THE GREAT REDWOOD TRAIL

MASTER PLAN

APRIL 2024 DRAFT

Coastal Conservancy

Frog Woman Rock Tunnel

Letter from State Senator Mike McGuire

We live in a big part of California. Big trees. Big skies. Big waves. And big dreams.

This is what the Great Redwood Trail is all about. Opening up the opportunity for every Californian to be outside, to experience one of the most beautiful places on earth - the North Coast.

The Great Redwood Trail (GRT) is being built over a largely abandoned rail line that stretches an astonishing 307 miles, from southern Marin County near the Golden Gate Bridge, to the rocky Pacific shores in Humboldt County.

For many years, the State of California has been fighting to ensure public access on this land, and now the project is quickly becoming the longest rail-trail in America. It is a once-in-a-lifetime opportunity that will be enjoyed for generations to come.

While walking the GRT, visitors and locals alike will experience the tallest trees on the planet, remote beaches, golden oak studded hills, mighty rivers home to the iconic salmon and lampreys, world famous vineyards, iconic cattle ranches and the most welcoming folks in the West.

But make no mistake, this trail is not just a place for beauty, exercise, and an opportunity to escape the stresses of life... it's far more than that. The Great Redwood Trail will be a truly transformational economic engine for the North Coast and give a huge boost to the numerous communities it runs through and that surround it.
The numbers on the next page only include the impact for the northern segment of the Trail in Mendocino, Trinity, and Humboldt counties.

Outdoor recreation is one of the fastest growing sectors of the Golden State's economy.

It generates over
$90 billion dollars

and is responsible for nearly
700,000 jobs *with over*
$30 billion in wages

and brings over
$6 billion *in tax revenues back to state and local communities.*

Total annual benefits from the Great Redwood Trail:

$102,568,000

Total daily retail revenue from the Great Redwood Trail:
$169,021

Total new walking/hiking trips per year:
5.3 to 7.9 million

The southern portion of the Great Redwood Trail, in Marin and Sonoma counties, is being built by the SMART Train and will have significant additional economic benefits for the entire region.

It has been a long journey, preparing for the launch of this draft Master Plan. The Great Redwood Trail Agency has hosted numerous community and kitchen table meetings seeking feedback from thousands of neighbors who live near and around this remarkable trail. We are grateful to all of those who provided comments and participated in the meetings. We promise there's more to come.

And we're here today thanks to our extraordinary local and state partners and advocates. We're grateful to the support of Governors Jerry Brown and Gavin Newsom, the State Legislature, and the outstanding work of the State Coastal Conservancy and the Great Redwood Trail Agency.

Hundreds of dedicated folks have been making a difference and moving this project forward and we are truly thankful. We are committed to doing this project right, not fast, and we know the best is yet to come with the Great Redwood Trail. Together, we're going to get the job done!

Mike McGuire,
Senate President pro Tempore

Acknowledgments

The Great Redwood Trail Agency would like to thank the hundreds of community members who helped shape this Master Plan for the Great Redwood Trail. Whether by completing a survey, attending an online or in-person meeting, visiting us at a community event, or contacting us via letter, email, or phone, we appreciate the time and energy you spent to add your voice to the process. We look forward to continuing to collaborate with you to implement this plan.

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Great Redwood Trail Vision

The Great Redwood Trail (GRT) will be a world-class regional rail-trail system that connects remote places in northern California with the bustling San Francisco Bay Area and Humboldt Bay communities. The GRT will offer unique, memorable trail experiences for people who live nearby or visit from far away. The GRT will generate new trail-oriented development and economic opportunities. The trail will be designed and managed to enhance the surrounding natural environment, respect neighboring properties, and offer safe and equitable access for a wide range of users, including hikers, equestrians, cyclists, runners, wheelchair users, and others. The Great Redwood Trail Agency (GRTA) and State Coastal Conservancy (SCC) also acknowledge the harmful legacy created by colonization and the railroad industry in this region. GRTA and its partners aim to support California Native American tribes by uplifting tribal connections and relationships to the land through meaningful consultations with tribal governments and engagement with tribal communities. GRTA and SCC will work collaboratively with California Native American tribes, residents, landowners, businesses, community-based organizations, and government partners to co-create and oversee this incredible trail network.

Guiding Values

Through thoughtful planning and partnerships, the GRTA intends the Great Redwood Trail to be:

Memorable.
The GRT will create unforgettable memories by connecting people to scenic landscapes, offering a wide variety of trail experiences and amenities, and telling the story of the people and natural resources that shape the region.

Respectful.
The GRT will be a good neighbor and work to maintain respectful relationships with California Native American tribes, adjacent landowners, and the local communities the trail connects.

Inclusive.
In the course of developing the GRT, the GRTA wishes to collaborate with all interested and affected members of the public, whatever their background, opinions, ideas, and lifestyle. Through partnership and collaboration, the GRT should reflect each unique community it travels through.

Responsible.
The GRT will minimize safety risks for trail users through proper trail design, maintenance, education, patrol, and enforcement. Policies and procedures will be established to respond to emergencies.

Enduring.
The GRT will protect and enhance the surrounding natural environment. It will seek opportunities to restore fish passage and enhance existing wildlife corridors. It will promote “Leave No Trace” practices to educate visitors on how to minimize their impact on the land and create a lifelong ethic of environmental stewardship.

Figure 1: *Existing, Planned, and Proposed Segments*

Historic Rail Bridge over Outlet Creek

Master Plan Purpose

The GRT Master Plan is a high-level roadmap for planning, constructing, and managing the Great Redwood Trail in Mendocino, Trinity, and Humboldt counties. The Master Plan is informed by a robust Community Engagement Plan that includes ongoing conversations with California Native American tribes and community stakeholders about their desires, concerns, and ideas to develop the trail.

The Master Plan provides guidelines for trail design to create safe and memorable recreational experiences. It identifies opportunities and constraints to building the trail, presents ideas for trail amenities, and highlights restoration of fish and wildlife habitat. The Master Plan provides policy recommendations for the Great Redwood Trail Agency, so it can govern, operate, and maintain the trail effectively. Recognizing the whole trail could take decades to complete, the Master Plan prioritizes certain segments for near-term investment. These Master Plan recommendations are a starting point to envision a successful Great Redwood Trail, which will evolve through deeper partnerships and discussions with California Native American tribes, government agencies, non-profit organizations, neighboring landowners, and trail users.

How will the Great Redwood Trail benefit you?

Local Residents and Business Owners

Locals and visitors alike will enjoy a world-class recreational experience that offers something to many different types of users (hikers, bikers, equestrians, rafting, and more). The completed trail is estimated to attract between 6.2 to 9.2 million trips annually and generate **$102,568,000 in benefits per yea** . One-third of the trips are anticipated to be from visitors, which presents significant economic opportunity for local businesses and the region as a whole. Each daily trip taken by groups of out-of-town trail visitors on the Great Redwood Trail is expected to generate the following revenue: $64 for meals purchased at area restaurants, $60 in spending at retail stores, $52 for bicycle and equipment rentals, and $93 for lodging. *See Appendix A: Economic Benefits Assessment* to learn more about the economic, health, transportation, and tax revenue estimated benefits. Local residents will also benefit from new employment opportunities to plan, construct, maintain, and patrol the trail. Additionally, the trail could provide access for vegetation management and forest firefighting in remote locations.

Existing Annie & Mary Trail in Blue Lake

Tribes and Tribal Communities

California Native American community members have voiced concerns that the Great Redwood Trail could continue the harmful legacy created by colonization and the railroad, which have negatively impacted the environment and cultural resources. The GRT rail right-of-way passes through many tribal ancestral lands and the railroad was part of California's history of tribal genocide, forced relocation, and cultural erasure. California Native American community members have also shared ideas for how the Great Redwood Trail could increase tribal access to their ancestral lands and respectfully celebrate Native American cultures, languages, and histories. By collaborating early and often with local tribes, the Great Redwood Trail Agency can work towards protecting cultural resources, culturally significant plants, and fish and wildlife habitat. The Great Redwood Trail Agency will seek opportunities to co-manage trail sections with interested California Native American tribal partners to help steward the land and generate employment for California Native Americans. To read more about how the Great Redwood Trail will work closely with tribes to address their concerns and needs, identify partnership opportunities, and closely collaborate, *see Chapter 2: Tribal & Community Engagement and "Table 3: GRT Master Plan recommendations that seek to address input from California Native American tribes" on page 51*.

Environment and Ecology

Trail development creates opportunities for environmental restoration along key waterways and their tributaries, with the goal of restoring fish habitat and improving water quality. Environmental restoration may also include removal of collapsed rail infrastructure, depot structures, and failed tunnel portals; rail cars, cranes, and excavators; switches, communication poles and lines; grease boxes and other hazardous materials; and failed culverts and other metal debris.

Tribal & Community Voices

Tribal and community input was sought throughout the development of the Great Redwood Trail Master Plan process. The project team engaged California Native American tribes and the public, listening to their concerns about the trail and their ideas on ways the trail could serve different communities. Recognizing that these conversations are just the start of ongoing tribal and community involvement and collaboration, the project team met with California Native American tribes and tribal community members via informal discussions and also offered government-to-government consultations, hosted in-person and virtual community workshops, and connected with the public through newsletters and interactive digital surveys.

The team also met with business owners, ranchers, farm bureaus, rural economic development organizations, tourism and visitor bureaus, vineyard owners, homeless service providers, law enforcement, first responders, trail users, environmental advocates, youth-focused non-profits, and local, state, and federal agencies.

Tribal and community collaboration and input guided the project team to develop a Master Plan that prioritizes the needs of diverse trail users and stakeholders, helping to inform the project goals, trail elements, and amenities, access point opportunities, policy considerations, and next steps. Additional and ongoing engagement with Tribes and tribal members, adjacent landowners, and the broader community will continue to be essential to future trail design phases, construction, and operations. See *Chapter 2: Tribal & Community Engagement* to read about the Master Plan engagement process and a summary of public input to-date.

Participants gather outside to learn more about the GRT Master Plan at a workshop in Alderpoint.

Project team staff set up a booth at the Blackberry Festival in Covelo to share project information.

The project team shared information about the GRT Master Plan at Coyote Valley Big Time.

By The Numbers

The team connected with residents and stakeholders along the GRT corridor in many ways: through regional GRT Master Plan tribal and community outreach and engagement events, tabling at existing community events, targeted tribal and stakeholder meetings, surveys, and web-based input tools. In total, there were:

22 *tribal meetings and events*

4 *in-person workshops*

371 *total attendees*

2 *online workshops*

23 *community events attended/tabled at, including tribal events*

653 *subscribers to the GRT Master Plan mailing list*

153 *unique comments* & **329** *votes on comments* *on the GRT Master Plan web map*

Over **70** *stakeholder meetings*

767 *surveys completed*

Abandoned train car near Scotia

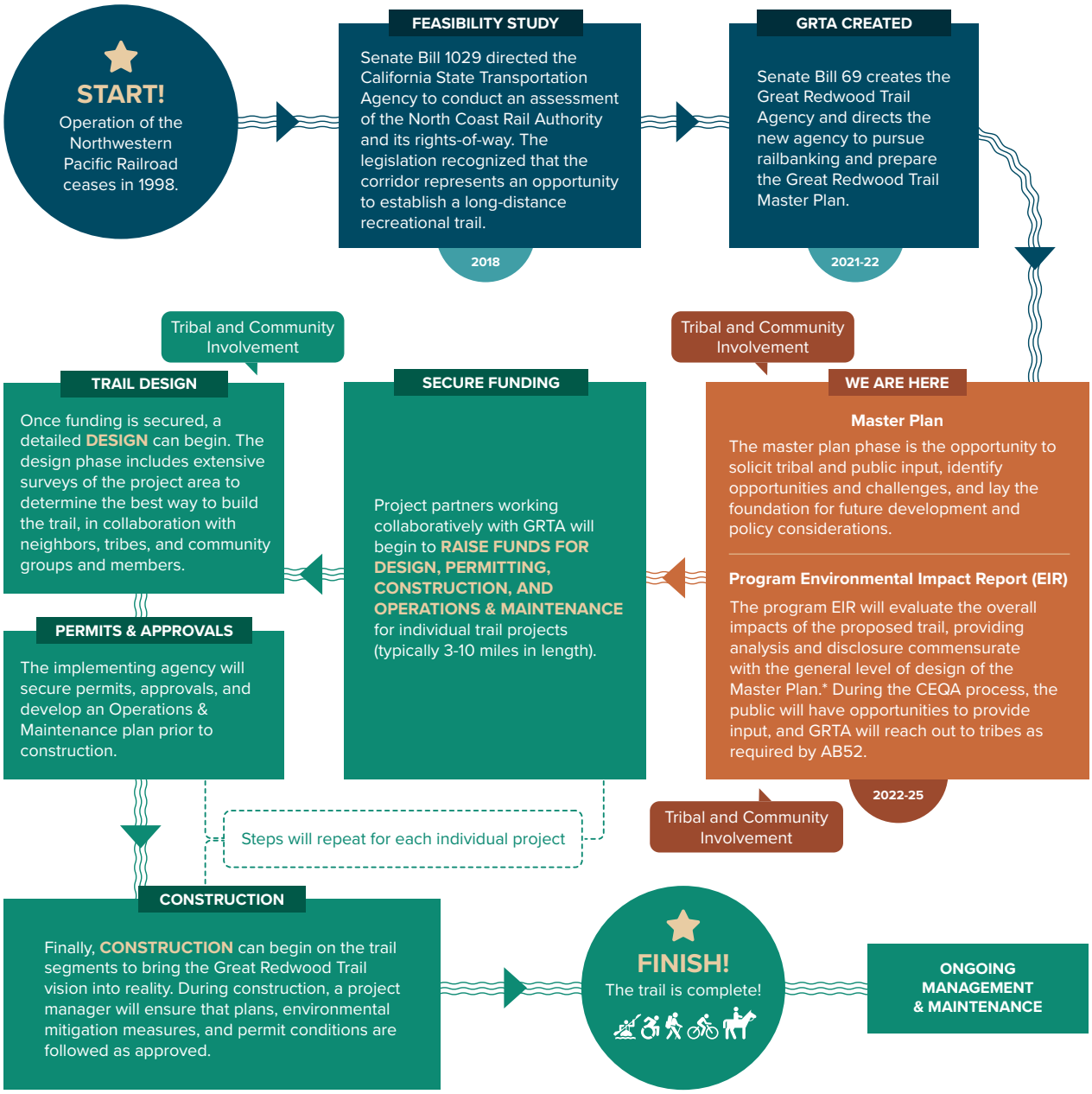
Opportunities & Challenges

The GRT corridor travels through scenic landscapes, including old-growth redwood forests, oak woodlands, vineyards, and the dramatic Eel River Canyon. Given its history of operation as a railroad, the GRT corridor has gentle grades across its entire length through rugged and mountainous topography. It passes through urban areas with complex public and private land ownership, as well as expansive rural and backcountry areas adjacent to nonprofit conservation lands and privately-owned agricultural, rangelands, and timberlands. Sections of the GRT in Ukiah, Eureka, Arcata, and Blue Lake exist already, and others are in the planning stages.

While much of the historic rail right-of-way provides a great opportunity for the trail, the trail also faces many challenges. The corridor has experienced over 250 documented landslides, causing retaining walls to fail, culverts to wash out, and tracks to be buried. Of the 30 tunnels along the corridor, eight are partially collapsed, and five are fully collapsed. There are 84 bridges and trestles in the GRTA right-of-way, but only 51 appear to be in good condition. The GRTA has also inherited abandoned railroad equipment, train cars, and potentially hazardous materials at old railroad stations. The trail route passes through ancestral tribal lands and in areas with sensitive cultural and natural resources that require close collaboration with California Native American tribes for protection and stewardship. Trail users will need to stay on the designated trail not only to protect cultural and natural resources, but because it is adjacent to private property for most of its length. The Master Plan documents these opportunities and challenges in Chapter 3: Existing Conditions and proposes possible solutions for the GRTA and its partners in Chapter 4: Trail Design & Use and Chapter 5: Trail Operations & Management.

What's Next?

The Master Plan sets the stage for coordinated efforts to plan and construct priority segments in the near term. The GRTA and local partners will seek funding for planning, design, permitting, and construction of segments, while developing long-term funding streams and staffing for ongoing operations and maintenance. Continued engagement with California Native American tribes, adjacent landowners, community members, law enforcement, first responders, and agency partners will be essential to realizing the Great Redwood Trail vision and goals. Overcoming the complex and costly infrastructure challenges will take time and sustained effort, but the economic, environmental, health and social benefits will grow with each new mile built and segment completed.



*After certification of the program EIR, responsible agencies may evaluate each individual project to determine whether the future project is consistent with the analysis in the program EIR. If the responsible agency finds that the impacts were within the scope of the program EIR and no new or substantially more severe significant effects could occur or no new mitigation measures would be required, the project can be found to be within the scope of the program EIR and no additional analysis would be needed. This would be determined and documented in a tailored, checklist-based review of the subsequent project. If a subsequent project is not within the scope of program EIR, then the responsible agency would need to prepare additional environmental documentation for CEQA compliance.

Where to Start?

Prioritization provides an organized framework for building out the Great Redwood Trail, by identifying high-value and low-constraint trail segments that could be built in the shorter term, as well as more challenging segments that could be built over a longer timeframe. Prioritization criteria were organized by the key factors that drive trail development: Impact, Feasibility, and Project Readiness.

For purposes of prioritization, the corridor was divided into 40 segments and scored based on the criteria listed above. The segments were then divided into priority tiers:

- **Tier 1** segments are generally high-impact and high-feasibility. These segments have existing momentum and provide strategic value to local agency partners.
- **Tier 2** segments are typically high-impact or high feasibility, but often not both. They tend to be located on the periphery of population centers or between Tier 1 segments.
- **Tier 3** segments are generally lower-impact and lower-feasibility.

These rankings are a snapshot of current conditions and are intended to be flexible over time. As Tier 2 or 3 segments develop local agency partner momentum, funding, tribal support, or community support, they could become Tier 1. The map on the following page displays the results of the prioritization process.

Table 1: *Overview of Prioritization Criteria*

CATEGORY	CRITERIA
Benefits Will the segment provide immediate positive impact to trail users and the environment?	Access
	Demand
	Continuity
	Ecological Restoration Opportunities
Feasibility Is the segment readily constructible with few major barriers?	Feasibility - Structures
	Feasibility - Natural Features
	Planning Status
	Railbanking Status
Project Readiness Is there community support and willing trail partners?	Community Support
	Willing Trail Partners
	Strategic Value

Figure 2: *Map of Segment Prioritization*

Glossary

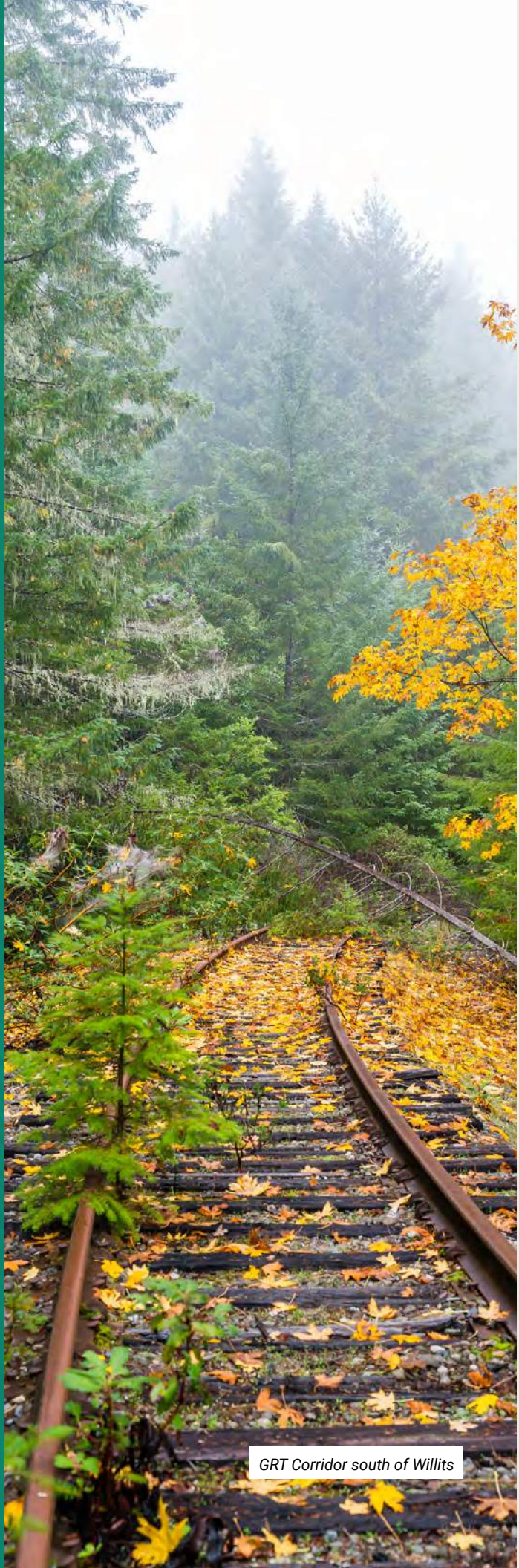
GRT Corridor south of Willits

Acronyms

ADA: The Americans with Disabilities Act (ADA) prohibits discrimination against people with disabilities in several areas, including employment, transportation, public accommodations, communications and access to state and local government' programs and services.

GRT: The Great Redwood Trail (GRT) is a 307-mile, world-class, multi-use rail-to-trail project connecting California's San Francisco and Humboldt Bays. The legacy trail will travel through some of the wildest and most scenic landscapes in the United States, traversing old growth redwood forests, running alongside oak woodlands and vineyards, and winding through the magnificent Eel River Canyon.

O&M: Operations and Maintenance of the trail, including identifying and securing long-term operational, maintenance, and enhancement funds; setting and implementing policies and procedures (including safety and emergency response); hiring, training, and managing paid professional staff; overseeing that maintenance activities are meeting expectations; managing uses and user conflicts; planning for the trail into the future; and engaging in outreach and public relations, including volunteer coordination.



GRT Corridor south of Willits

Agencies

CALFIRE: The California Department of Forestry and Fire Protection (CALFIRE) is the fire department of the California Natural Resources Agency in California. It is responsible for fire protection in various areas under state responsibility totaling 31 million acres, as well as the administration of the state's private and public forests. In addition, the department provides varied emergency services in 36 of the state's 58 counties via contracts with local governments.

BLM: The Bureau of Land Management is an agency within the United States Department of the Interior responsible for managing outdoor recreation, livestock grazing, mineral development, and energy production on 245 million acres of public lands and 700 million acres of mineral estate. Their mission is to sustain the health, diversity, and productivity of public lands for the use and enjoyment of present and future generations.

Caltrans: The California Department of Transportation (Caltrans) is an executive department of the state of California. The department is part of the cabinet-level California State Transportation Agency (CalSTA). Caltrans manages the state's highway system, which includes the California Freeway and Expressway System, supports public transportation systems throughout the state and provides funding and oversight for Amtrak California.

California State Parks: The California Department of Parks and Recreation, more commonly known as California State Parks, manages the California state parks system. The system administers 279 separate park units on 1.4 million acres, with over 280 miles of coastline; 625 miles of lake and river frontage; nearly 15,000 campsites; and 3,000 miles of hiking, biking, and equestrian trails.

GRTA: The Great Redwood Trail Agency (GRTA) is a local agency established by the Great Redwood Trail Agency Act, Government Code § 93000 et seq., to develop and manage the Great Redwood Trail and discharge the duties of a rail common carrier before the Surface Transportation Board. The GRTA replaced the North Coast Railroad Authority (NCRA) in 2021. The GRTA's service area is the former NCRA rail corridor in Mendocino, Trinity, and Humboldt counties. The rail corridor in Sonoma and Marin counties was transferred to Sonoma – Marin Area Rail Transit (SMART), who will be responsible for rail-with-trail development for the Southern Segment of the Great Redwood Trail.

NPS: The National Park Service (NPS) is an agency of the United States federal government, within the U.S. Department of the Interior. The Service manages all national parks; most national monuments; and other natural, historical, and recreational properties, with various title designations.

SCC: The Coastal Conservancy is a state agency, established in 1976, to protect and improve natural lands and waterways, to help people get to and enjoy the outdoors, and to sustain local economies along California's coast. The Coastal Conservancy is a non-regulatory agency that supports projects to protect coastal resources and increase opportunities for the public to enjoy the coast.

SMART: Sonoma-Marin Area Rail Transit (SMART) is the North Bay's passenger rail service providing a safe, reliable, and congestion-free transportation option for Marin and Sonoma counties. The current 45-mile system includes stations in the Sonoma County Airport area, Santa Rosa, Rohnert Park, Cotati, Petaluma, Novato, San Rafael, and Larkspur. SMART's system also includes a bicycle and pedestrian pathway along the rail corridor. The SMART Pathway will serve as the southern segment of the GRT when fully built. Future extensions are planned for Windsor, Healdsburg, and Cloverdale. The full project will provide 70 miles of passenger rail service, connecting SMART passengers with jobs, education centers, retail hubs, and housing along the Sonoma-Marin corridor, and a bicycle-pedestrian pathway.

Project Specific Terms

Backcountry Trail: A 2ft- to 6ft-wide trail constructed of gravel or bare earth material found on-site. This trail type is best suited for rural or wilderness areas with lower demand, frequent landslides, or highly constrained environments such as the Eel River Canyon.

Bridge: A generic description for a structure that carries transportation infrastructure over an obstacle, such as a river, without blocking the way underneath.

Culvert: A drainage structure to convey water below the surface of a road, railroad, or trail. Culvert pipes are typically made out of plastic, metal or reinforced concrete.

Encroachment: Entry or use of GRTA's property without right or permission.

Land Trust/Land Conservancy: A land trust or land conservancy is a community-based, nonprofit organization that actively works to permanently conserve land. In some cases, land trusts acquire land outright. They also partner to conserve land that remains the property of willing landowners using a tool called a conservation easement. Land trusts also manage or restore land once it has been conserved.

Railbanking: Railbanking is the process by which unprofitable or unused rail corridors can be converted to trails for recreational or transportation purposes. Railbanking allows railroad owners to preserve established rail lines by transferring them, through sale, donation, or lease, to a qualified public or private entity to manage the right-of-way (ROW) as an interim trail. This entity becomes legally and financially responsible for managing the rail corridor ROW. The corridor can be used as a trail until the need for rail service resumes, at which point the ROW can be converted to, or shared with, active rail.

Rail-Trail: Trails created from inactive, former railroad corridors.

Rail-with-Trail: Trails adjacent to or within an active railroad corridor.

Right-of-Way (ROW): Legal right to travel on or cross property owned by another. In the Master Plan, ROW typically refers to the public lands controlled by the Great Redwood Trail Agency.

Trailhead: A trailhead is a designated public access point to a trail, often—but not always—located at its terminus points. The trailhead is typically a place where users begin or end their journeys and where they get oriented to the trail or trail network.

Trail Town: A community through which a trail passes that supports trail users with services, promotes the trail to its citizens and embraces the trail as a resource to be protected and celebrated.

Trestle: A series of short spans supported by bents or piles and can vary greatly in both length and height, from small bridges over streams to long, low structures stepping across wide bodies of water to massive frameworks crossing deep valleys.

Universal Design: A trail with universal design goes beyond baseline accessibility standards to create facilities and experiences that are usable by all people, to the greatest extent possible, without the need for adaptation or specialized accommodations.

Wayfinding: A wayfinding system is an informational system that helps people orient themselves and navigate from place to place. Along the trail, wayfinding will take the form of signage, maps, or environmental graphics.

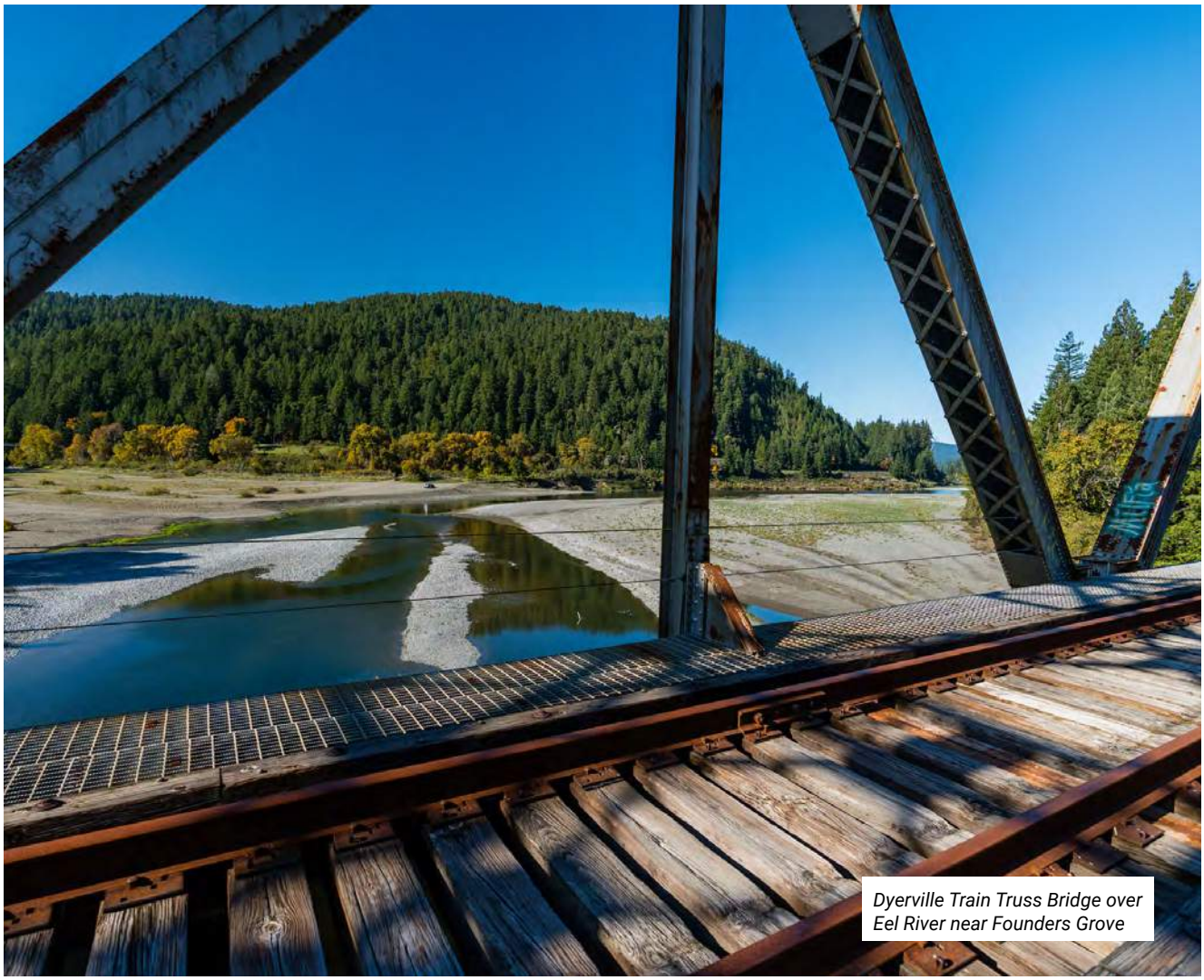
01 Introduction

GRT Corridor along the Eel River near Hwy 162

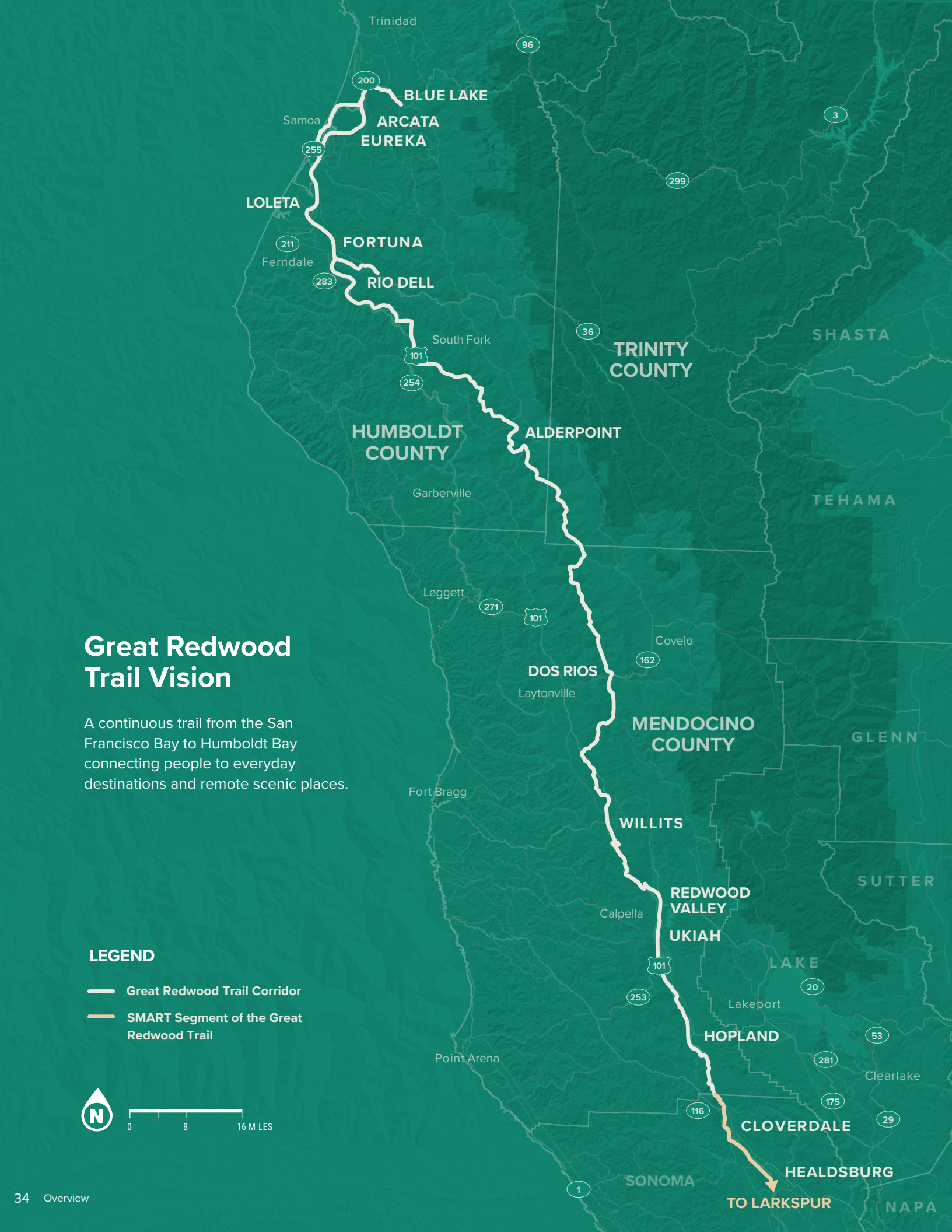
OVERVIEW

The Great Redwood Trail (GRT) is a 307-mile, world-class, multi-use trail project connecting California's San Francisco and Humboldt Bays on former North Coast Railroad Authority (NCRA) right-of-way. The right-of-way travels through ancestral and current tribal lands, rural areas, towns and urban centers. The legacy rail-trail will travel through some of the most scenic landscapes in the United States, traversing old-growth redwood forests, running alongside oak woodlands and vineyards, and winding through the magnificent Eel River Canyon.

As the right-of-way was formerly used for rail purposes, it consists of a gentle grade with railroad tracks, passes over many rail bridges and trestles, and through tunnels, some of which have collapsed. Much of the rail line is in good condition for conversion to trail, but in some areas, erosive geology and deferred maintenance create challenges that will need to be addressed through careful planning. When completed, the GRT will be the longest rail trail in the nation, providing a continuous regional corridor for walking, rolling, bicycling, and equestrian use, as well as key connections to local and regional destinations.



Dyerville Train Truss Bridge over Eel River near Founders Grove



Great Redwood Trail Vision

A continuous trail from the San Francisco Bay to Humboldt Bay connecting people to everyday destinations and remote scenic places.

LEGEND

- **Great Redwood Trail Corridor**
- **SMART Segment of the Great Redwood Trail**

MASTER PLAN PURPOSE AND ELEMENTS

The GRT Master Plan is a high-level roadmap for planning, constructing, and managing segments of the Great Redwood Trail in Mendocino, Trinity, and Humboldt counties. The segments in Sonoma and Marin counties will be planned, constructed, and operated by Sonoma – Marin Area Rail Transit (SMART). The Master Plan is informed by a tribal and community engagement process that captures desires, concerns, and ideas to develop the trail. The Master Plan expands on information gathered in State Park's feasibility study (2020), which provided an initial assessment of the railroad infrastructure and the physical and environmental characteristics of the corridor. The Master Plan provides policy recommendations to the GRTA and local governments for how best to develop the trail and maintain it in the long term. Specific issues addressed by the Master Plan include, but are not limited to, guiding principles for the trail; status of trail development (drawing from the existing feasibility study); design principles, signage and branding; trail user experience; cultural resources protection; trail route; project opportunities and concept designs; and future project selection and priorities.

Finally, the Master Plan provides recommendations for how the right-of-way can be used to promote environmental benefits such as fish habitat restoration along the Eel River. The development of the original rail line was done without much attention to its impact on fish populations. Stream crossings were built that blocked fish passage and sections of the rail line also created additional erosion. There are many opportunities to partner with nonprofit organizations, the California Department of Fish and Wildlife, and NOAA Fisheries, to identify and support restoration opportunities along the corridor.

The GRT Master Plan includes the following chapters and appendices:

Chapter 1: Introduction – Provides an overview of the GRT Master Plan, including its vision and goals, as well as the history of the corridor.

Chapter 2: Tribal & Community Engagement – Summarizes collaboration and input from tribal, stakeholder, community-based organization, and general public engagement, and points out where in the Master Plan key concerns are addressed.

Chapter 3: Existing Conditions – Describes the existing conditions of the GRT corridor including the physical conditions, existing and planned trails, and the land use and regulatory contexts.

Chapter 4: Trail Use & Design – Provides information on trail use and design, including trail experience and a trail design guide, and trail-oriented development, including trail facilities and amenities.

Chapter 5: Trail Operations & Management – Provides guidance regarding the governance, operations, and maintenance of the GRT to ensure the GRT segments are well-maintained and operated.

Chapter 6: Project Prioritization – Provides an organized framework for building out the GRT, including an overview of the prioritization process and criteria, and a list of prioritized trail segments.

Chapter 7: Implementation Strategy – Provides guidance on the GRT permitting process and requirements; available funding sources; and short-, near-, and long-term project phasing.

Appendices – Provides more details on various Master Plan elements, including but not limited to previous plans, economic benefits, trail design guidelines, branding guidelines, wayfinding, and community engagement.

VISION, INTENDED BENEFITS, AND GUIDING VALUES

Vision

The Great Redwood Trail will serve as a world-class regional rail-trail system that connects wild places in northern California with the bustling San Francisco Bay Area and Humboldt Bay communities. The GRT will offer unique, memorable trail experiences for people who live nearby or visit from far away. The GRT will generate new trail-oriented development and economic opportunities for local businesses. The trail will be designed and managed to enhance the surrounding natural environment, respect neighboring properties, and offer safe and equitable access for a wide range of users, including hikers, equestrians, cyclists, runners, wheelchair users and others. The Great Redwood Trail Agency will work collaboratively with California Native American tribes, residents, landowners, businesses, community-based organizations, and government partners to solve problems and oversee this world-class trail network.

Intended Benefits

The Great Redwood Trail will be planned, designed, and constructed to create multiple and overlapping community benefits, including:

- Creating a world-class recreational experience that accommodates many different users (hikers, bikers, equestrians, rafting, and more)
- Providing access to State Parks
- Expanding fire resilience and vegetation management access
- Protecting and restoring cultural resources
- Protecting known sensitive plant and animal species
- Restoring habitat for wildlife and increasing native landscaping
- Watershed Improvement/Restoration
- Creating economic development opportunities (trail amenities and accommodations)
- Expanding green infrastructure and sustainable transportation
- Cleaning up hazardous materials

A young family enjoying a walk on the Great Redwood Trail in Ukiah, Mendocino County.

Guiding Values

Through thoughtful planning and partnerships, the GRTA intends the Great Redwood Trail to be:

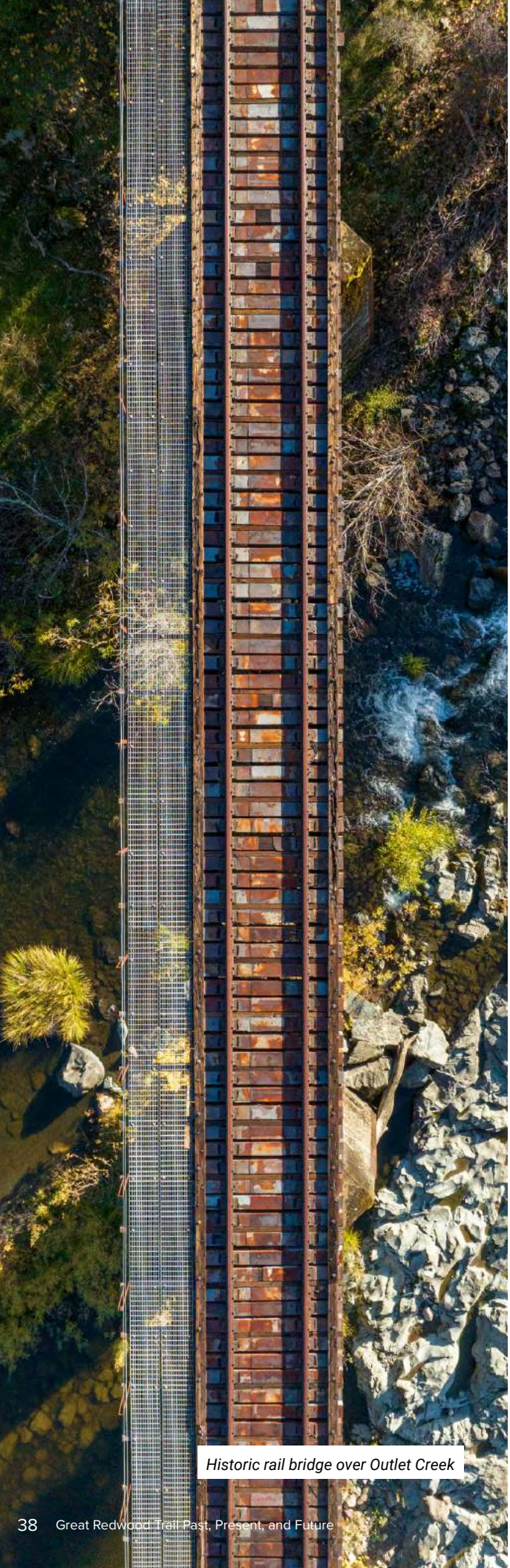
Memorable.
The GRT will create unforgettable memories by connecting people to scenic landscapes, offering a wide variety of trail experiences and amenities, and telling the story of the people and natural resources that shape the region.

Respectful.
The GRT will be a good neighbor and work to maintain respectful relationships with California Native American tribes, adjacent landowners, and the local communities the trail connects.

Inclusive.
In the course of developing the GRT, the GRTA wishes to collaborate with all interested and affected members of the public, whatever their background, opinions, ideas, and lifestyle. Through partnership and collaboration, the GRT should reflect each unique community it travels through.

Responsible.
The GRT will minimize safety risks for trail users through proper trail design, maintenance, education, patrol, and enforcement. Policies and procedures will be established to respond to emergencies.

Enduring.
The GRT will protect and enhance the surrounding natural environment. It will seek opportunities to restore fish passage and enhance existing wildlife corridors. It will promote “Leave No Trace” practices to educate visitors on how to minimize their impact on the land and create a lifelong ethic of environmental stewardship.



Historic rail bridge over Outlet Creek

GREAT REDWOOD TRAIL PAST, PRESENT, AND FUTURE

19th and 20th Centuries

The GRT rail right-of-way passes through many tribal ancestral lands and the railroad was part of California's history of tribal genocide, forced relocation, and cultural erasure. The right-of-way dates to the late 1800s, when the Northwestern Pacific Railroad constructed the line to carry passengers and redwood logs between Humboldt Bay and San Francisco. Over the ensuing decades, the line changed hands several times, and by the 1980s the operators were struggling and in bankruptcy.

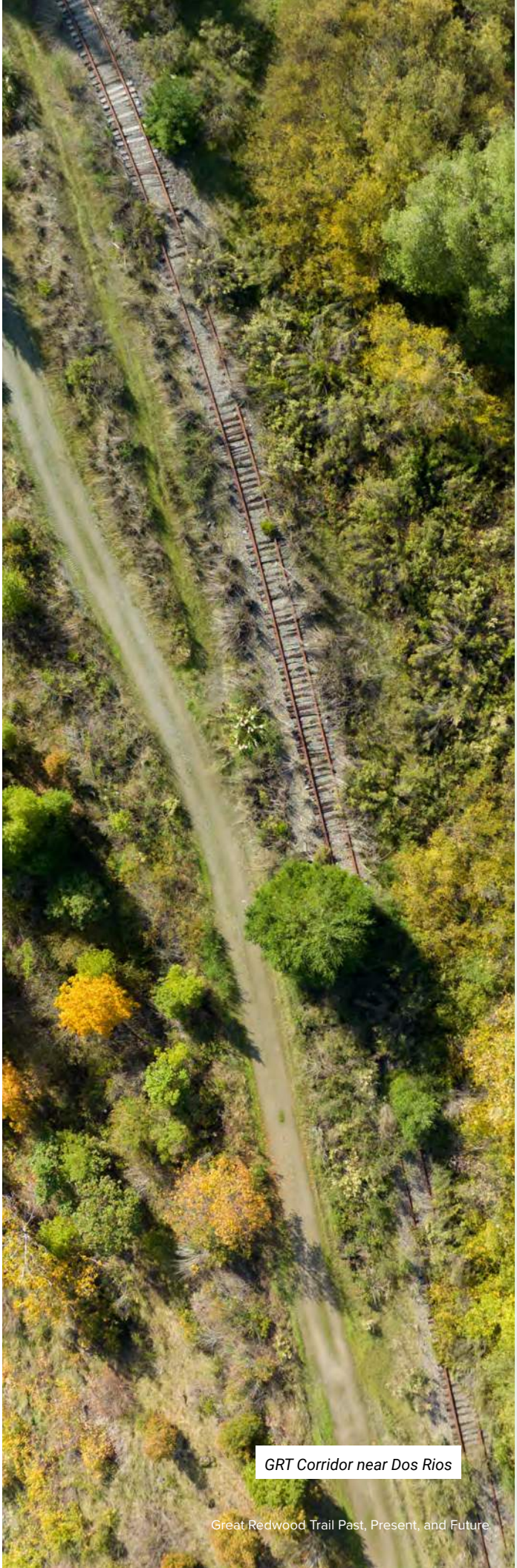
To preserve the rail corridor, the State of California created the North Coast Railroad Authority (NCRA) in 1989, with the intent of ensuring continued rail service in Northwestern California. Over the next few years, the NCRA purchased the railroad line from Healdsburg in Sonoma County north to Humboldt Bay, and a joint powers authority, the Northwestern Pacific Railroad Authority, purchased the right-of-way from Healdsburg south to Schellville in Sonoma County and east to Lombard near the Napa River. However, a consistent source of state funds was not provided for investment in infrastructure. Deferred maintenance, combined with the unforgiving geology in the Eel River Canyon, led to substantial failures along portions of the line.

In 1998, the Federal Railroad Administration ordered the entire line closed due to safety concerns. Though the southern portion of the line from Windsor in Sonoma County to Lombard was eventually repaired and reopened for freight service in 2011, no funds were available for the costly repairs in the Eel River canyon and no trains have operated north of Windsor since 1998. In all, $124 million of state and federal funds were invested in the line between 1990 and 2011 to support freight service, including the costs of purchasing the line, emergency repairs and maintenance, litigation, debt service, environmental remediation, and other expenses. Despite this investment, without ongoing state funding subsidies or a reliable revenue source, the NCRA fell deeply into debt.

Great Redwood Trail Project Background

As hopes of restoring rail service diminished, support for developing a rail trail project increased. In 2018, legislation introduced by Senator McGuire and signed by Governor Brown (Senate Bill 1029–the NCRA Closure and Transitions to Trails Act) declared that "the North Coast Rail Authority's railroad tracks, rights-of-way (ROW), and other properties provide an opportunity to create a Great Redwood Trail for hiking, biking, and riding, that may be in the public and economic best interests of the north coast." The legislation sought to assess the feasibility of turning the 307-mile historic corridor into a long-distance recreational trail to be known as the Great Redwood Trail.

With SB 1029, the Legislature called for the preparation of a feasibility study for the Great Redwood Trail. Subsequently, California State Parks, working under contract from the California State Transportation Agency (CalSTA), prepared a GRT Feasibility Assessment that was contained in the GRT Feasibility, Governance, and Railbanking Report (2020). The report provided the Legislature with an in-depth look at the railroad infrastructure, as well as the physical and environmental characteristics of the corridor. The feasibility study found that, overall, developing the GRT would be challenging and costly but much of the line is in good condition for conversion to trail uses. In fact, segments of the trail have already been built along the rail corridor–such as portions along Humboldt Bay as part of the Humboldt Bay Trail/Coastal Trail, and other segments in Ukiah and Healdsburg. Other portions will be more challenging, particularly the trail alignment through the spectacular wild and scenic Eel River Canyon, due to erosive geology and some failing infrastructure, including tunnels, bridges, and trestles.



GRT Corridor near Dos Rios

After considering the report and reviewing the opportunities and challenges afforded by the rail right-of-way, the Legislature decided to move forward with the creation of the GRT. Senator McGuire introduced Senate Bill 69 ("The Great Redwood Trail Act") signed by Governor Newsom in 2021, which provides the framework needed to develop the trail. First, the right-of-way was divided on the Mendocino/Sonoma County line. South of Mendocino County, the rail right-of-way was transferred to Sonoma-Marin Area Rail Transit (SMART), which will lead the development of the GRT for Marin and Sonoma counties as a rail with trail system. Second, to manage and develop the northern section of the trail, SB 69 directed NCRA to commence efforts to railbank portions of the rail line to preserve the right-of-way and enable the development of the trail and established the Great Redwood Trail Agency (GRTA) as the successor agency to the NCRA.

The GRTA formally succeeded the NCRA on March 1, 2022. The GRTA now holds the rail right-of-way for the approximately 252-mile section from the Sonoma/Mendocino County line to its terminus in Arcata/Blue Lake. In converting the NCRA to the GRTA, the focus of ownership has changed from an agency whose primary mission was to ensure rail service to an agency that is now charged with developing the rail corridor into a world-class trail.

SB 69 directs the GRTA to:

1. Inventory any parcel, easement, or contract related to its rail rights-of-way;
2. Complete an environmental assessment of the conditions of its rail rights-of-way for purposes of trail development;
3. Plan, design, construct, operate, and maintain a trail in, or next to, the rail rights-of-way;
4. Conduct a robust community engagement process; and
5. Pursue a federal railbanking process for the rail rights-of-way.

Moreover, SB 69 also called for the GRTA to contract with the State Coastal Conservancy (SCC) to provide interim staffing and, to support this effort, the Legislature appropriated $10.3 million to the SCC in the FY 2021/22 budget. To meet SB 69's requirements, SCC staff entered a Joint Powers Agreement (JPA) with GRTA, allowing the two agencies to work together to exercise common powers and achieve shared goals—in this case, development of the Great Redwood Trail. The JPA provided the structure that enables the SCC to assist the GRTA, as intended by the Legislature, by conducting extensive public outreach, developing this GRT Master Plan, and providing interim staffing to the GRTA.

Young bicyclists enjoying the Annie & Mary Trail (a portion of the Great Redwood Trail) in Blue Lake, Humboldt County. Photo courtesy of the Friends of the Annie & Mary Trail.

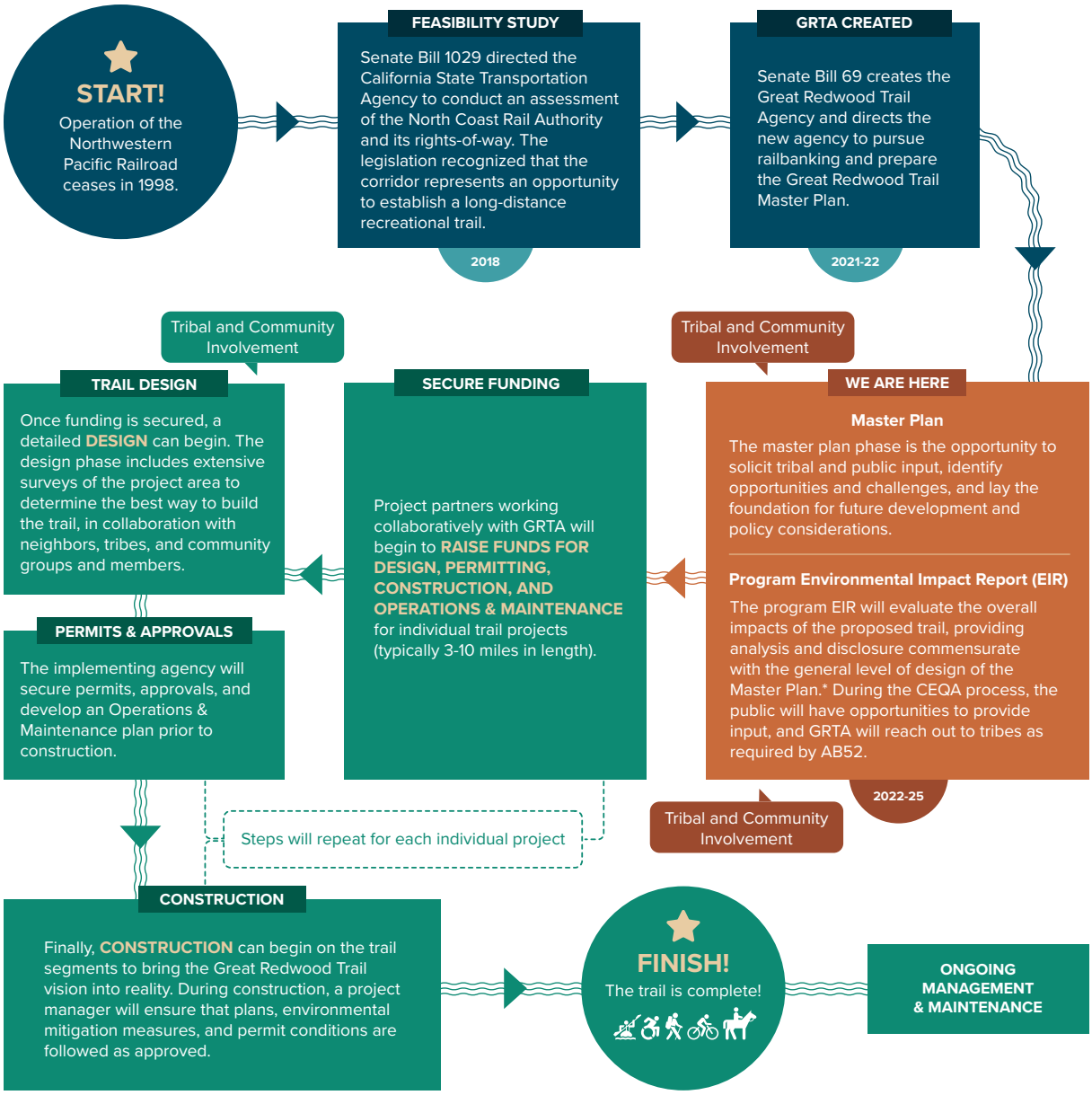
Existing Plans & GRT Work to Date

The GRT Master Plan builds on decades of work as described above. It expands on the aforementioned CalSTA and State Parks Feasibility, Governance, and Railbanking Report (2020), which evaluated the feasibility of repurposing NCRA's right-of-way into the GRT and provided an initial assessment of the existing conditions of the corridor. Additionally, it continues work by numerous jurisdictions who have already designed and built segments of the GRT corridor covered by this Master Plan, including the Ukiah Rail Trail, Humboldt Bay Trail, Annie and Mary Trail, and Willits Rail Trail (see Chapter 3 for more details). Moreover, there are 30.7 miles of completed segments in Sonoma and Marin counties to the south, plus an additional 41.5 miles to be planned and completed by SMART.

Nearly two miles of the Great Redwood Trail are complete and open to the public in Ukiah, Mendocino County.

What Happens Next?

The Master Plan sets the stage for coordinated efforts to advance priority segments in the near term with tribal and community involvement throughout the process. The GRTA and local partners will seek funding to advance the design, permitting, and construction of segments, while developing long-term funding streams and staffing for ongoing operations and maintenance. Continued engagement with California Native American tribes, adjacent landowners, community members, law enforcement, first responders, and agency partners will be essential to realizing the Great Redwood Trail vision and goals. Overcoming complex and costly infrastructure challenges will take time and sustained effort, but the economic, environmental, health and social benefits will grow with each new mile built and segment completed.



*After certification of the program EIR, responsible agencies may evaluate each individual project to determine whether the future project is consistent with the analysis in the program EIR. If the responsible agency finds that the impacts were within the scope of the program EIR and no new or substantially more severe significant effects could occur or no new mitigation measures would be required, the project can be found to be within the scope of the program EIR and no additional analysis would be needed. This would be determined and documented in a tailored, checklist-based review of the subsequent project. If a subsequent project is not within the scope of program EIR, then the responsible agency would need to prepare additional environmental documentation for CEQA compliance.

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02

Tribal & Community Engagement

Community members participate in a GRT Workshop in Hopland.

ENGAGEMENT PROCESS

Tribal and community collaboration and input guided the project team to develop a Master Plan that prioritizes the needs of diverse trail users and stakeholders, helping to inform the project goals, trail elements, and amenities, access point opportunities, policy considerations, and next steps. Additional and ongoing engagement with California Native American tribes and tribal community members, adjacent landowners, and the broader community will continue to be essential to future trail design phases, construction, and operations.

Community members provide input at a workshop in Willits.

FALL 2022 – SPRING 2023

- Began engagement with California Native American tribal chairpersons, and Tribal Historic Preservation Officers (THPOs), tribal non-profits, tribal community members, associations, and the general public
- Developed and opened project website, survey, and interactive map tool
- Held interviews and focus group meetings with key stakeholder groups, such as elected officials, landowners, and advocates

SPRING – SUMMER 2023

- Ongoing tribal engagement, including follow-up to letters sent to California Native American tribal chairpersons and THPOs via email and phone calls
- Held the first round of in-person community workshops in Fortuna and Willits, and one online workshop
- Tabled at community events and held ongoing stakeholder meetings

FALL – WINTER 2023

- Ongoing tribal engagement, including in-person and zoom meetings with California Native American tribal chairpersons and THPOs, elders, and tribal community members
- Held second round of in-person community workshops in Alderpoint and Hopland, and one online workshop
- Tabled at community events and held ongoing stakeholder meetings

SPRING 2024

- Ongoing tribal engagement, including in-person and zoom meetings, phone calls, presentations, and other communications with California Native American tribal chairpersons and THPOs, elders, and tribal members.
- Public Draft of GRT Master Plan released
- Held third round of in-person community workshops in Eureka and Ukiah, and one online workshop

At community workshops, participants were able to visit stations and complete activities, including commenting on large-scale maps of the GRT corridor.

The engagement process focused on listening to diverse residents, future users, and stakeholders along the GRT corridor. To do this, the engagement process centered on partnerships with several community non-profits who work with diverse communities across the GRT region. The State Coastal Conservancy (SCC) contracted with the following community partners for the Plan:

- **North Coast Opportunities (NCO)**
- **Redwood Community Action Agency (RCAA)**
- **Jen Rice**
- **Rails-to-Trails Conservancy**
- **Zander Westbrook Design**

These partnerships are a part of a long-term process to build trust, improve communication and collaboration, and foster a common vocabulary and understanding across different communities, future users, and stakeholders along the GRT corridor.

By The Numbers

The team connected with residents and stakeholders along the GRT corridor in many ways: through regional GRT Master Plan tribal and community outreach and engagement events, tabling at existing community events, targeted stakeholder meetings, surveys, and web-based input tools. In total, there were:

371 *total attendees*

4 *in-person workshops*

2 *online workshops*

26 *tribal community and general public events attended*

Over **70** *stakeholder meetings*

767 *surveys completed*

653 *subscribers to the GRT Master Plan mailing list*

153 *unique comments* & **329** *votes on comments* *on the GRT Master Plan web map*

WHAT WE HEARD

This section summarizes key aspirations and concerns that the project team heard throughout the engagement process for the Master Plan. This engagement lays the groundwork for continued collaboration with tribal and community partners for future phases of trail design, implementation, and operations. The proposals included in this Plan were guided by tribal, community, and stakeholder input and collaboration. Description of specific engagement strategies used and input received are included in the remaining sections of this chapter.

Participants gather outside to learn more about the GRT Master Plan at a workshop in Alderpoint.

Table 2: *Key Themes and Solutions Proposed*

KEY THEMES WE HEARD	WHAT WE HAVE PROPOSED
GRT Economic Benefits and Community Integration—There are many opportunities for economic benefits and development along the trail corridor.	▶ The GRT will be a transformational economic engine. In total, the completed GRT and associated impacts are estimated to generate $102,568,000 in annual recreation/tourism/retail, health, and transportation benefits, as well as $5,490,000 in annual tax revenue increase (see Appendix A for a detailed GRT Economic Benefits Assessment). ▶ GRT Operations and Maintenance (Chapter 5) includes recommendations for supporting the creation of trail-related jobs, such as in construction and maintenance, for tribal community members and local residents. The GRT will also create trail-oriented development opportunities to grow the tourism industry. See the Trail-Oriented Development section of Chapter 4 for more details. ▶ The GRT will be supported by trailheads, linear parks, and day-use areas that will provide new space for events and other activities. Learn more in the GRT Trail Use and Design Guide (Chapter 4).
New Trail Network and Connections—The trail will provide new connections to a wide range of destinations, including other local trails, and serve as a new recreational opportunity.	▶ The GRT will connect to numerous communities and destinations along the rail corridor. These new and improved connections will be supported with amenities such as new trailheads and wayfinding signage. To see the extents of the GRT and the various destinations and communities it connects to, see the Segment Maps in Chapter 6 for more information.

KEY THEMES WE HEARD	WHAT WE HAVE PROPOSED
Inclusive GRT Design—The trail should include accessibility for different ages, abilities, and trail uses including for people using mobility devices, walking/hiking, biking, and equestrians.	▶ Trail sections will accommodate hikers, cyclists, people who use mobility devices, and equestrians through a variety of trail types and amenities. See the GRT Trail Use and Design Guide (Chapter 4) for more details. ▶ A central goal for the GRT design is to create a high-quality trail experience with access to previously inaccessible recreational destinations for people with disabilities. See the Accessibility section of the GRT Trail Use and Design Guide (Chapter 4) for more information. ▶ Chapter 4 includes information about ongoing measures for ensuring the trail meets ADA standards and guidelines. ▶ GRTA could work with partners to develop and adopt policies for safe use of e-bikes on the GRT.
Desired Trail Amenities—Top trail amenities requested include restrooms, access to water, campgrounds, public art, multilingual wayfinding signage, interpretive elements with tribal collaboration, benches, and picnic areas.	▶ These top amenities and others are included in the Trail Amenity section of the GRT Trail Use and Design Guide (Chapter 4).
Operations and Management: Funding and Responsibility—Who will maintain the trail (e.g., regular cleanups), how much will it cost to build and then to maintain?	▶ No singular entity will maintain the entire GRT; rather, maintenance will require a collection of regional and local partners. Chapter 5 documents the policies, strategies, planning, budget, and staffing needs for maintaining and operating the trail.
There is a desire for opportunities that allow volunteers to work together with tribal and community members, stakeholder groups, and agencies to get the trail built and to then maintain the trail.	▶ Volunteers are a critical part of trail maintenance and operations. See the Volunteers section of Chapter 5 for recommendations, such as how volunteers can assist with maintenance of trailheads and trailside amenities. ▶ There are also existing volunteer groups in Ukiah and Humboldt County who can be partnered with and whose resources could be expanded to help maintain the GRT.
GRT Impact on Cultural Resources and Sites—Increased public access to the trail, river, and surrounding areas will harm sacred tribal lands. There is an opportunity to honor tribal land, cultures, landmarks, and sacred spaces. Identify opportunities for local tribes to benefit through interpretation and restoration contracts.	▶ See the Tribal Engagement section (Table 3 on page 51) for recommendations for how to address concerns and ideas of California Native American tribes. ▶ The project team is committed to ongoing engagement with individual California Native American tribes to determine their unique needs and desires. This will include additional meetings with tribal leaders and associations, presentations to tribal councils, tabling at community events and engaging with tribal communities as appropriate, and in some cases, Government-to-Government consultation.

KEY THEMES WE HEARD	WHAT WE HAVE PROPOSED
Public Safety—There are many remote areas along the trail that might result in personal safety issues with little to no cellular service and limited access to law enforcement and emergency services.	▶ Operations and maintenance of the GRT will include many strategies to address personal safety concerns related to remote areas and emergency services. These include, but are not limited to, development of a regionally-coordinated mile marker/emergency response system, solar powered call boxes, and a reservation/permit system. See Chapter 5 for more information. ▶ Backcountry trailheads may include sign-in kiosks where trail users can check in and out before and after hiking segments of the GRT. See Chapter 4 for more details on backcountry trailheads and access. ▶ Consider developing Memorandum of Understanding (MOU) with law enforcement and first responders to ensure a coordinated emergency response.
Protecting the Environment—Providing more public access to the trail and the river could harm the environment (e.g., waste, fire risk, toxins and pollutants during construction, hunting/illegal poaching, etc.).	▶ The GRT will improve existing conditions along the corridor including removal of hazardous waste, failed culverts, and more. The GRT Trail Use and Design Guide (Chapter 4) includes approaches to navigating and avoiding environmental issues when constructing the trail. ▶ Ongoing operations and maintenance of the GRT includes rules and regulations for fire use, hunting, trash and debris removal, and other environmental concerns. Additionally, design, construction, management, and operation of the GRT will endeavor to protect and enhance natural resources present along the corridor. Strategies for environmental stewardship and maintenance are outline in Chapter 5.
Needs of the Unhoused Community— People experiencing houselessness will set up encampments on the trail, leading to increased property crimes, robberies, and nuisance activities. How will resources be provided to people experiencing houselessness?	▶ Part of ongoing trail maintenance and operations will include working with local public health experts, social service providers, and law enforcement to prevent encampments and provide services to people experiencing houselessness. See Chapter 5 for more information. ▶ The GRT design will feature lighting along trail segments in developed areas to help deter nuisance activities and crime.
Neighbor Concerns—Providing more public access will place additional burden on the people who have been conserving this land for generations, including trespassing and nuisance issues.	▶ The GRT Trail Use and Design Guide (Chapter 4) includes design treatments along the trail to increase the security of the GRT to and from adjacent private properties, such as secure fencing and landscape buffers. ▶ GRT Operations and Maintenance (Chapter 5) includes recommendations for addressing landowner concerns like trespassing, such as “No trespassing off trail” signage, monitoring issues with law enforcement and landowners, and working with landowners on effective fencing if needed.

Tribal Engagement

The GRT corridor right-of-way travels through multiple ancestral and current tribal lands including lands of federally and non-federally recognized tribes. The project team understands that each tribal government is a separate sovereign entity and have different interests, so tribal engagement required individualized outreach and in-person engagement to connect to California Native American tribal governments and tribal community members. The project team's outreach and engagement staff conducted in-person visits to tribal offices to make introductions to tribal staff and government leaders, when possible. Staff presented to seven sovereign governments and attended eleven tribal community events to provide information and solicit input on the GRT Master Plan.

Overall, feedback included concerns about protection of tribal cultural resources and lands, interest about who would be responsible for maintaining the trail, protection of native plants, and involving and employing tribes in the design, construction, development, and operations and maintenance of the GRT. GRT Master Plan recommendations related to tribal input and concerns are listed in Table 3. Feedback received during tribal engagement is included in Table 4. Engagement with tribal community members is included in Table 6.

TYPES OF ENGAGEMENT TO DATE:

Letters to tribes on NAHC list—December 2022

Presentations to Northern California Tribal Chairpersons Association—January & December 2023

Webinar on GRT for California Native American tribes—February 2023

One-on-one outreach—ongoing

Government-to-Government Consultations—ongoing

Workshops and presentations at tribal offices

Tabling and presentations at events—ongoing

Through:

Email

Phone Calls

In-Person Meetings

Tribal Recommendations

Table 3: *GRT Master Plan recommendations that seek to address input from California Native American tribes*

RECOMMENDATION	LOCATION IN THE MASTER PLAN
1. Respectfully consult early and often with tribes to build long-term relationships and collaboration.	Chapter 5: Trail Operations & Management (Recommendation G-3) (page 207)
2. Early in project implementation planning, work with appropriate tribes to identify culturally sensitive sites and plant species for protection or tribal access. All cultural resources investigations required by AB 52 and Section 106 of the National Historic Preservation Act will be conducted and paid for by the Great Redwood Trail Agency (GRTA) or local trail development partners and involve tribal participation. Copies of cultural resources survey reports should be shared with the respective tribes listed with the California Native American Heritage Commission (NAHC).	Chapter 4: Trail Use & Design (page 118 and page 184)
3. Where feasible, the GRTA should consider alternate routes to avoid sensitive cultural sites and sacred spaces.	Chapter 4: Trail Use & Design (page 152)
4. Early in project implementation planning, identify opportunities for and invite tribal participation in ecological restoration activities and construction monitoring.	Chapter 4: Trail Use & Design (page 125)
5. Invite interested tribes to co-manage portions of the trail that cross ancestral tribal lands.	Chapter 5: Trail Operations & Management (Recommendation G-3) (page 207)
6. Find ways to hire tribal members to engage in paid stewardship activities such as construction monitoring, leading tours or performing trail patrols, or maintenance.	Chapter 5: Trail Operations & Management (Recommendation G-3) (page 207)
7. Explore creating jobs for tribal members or having a tribal preference in the hiring process.	Chapter 5: Trail Operations & Management (Recommendation G-1) (page 203)
8. Install interpretative signage and tribal artwork along the trail that is developed by local tribal people.	Chapter 5: Trail Operations & Management (Recommendation OP-11) (page 228)
9. Name portions of the trail using native languages.	Chapter 4: Trail Use & Design (page 118 and page 187)
10. Consider building an interpretive center and/or culturally important buildings. If built, ensure it is located in collaboration with local tribes to avoid trespassing, or identification of and possible damage to sensitive cultural resource areas.	Chapter 4: Trail Use & Design (page 187) Chapter 5: Trail Operations & Management (Recommendation OP-11) (page 228)
11. Take steps to ensure the trail is as safe as possible for all.	Chapter 5: Trail Operations & Management (Recommendation G-6) (page 211)
12. Consider creating a memorial to Murdered and Missing Indigenous People (MMIP).	Chapter 4: Trail Use & Design (page 118 and page 187)
13. Consider forming a tribal advisory committee to provide input as the GRT is developed.	Chapter 5: Trail Operations & Management (Recommendation G-3) (page 207)

Table 4: *Summary of Tribal Engagement and What We Heard*

TRIBE OR TRIBAL ASSOCIATION	ENGAGEMENT TYPE	DATE	WHAT WE HEARD
Blue Lake Rancheria	Meeting with tribal representatives	Various	▶ The Tribe is interested in being the owner and steward of the section of the trail that is contiguous to Blue Lake Rancheria Trust lands. This section will be in proximity to existing and new infrastructure on the Blue Lake Rancheria, and want to ensure trail design and operation meets the needs for safety, security and lighting. For the portion of the GRT that is not contiguous to the Blue Lake Rancheria Trust land, the tribe is interested in partnering for the trail build out. The Tribe is cognizant of the importance of protecting cultural resources and reducing the potential environmental impacts from the proposed trail.
Hopland Band of Pomo Indians	Meeting with Ramón Billy, Jr., Tribal Historic Preservation Officer	August 2, 2023	▶ Interested in ways to get involved and included, specifically with the GRT that would be proposed to be going through Hopland towards Frog Woman Rock on ancestral land. ▶ Would like to see: • This area of this trail be named "Sho-Ka-Wah Trail" in honor of the tribal ancestral lands that this part of the GRT would be going through. • Respect and honor of sacred sites and ancestral lands. • Signage. • Being invited in the conversation for the GRT Master Plan and further decision-making process. ▶ This is a second chance to do things differently than in the past so it can be mutually beneficial and create a symbiotic relationship centering tribal input.
Multiple (11 distinct California Native American tribes)	Webinar hosted by GRT Master Plan Team	February 8, 2023	▶ Many tribes have ecological stewards and Tribal Historic Preservation Officers (THPO) that would be good resources for the team. ▶ Tribes are working actively on signage on other trails and want to get their language and history out. They would like to look at opportunities to add back special plant species. They recommend connecting with the Native American Heritage Commission. ▶ Perhaps jobs could be listed with Native entities first. ▶ Small tribes may have to share monitors during construction and may not have as many paid or full-time staff in the planning and design phase. ▶ The trail should consider culturally important plant protection and enhancement. AB52 could also facilitate opportunities for tribal ethnobotanical knowledge to be incorporated.
More To Be Announced, pending confirmation	–	–	–

Equity-Focused Engagement

The project's outreach and engagement team (NCO, RCAA, Jen Rice, Rails-to-Trails Conservancy, and Zander Westbrook Design), worked with additional local community-based organizations (CBOs) to lead equity-focused engagement:

- **Arbor Youth Resource Center**
- **Boys and Girls Club**
- **Peninsula Community Collaborative, and**
- **Ukiah Vecinos en Acción**

These organizations were selected by NCO and RCAA due to their interest in the GRT and opportunity to connect with youth, low-income residents, and predominantly Spanish-speaking communities. Without this focused engagement, the project team would not have been able to hear from these voices because they are often left out of traditional planning processes. Each of the CBOs were paid an honorarium to support the engagement work of the GRT Master Plan. Partnerships with these locally focused CBOs helped foster trust and understanding and elicited valuable insights from the communities the CBOs serve.

THE ARBOR YOUTH RESOURCE CENTER IN UKIAH

offers youth programs around education support, housing navigation, peer mentorship, health and well-being, employment workshops and more. During the GRT Master Plan process, Arbor Youth conducted weekly trail clean-ups along the trail and invited GRT Master Plan project team members to join.

THE BOYS AND GIRLS CLUB OF UKIAH

provides a positive, healthy learning environment for children by offering programs related to education, arts and culture, and health and wellness. Boys and Girls Club partnered with NCO and the GRT Master Plan team to offer community events, including a Back to School Bash in Ukiah on August 12, 2023.

Partnering with local community-based organizations like Ukiah Vecinos en Acción allowed the project team to engage with predominantly Spanish-speaking communities.

PENINSULA COMMUNITY COLLABORATIVE (PCC)

is a residence-based community group comprised of residents from Manila, Samoa, and Fairhaven, and aims to improve well-being and safety on the Samoa Peninsula. On March 20, 2023, PCC led a community walk along a portion of the GRT corridor near Manilla Park, with 12 residents in attendance.

Comments received during the walk included:

- Bike connectivity between communities is important.
- The community wants to get more involved in advocating for the transition of the corridor to a trail to make it happen as soon as possible.
- Families want their kids to be able to travel through the community in a safe way.
- People appreciated getting on the trail, noticing wetlands, and seeing opportunities for education.

UKIAH VECINOS EN ACCIÓN (UVA)

provides information, guidance, and advocacy on health equity, emergency preparedness and response, economic development, and civic engagement. They led a series of Ukiah GRT-based events, called Viernes con UVA, on June 30, July 28, and August 25, 2023.

Key themes heard at these events included:

- Focus on health and wellness – people love that the trail can provide free access to physical activity.
- Important for people to know where to access the trail and more signage in English and Spanish is needed.
- There is a desire for more community events along the GRT.
- Accessibility for different types of trail users is a concern.
- Trail design should consider safety and visibility of pedestrians and bicyclists.

General Public

PUBLIC WORKSHOPS

The project team hosted four in-person public workshops throughout the GRT region and master planning process. Generally, these workshops aimed to share information on the GRT and the GRT Master Plan process, trail best practices, trail experiences, economic benefits and opportunities of the trail, and gather input on participants' ideas and concerns for the trail.

Each workshop featured different stations that participants could visit to learn and provide feedback about specific topics. An overview of the six community-based in-person workshops and key takeaways can be found in Table 5. Two additional workshops will be held in April 2024 to receive feedback on the Draft Master Plan.

57 community members joined the project team for a workshop in Hopland

Table 5: *Summary of In-Person Workshops (to date)*

LOCATION	DATE	NUMBER OF ATTENDEES	WHAT WE HEARD
Fortuna River Lodge Conference Center (Fortuna)	March 22, 2023	98	▶ General input included concerns about protection of cultural resources, private property, trespassing, unauthorized uses, and homeless encampments. ▶ Common ideas and opportunities included: signage/ mile markers, equestrian infrastructure, access to restrooms and water, and emergency access. People were also interested in campgrounds, historical narratives (particularly tribal), and environmental restoration. ▶ Common concerns and issues included: illegal hunting/poaching, trespassing and private property rights, livestock safety, e-bike speed limits, adequate equestrian user access, fire risk, and enforcement and rescue in the more remote GRT sections.
Willits Community Center (Willits)	March 23, 2023	69	▶ Concern about safety of landowners and trail users in remote areas, general support for the GRT and volunteering, as well as concerns about private property, trespassing, unauthorized uses, and homeless encampments. ▶ Common ideas and opportunities included: bed and breakfasts, safe passage through town for non-motorized users, and GRT kiosks providing wayfinding, advertisement, and concessions. ▶ Common concerns and issues included: sanitation/ trash, water/sewer infrastructure, and accessibility for different user groups.
Volunteer Fire Hall (Alderpoint)	July 26, 2023	70	▶ General comments included concerns about GRT being a "good neighbor," protection of cultural resources, trail maintenance, protection of private property, and encampments. ▶ Common ideas and opportunities included: boat launch and river access, campgrounds, and access to restrooms and water. ▶ Common concerns and issues included: trespassing, accessibility for different users, access for safety and emergency services, and funding for long-term maintenance and costs.
Brutocao Cellars (Hopland)	July 27, 2023	57	▶ Concerns about adjacent private property ownership and the width of the GRT ownership, trespassing, homeless encampments, and fires. ▶ Common ideas about economic benefits from tourism and attracting national/international attention. ▶ Participants requested Hopland GRT staging area and rest stop, including public art, restrooms, bike and car parking, electric chargers for bikes and cars, bike repair stations, shade, wayfinding, hydration stations, benches and picnic seating, play areas, and a visitor/interpreter center with information about the trail.

Residents enjoying the Great Redwood Trail in Ukiah.

In addition to in-person workshops (Table 5), the project team offered two online workshops via Zoom:

- April 24, 2023 – 45 attendees
- August 2, 2023 – 32 attendees

The online workshops provided a flexible opportunity for California Native American tribes, stakeholders and residents from along the GRT and beyond to share their concerns and ideas for the trail. As with the in-person workshops, the project team presented the GRT and the GRT Master Plan process, trail best practices, trail experiences, and economic benefits and opportunities associated with the trail. Throughout the presentation, attendees were asked to participate in a series of polls, asking for their opinion on different GRT-related topics. Following the presentation, participants were invited to use the Q&A feature to share additional concerns, questions, and ideas for the trail. A third online workshop is scheduled for April 2024.

Key takeaways from the online workshops included:

- Most attendees said they felt excited about the Great Redwood Trail.
- The top trail features desired by participants included restrooms, river access/boat launches, landscape and ecological areas, rest areas, and overlooks.
- Common concerns of participants included safety, emergency access, how long the trail will take to build, homeless encampments, fire, trail maintenance, connecting to other trails in the region, and equestrian access.
- Common desires and ideas expressed by participants included bicycling, honoring California Native American cultures, economic benefits and development along the trail, connectivity between towns along the trail, and trail docents.

TABLING AT TRIBAL AND COMMUNITY EVENTS

Throughout the GRT Master Planning process, the project team shared information and received feedback at 26 community events. This allowed the project team to table at California Native American tribal gatherings and popular public events across the region, sharing information about the GRT Master Plan and receiving feedback from tribal community members and a wide range of stakeholders. Tabling events help the GRTA connect with people who might not be able to attend a more formal workshop, by meeting them in their daily lives at school events, festivals, celebrations, block parties, community walks, and more. Table 6 below includes a summary of California Native American tribal gatherings and community events attended by the project team.

Project team staff set up a booth at the Blackberry Festival in Covelo to share project information.

Table 6: *Summary of Tabling Events (in chronological order)*

EVENT (LOCATION)	DATE	WHAT WE HEARD
Good Fire Workshop at Mateel (Redway)	January 7, 2023	▶ The project team handed out flyers, stickers, and magnets to share information about the GRT Master Plan.
Godwit Days (Arcata)	April 14-16, 2023	▶ Attendees were excited about the GRT and sections already being built. ▶ There are many destinations in the area that the trail could connect to, such as beaches.
Dia del Nino (Ukiah)	April 30, 2023	▶ Many people in Ukiah walk and bike on the GRT for commuting and recreation. ▶ Families would like the GRT to provide easy, safe access to schools to schools.
Bike Month Humboldt Celebration (Eureka)	May 20, 2023	▶ People are excited about the GRT and want to be kept in the loop about progress on the new Humboldt Bay Trail segment.
Kinetic Sculpture Race (Ferndale)	May 27, 2023	▶ Manila residents are excited about the possibility of a trail connecting them to Arcata and generally support the GRT.
Intertribal Youth Campout (Fort Bragg)	June 22, 2023	▶ Project team staff provided informational flyers about the GRT Master Plan to attendees.
Willits Frontier Day (Willits)	June 30, 2023	▶ The public has safety concerns, especially north of Willits near Spy Rock and Covelo. ▶ Attendees wanted to know how the GRT can benefit small, local businesses in Willits and other rural towns. ▶ Families are excited to use the trail.

The project team tabled at the Willits Frontier Days event in June 2023.

EVENT (LOCATION)	DATE	WHAT WE HEARD
Coyote Valley Big Time, hosted by Coyote Valley Band of Pomo Indians (Redwood Valley)	July 1, 2023	▶ Make sure tribal voices are heard throughout the engagement process. ▶ Health and wellness are a great part of why this trail can be so beneficial. ▶ Addressing safety concerns is essential. ▶ There is a desire for more public art by Native people
Fourth of July (Eureka)	July 4, 2023	▶ There is a desire for hostels along the GRT. ▶ Support for equestrian use along the trail.
Sherwood Valley Big Time, Hosted by Sherwood Valley Band of Pomo Indians (Willits)	July 8, 2023	▶ More information needs to be brought to California Native American tribes (especially tribal leaders). ▶ The tribal community could be interested in getting involved with the engagement of the GRT Master Plan once we speak with the Tribal Council. ▶ Who is going to consult with us regarding protection of the land and cultural sites? ▶ Who is going to maintain and keep the land clean and well cared for? ▶ Will there be Native art along the whole GRT? ▶ Encourage children to walk and bike more and it would be great to have a safe trail for them to do that in and around Willits.
Annie and Mary Days (Blue Lake)	July 9, 2023	▶ Along the A&M Trail, the rocks of the gravel trail surface are too large to be equestrian friendly. ▶ Request for a bridge at Mad River.

EVENT (LOCATION)	DATE	WHAT WE HEARD
Pinoleville Big Time, hosted by Pinoleville Pomo Nation (Ukiah)	July 15, 2023	▶ FAQs and project fact sheets were handed out to event participants.
Redwood Empire Fair (Ukiah)	August 3-6, 2023	▶ The project team attended and passed out flyers about the GRT Master Plan.
Eureka Block Party (Eureka)	August 5, 2023	▶ Maintenance of the GRT is a concern, especially trash and human waste. ▶ Request for restrooms at regular intervals along the trail, but maintenance of these facilities is a concern.
Wildwood Days (Rio Dell)	August 5, 2023	▶ Request for surfaces that are gentler on feet than asphalt. ▶ Concern about landslides at Scotia Bluffs and how the trail will navigate this area. Other concerns included encampments, trespassing, and how long it will take to construct the trail.
Back to School Bash (Ukiah)	August 12, 2023	▶ Requests for artwork, such as murals, and water stations along the trail. ▶ Request from residents to extend the GRT to south Ukiah. ▶ Natural resource protection is a top concern.
Round Valley Blackberry Festival (Covelo)	August 19, 2023	▶ Top concerns included safety, natural resource protection, and protection and preservation of petroglyphs and sacred sites, as well as protecting the ancestral land that the proposed trail would be going through. ▶ Round Valley Indian Tribes members/elders were in attendance and expressed interest in ongoing engagement with the tribe. ▶ A lot of individuals would not respect or understand the cultural significance of sacred sites. Make sure that there would be measures taken to protect and preserve those historical, spiritual places as well as trash not being left behind. ▶ Generally, people were interested in the GRT timeline, connections to other trails, and safety for people walking and biking.
Weott Days (Loleta)	August 26, 2023	▶ Native people ride horses in Eel River Canyon but not around Humboldt Bay. ▶ Use native place names in signage and interpretive materials.
Mendocino College WOW Week (Ukiah)	August 28, 2023	▶ Generally, students were interested in the GRT and expressed excitement/interest in being more involved. ▶ Top concerns were natural resource protection, safety for bicyclists, and desire for more trails and paths.
Peninsula Beautification/Mural Celebration (Manila)	September 10, 2023	▶ Excited to see the trail happen. ▶ Questions about how the trail will cross 255 safely.

EVENT (LOCATION)	DATE	WHAT WE HEARD
Festejando Nuestra Comunidad (College of the Redwoods)	September 16, 2023	▶ Tribal input needs to be a priority. ▶ Make GRT timeline information available. ▶ Excited to see a trail all the way down to San Francisco Bay.
Indian Days, hosted by Bear River Band of Rohnerville Rancheria (Loleta)	September 30, 2023	▶ Emphasize ADA access where appropriate, increase inclusivity. ▶ Tribes agree that we need to honor the land and specific sacred spaces, but not all tribes /tribal members agree on how to do so. ▶ Avid trail users in attendance are excited about more opportunities to hike with their dogs and noted that we need to plan for dogs (e.g., water access, trash cans for pet waste).
Friends of GRT Celebration Event (Dyerville)	October 14, 2023	▶ Make trail users feel safe to leave valuables in their cars while they use the trail. ▶ Safety for people using the trail is a key concern. ▶ Need to create time and space for tribes to honor their ancestors and ancestral lands before it becomes a trail. ▶ Need to protect Native cultural resources, sites, and way of life.
Mendocino College Dia de los Muertos (Ukiah)	October 25, 2023	▶ The project team attended and passed out flyers to share information about the GRT Master Plan. ▶ Many students were not aware of the GRT but felt it is important to make sure the land is protected, especially in alignment with Native ways. Speak to elders, as they know best. ▶ Concerns about trash, and trail users taking native plants. Encouraged use of more signage to teach users how to be respectful. ▶ Want to see murals with more diverse art along the trail. Suggestion to have an art class offered through Mendocino College that helps artists demonstrate their skills publicly.
Native Art Expo (Ukiah)	October 28, 2023	▶ Want to get youth more involved so they can think about what economic development opportunities they would be interested in related to environment and climate action. ▶ Interest in how tribes can be involved in discussions about where art meets natural resource protection and cultural resource protection.
Loleta Harvest Days (Loleta)	November 3, 2023	▶ A lot of excitement for the GRT and want to expedite it. ▶ Excited for safe ways to exercise with family, and to see what the trail could do to improve safe transportation between work, school, and errands. ▶ Concern about GRT traffic mitigation strategies and user safety in towns.

DIGITAL ENGAGEMENT

The project team used digital engagement tools to augment in-person engagement and to reach more people. These included an online public survey and an interactive web map tool.

PUBLIC SURVEY

As part of the engagement process, the project team created a 24-question online survey using SurveyMonkey. This public survey was developed in English and Spanish and remained open for responses for over a year starting in October 2022. The survey was distributed to various stakeholders and publicized by the project team, as well as by local groups and agencies. Respondents self-selected and were not randomly sampled and therefore do not necessarily represent the views of the general population of GRT county residents and future/current users. In total, 767 respondents answered the first page of the 3-page survey (questions 1-9), and 508 (66%) of these respondents continued to the second page. Of the 508 respondents who answered questions 10-17 on page two of the survey, 480 (62.5% of the original 767) completed the survey by answering at least some of the questions 18-24 on page 3.

The survey asked respondents about their support for the GRT, how often they use trails, how they would use the GRT, what modes they would use along and to/from the trail, preferred trail types, preferred trail features and amenities, and top concerns about the GRT and ideas about how to address these concerns. Key takeaways from the survey are summarized on the following pages.

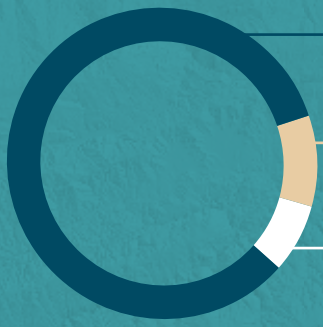
Mode of Travel

78% *on foot (walking, running)*

15% *on horseback*

72% *on bicycle*

General Support/Opposition



83.5% *support the GRT*

9.5% *oppose the GRT*

7.0% *are undecided*

56.1% *of respondents would be interested in volunteering to help maintain the trail.*

Geographic Distribution

Respondents who spend a significant amount of time in rural areas/smaller towns were more likely to oppose the GRT than those in urban areas.

25% *vs* **9%**

Will Trail Proximity Induce More Use?

83%

of respondents said they would use trails more often than they currently do if they had more nearby trail access.

Trip Purpose

87%

of respondents said they use trails for recreation or exercise

40%

use trails for transportation (e.g., commuting).

Most Requested Amenities

Restrooms were the most-desired trail feature, listed by 56% of all respondents,

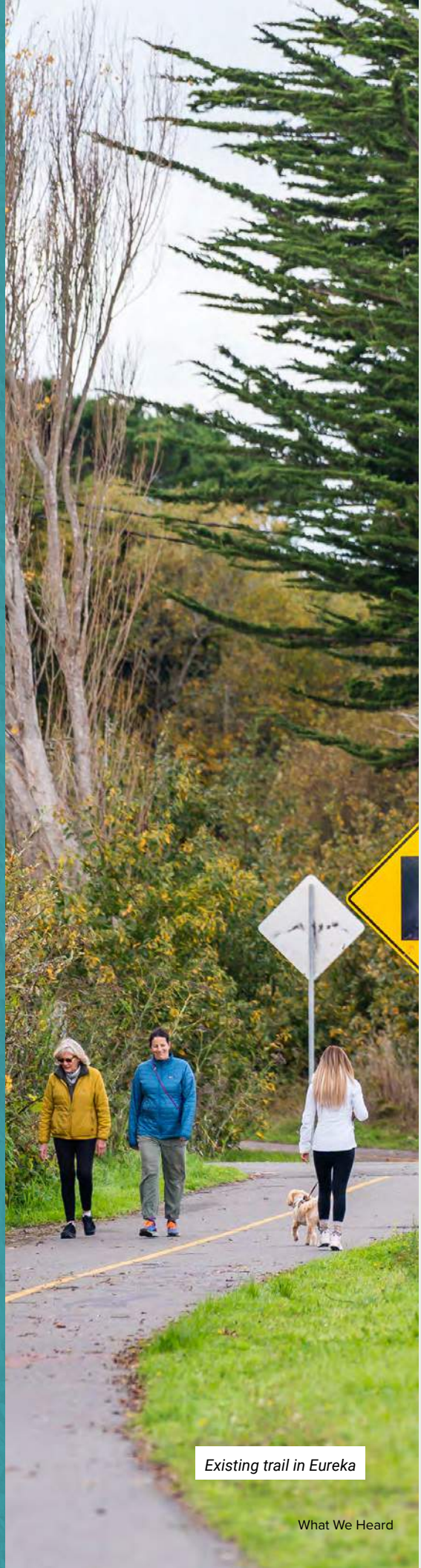
followed by directional signs/mile markers at 46%.

MOST CITED CONCERNS

Concern about homeless encampments and littering was consistently high among survey respondents, and concern for personal safety was consistently noted regardless of respondents' view of the trail. Additionally, maintenance was a more important concern to respondents who support the trail, while impacts on the environment were important for both respondents who support and those who are undecided. Further, concern about trespassing or property crime was particularly high among respondents opposed to the trail, and moderately high among undecided respondents. Finally, emergency access was particularly important to undecided respondents.

Top 5 Concerns by Support for the GRT

	SUPPORT	UNDECIDED	OPPOSE
1	Encampments or Littering	Other	Trespassing or property crime
2	Maintenance	Encampments or Littering	Encampments or Littering
3	Impacts on the Environment	Impacts on the Environment	Other
4	Accessibility	Trespassing or Property Crime	Personal Safety
5	Personal Safety	Emergency Access	Impact on Privacy



Existing trail in Eureka

INTERACTIVE WEB MAP

In addition to the public survey, community members and stakeholders could provide input along the GRT corridor through an online web tool that allowed people to “like,” “dislike,” and add their own comments. This tool, which was hosted on the project website, gathered 153 unique comments and 329 votes.

Common themes of the comments included:

- Information about trail segment maintenance and partnership opportunities
- Ideas for future connections to/from the trail, and connections to other regional trails and paths like the Golden Gate Bridge
- Safe bicycle and pedestrian connections/access to the trail
- Desired trail access points
- Ideas for trail elements, such as campgrounds, restrooms, and playgrounds
- Existing businesses to highlight and economic opportunities along the trail
- Environmental and wildlife concerns
- Equestrian needs, such as horse trailer staging areas

The comments that received the most likes from other participants were:

"Converting the old Redwood Valley School into a Great Redwood Trail Visitor Center + campground + park / playground + long-term parking for trail hikers and bikers could be a great use of already public land!"

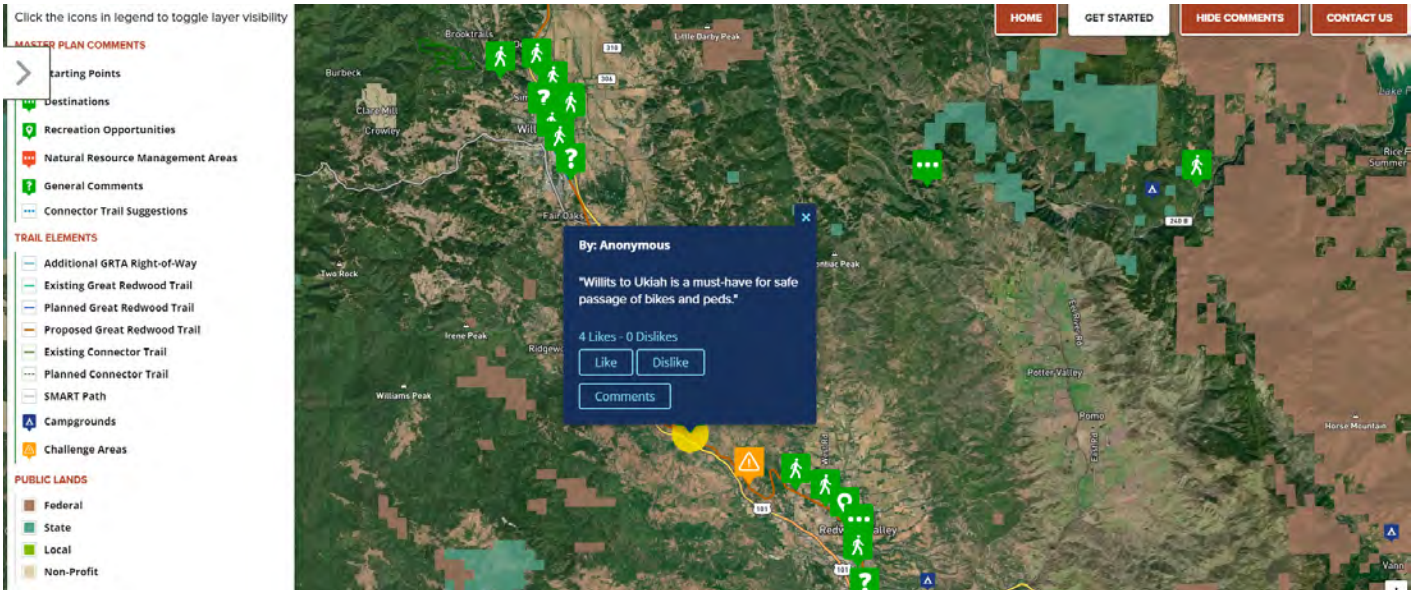
18 Likes

"We live in Manila and are thrilled to have the start/end of the trail right in our neighborhood! Manila residents need a safe trail to access Arcata by bike and/or other wheeled devices. The Great Redwood Trail will do this!"

16 Likes

“I like the idea of taking the train, i.e., not driving to Cloverdale and starting from there.”

10 Likes



Community members and stakeholders left over 150 comments on an interactive map of the GRT corridor.

Tabling at 26 tribal gatherings and popular public events allowed the project team to share information about the Master Plan and gather input from a wider range of people.

COMMUNICATIONS AND OUTREACH

The project team used various communications channels to share information about the GRT Master Plan, notify residents and stakeholders about the project, and promote upcoming community engagement opportunities. Information about the GRT Master Plan was available at the website GreatRedwoodTrailPlan.org and included a project summary and timeline, the survey and interactive web map tool, upcoming events and workshops, Frequently Asked Questions (FAQ), e-newsletters, and Master Plan-related documents and maps. Three e-newsletters were sent out to the GRT mailing list during the development of the Draft master Plan. The e-newsletters featured Master Plan updates, tribal engagement spotlights, CBO engagement spotlights, and more.

To help promote public workshops and attract people to the project website, social media posts were shared on GRTA's Instagram and Facebook pages, as well as through partners' social media platforms. Facebook advertisements were also purchased to further promote community workshops and drive more visits to the project website.
In addition to digital communications, postcards and letters were mailed to GRT-adjacent landowners to introduce the project and invite them to attend the first round of public workshops.

Further, the project team used radio to reach people in the project area, particularly in rural communities and the most remote areas. The GRT Master Planning team did interviews with KZYX and KMUD, and sent public service announcements (PSAs) to encourage KZYX, KMUD, KHUM, KIDE FM, and KINS listeners to attend public workshops and visit the Master Plan website for more information.

Social media posts were used to promote workshops on Instagram, Facebook, and Twitter.

14,128 postcards were sent to residential and business addresses adjacent to the corridor to ensure neighbors knew how to connect with the planning process.

Stakeholder Groups

Throughout the development of the GRT Master Plan, the project team met with over 60 stakeholders and stakeholder groups to share information about the Plan, listen to concerns and ideas for the trail and learn about additional engagement opportunities. Stakeholder groups included local jurisdictions and elected officials, landowners, tourism/economic development agencies, trail user groups, the Farm Bureau, and more. Table 7 provides a thematic summary of the range of stakeholders engaged and their key concerns and ideas for the trail.

Community members learn about and provide feedback on the GRT Master Plan at a community workshop in Alderpoint.

Table 7: *Summary of Stakeholder Groups Engaged*

STAKEHOLDER GROUP	AGENCIES, ORGANIZATIONS, AND INDIVIDUALS	WHAT WE HEARD
Elected Officials Local Agencies	▶ Blue Lake City Council ▶ Hopland Municipal Advisory Committee ▶ Humboldt County Association of Governments ▶ Humboldt County Board of Supervisors ▶ Mendocino County Planning Department ▶ Mendocino County Board of Supervisors ▶ Redwood Valley Municipal Advisory Committee ▶ Trinity County Planning Department ▶ Willits City Council	▶ Primary concerns include fire hazard, emergency response, trespassing onto adjacent private property, natural resource protection, cultural resource protection, and long-term funding for ongoing operations and maintenance. ▶ Restrooms and misuse of restrooms are a major maintenance concern. ▶ There are numerous economic development opportunities and opportunities to re-purpose GRTA land holdings for community benefit. ▶ The trail could help increase safety in areas that were previously high crime, though remote areas are a safety concern. ▶ Excitement for the trail connecting to Blue Lake, but some are concerned about costs and influx of negative uses.
Law Enforcement, Fire Departments, First Responders	▶ Alderpoint Volunteer Fire Dept. ▶ CALFIRE ▶ Fortuna Police Dept. ▶ Laytonville Fire Dept. ▶ Mendocino Sheriff's Dept. ▶ Humboldt Sheriff's Dept. ▶ Coast Guard	▶ Primary concerns of law enforcement include emergency responder access, trespassing, fires, assaults, and homicides. ▶ Extra support would be needed for emergency services along the GRT. Ideally, there would be dedicated emergency services provided by GRT partners, Sheriff's Depts., Police, Fire Depts., State Parks, and/or GRTA. ▶ GRTA should develop a memorandum of understanding (MOU) with law enforcement agencies in Mendocino, Trinity, and Humboldt counties. This MOU could delineate which jurisdiction or agency could respond to emergencies in particular areas, which is critical where there are overlapping areas of responsibility.

STAKEHOLDER GROUP	AGENCIES, ORGANIZATIONS, AND INDIVIDUALS	WHAT WE HEARD
State and Local Natural Resource Agencies and Organizations	▶ Avenue Trail Group ▶ California Department of Fish and Wildlife ▶ California Trout ▶ Humboldt Redwoods State Parks ▶ Mendocino County Resource Conservation District	▶ Shively Bluffs tunnel is currently impassable, so an alternative route could be considered. In some areas, could possibly add a separated trail next to Avenue of Giants. ▶ Bridges could work well for crossing during certain times of year.
Federal Natural Resource and Regulatory Agencies	▶ Bureau of Land Management ▶ National Oceanic and Atmospheric Administration ▶ National Park Service ▶ US Forest Service	▶ US Forest Service would like to see the GRT connect to the Bigfoot Trail (to the east of the GRT). ▶ Concerned about impacts on water quality and fish (salmon and steelhead). ▶ The lack of access to the river through BLM and private lands is a major challenge to managing the GRT and Eel River. This also includes the land between the GRT and river that will be used by trail users. River access is key but will come with more management complications – waste management, impacts to wildlife, etc. ▶ The Rivers, Trails, and Conservation Assistance Program within NPS may be able to provide technical assistance. ▶ NPS capacity to help on the GRT, other than perhaps the Rivers & Trails Program, is limited due to lack of resources. BLM staff in Arcata would also have limited capacity to support concessionaires and perform operations/maintenance tasks.
Tourism and Economic Development	▶ Arcata Economic Development Corporation ▶ Community Economic Resilience Consortium ▶ Fortuna Chamber of Commerce ▶ Garberville Rotary ▶ Humboldt County Convention and Visitors Bureau ▶ Humboldt Workforce Coalition ▶ Loleta Chamber of Commerce ▶ McLean Foundation ▶ Norcal Apex Accelerator ▶ Redwood League of Cities ▶ Southern Humboldt Family Resource Center ▶ Visit Mendocino County ▶ Willits Chamber of Commerce	▶ A key element of GRT success will be an environmental development angle. How can the GRT benefit small local businesses along the trail? How will it encourage more economic development in the surrounding area? ▶ Encouraging youth to get more involved in the GRT throughout its development and beyond. ▶ Cities not adjacent to the GRT rail-trail are envious of cities that are. ▶ Strong desire to create a welcoming place to share Southern Humboldt culture. Southern Humboldt lacks resources and economic opportunities – GRT could help change this. ▶ Residents intentionally want to live remotely but also want economic opportunities for their kids to keep them on the land. ▶ General excitement about the trail and related development opportunities, including building job opportunities.

STAKEHOLDER GROUP	AGENCIES, ORGANIZATIONS, AND INDIVIDUALS	WHAT WE HEARD
Trail Users with Disabilities and ADA Advocates	▶ Designing Accessible Communities	▶ Important to include people with disabilities in the GRT process from the outset of trail planning and throughout the life of trail development and operations, so that concerns can be anticipated and properly integrated into trail design. ▶ Trail elements to consider: signs that work for all (for blind/ visually impaired, hearing impaired), picnic tables with arms for wheelchair users, kiosks that are the correct height for people in wheelchairs. ▶ Be aware of the many new technologies that help make trails more accessible to disabled populations.
Trail Users – Bicyclists and Pedestrians	▶ Adventure's Edge ▶ Coalition for Responsible Transportation Priorities ▶ Friends of Annie and Mary Trail ▶ Humboldt Trails Council ▶ Manila Moves	▶ The trail should be family-friendly and be accessible to users of all ages and abilities. ▶ Manilla wants connectivity to the trail, which would connect residents to other areas along the trail. ▶ Concerns about regular maintenance and homeless encampments. ▶ Parking at certain points would be better than just bike racks as people would like to park and ride if one must come before the other. In addition to bicycle parking, provide vehicle parking at certain points along the trail to support park and ride opportunities. ▶ Desire for showers at certain areas where bicyclists tend to ride/stop, particularly in remote areas without access to towns. ▶ A paved surface would be ideal for bicycling but packed gravel could also work. ▶ A priority segment should be between Willits and Ukiah, which is currently not bike friendly. ▶ Create loops that incorporate roads and trail(s). ▶ Set speed guidelines for E-Bikes to ensure safety for all trail users. ▶ There is momentum to complete this trail, let's keep it going. ▶ The connection to Blue Lake is a critical piece of the beginning of the trail.
Trail Users - Equestrian	▶ Julia Peterson ▶ Susan Combs ▶ Karen Underwood	▶ Equestrians are eager to help and can be mobilized to do many things in support of the trail, including trail patrolling, hauling materials into the backcountry, fundraising, etc. ▶ Equestrians want to feel welcome and are a diverse group with a variety of desires. ▶ Top trail elements requested include freshwater access and large parking/staging areas for trailers. ▶ Making the Carlotta Spur a gravel trail could be a good "starter" project as practice for the Eel River Canyon. ▶ Providing river access or view access is important and should be deeded access that considers shifting rivers.

STAKEHOLDER GROUP	AGENCIES, ORGANIZATIONS, AND INDIVIDUALS	WHAT WE HEARD
Trail Users – River and Boating Access	▶ Black Butte River Ranch ▶ Alderpoint-Dos Rios Shuttle Service	▶ Eel River Canyon community needs economic opportunities and GRT seems like a good option. ▶ People should have more recreational access to Eel River. ▶ There is interest in further developing visitor services along the river and the trail.
Timber	Timber Heritage Association	▶ The primary goal/desire is for an expansion to use railbikes to help fund a future excursion train. ▶ They would like the opportunity to collect historic pieces of the railroad that would otherwise be scrapped or salvaged. ▶ Request GRTA assess rail with trail route options from Samoa to Arcata. This assessment could include pros/cons, cost estimates, and property ownership.
Farming and Ranching	Mendocino County Farm Bureau	▶ Desire for rail with trail and rail connections to the interstate network. ▶ Concerns about fire and emergency access, as well as public safety and trail-related crime. ▶ Want the State to fund GRT operations and maintenance, including more funding for law enforcement and fire personnel, as well as dedicated trail employees. ▶ Concerns about trail users' sanitation and human waste interfering with safe crop production.
Landowners	▶ Alex Hubert ▶ Amy Machado ▶ The Buckeye Conservancy ▶ Chris Weston ▶ George Pinches ▶ Glen Schieffer ▶ Jack Rice ▶ Jennifer Famoso ▶ Liz and Randy Whitlow ▶ Lori Morettini ▶ Marty Holzhauser ▶ Melvin Black ▶ Michelle Bushnell ▶ Robert Davis ▶ Sarah Scudder ▶ Sherri Horan ▶ Stuart Bewley ▶ Valerie Elder	▶ Acknowledge residents' knowledge and experience, their concerns and interests, and ask them how they want to be engaged in the process. Public safety and river access/ trespass/encroachment are major concerns for them. ▶ Interest in future economic development opportunities (campgrounds, etc.)- need to address zoning barriers to these kinds of overnight and other trail-related developments. ▶ Need to address trespassing – signage, education, and enforcement. Concerns about some "bad actor" trail users causing costly issues for adjacent landowners, realities of access in/out of the canyon, and services/facilities for trail users. ▶ Create a trail law enforcement division, funded, working with local law enforcement. ▶ A rails-to-trails program between the northern and southern parts of the Eel River Canyon would be amazing for the public. ▶ Concerns about impacts to wildlife. If landowners must put up fences to prevent trespassing, there could be unfair wildlife impacts. Access for wildlife to water (the river) is important. If trail users are using the river and connected creeks, there are potential impacts to otters, eels, beavers, and other wildlife. Need to find a way to keep folks on the trail. ▶ Swimming/river access is concerning to landowners because of the lack of public land between the corridor and the river. That kind of access, and camping, is unwanted in private areas with private ownership.

STAKEHOLDER GROUP	AGENCIES, ORGANIZATIONS, AND INDIVIDUALS	WHAT WE HEARD
Winegrowers	Mendocino Winegrowers Association	▶ Working with landowners/vineyard owners will be key for the GRT. ▶ Security is a major concern – interested in trail rangers, funding to staff up local law enforcement, overnight permit system. Volunteers on bikes occasionally patrolling the trail. Physical fence may not stop the problem – the solution may need to be more than that. ▶ Excitement about having new people come into Mendocino County. Economic opportunities – have people camp on vineyard land, spend money on tasting rooms, etc.
Cannabis Cultivation	Mendocino Cannabis Alliance	▶ Members are proud of their history in cannabis industry and want to expand tourism to the Emerald Triangle. ▶ Cannabis industry is ready to partner with GRT and tourism industry. ▶ There are retail/economic development opportunities right along the trail. ▶ Would like to see infrared fire-spotting cameras on trails.
Environmental Advocates	▶ Alternatives 2 Toxics ▶ California Against Toxins ▶ Friends of the Eel/Friends of the Great Redwood Trail ▶ Humboldt Volunteer Trail Stewards ▶ NEC ▶ Save the Redwoods League ▶ Sierra Club ▶ Russian River Watershed Association ▶ Transportation Alternatives	▶ Potential for the GRT corridor to become a conservation acquisition corridor. ▶ GRT could be a spine for trails connecting to redwoods and preserves along the corridor. ▶ Concerns about clean water, watershed restoration, and enhancement of habitat around the trail. ▶ Need more public river access points (90% are privately owned property in the watershed). It is challenging to get to the river – plan for river access. ▶ There are concerns about how toxins will be handled, how CEQA will be handled, and how Indigenous concerns will be handled. ▶ Prioritize trail clean-ups – part of building the trail is cleaning up the mess. There is a large amount of debris in the river – railcars, scrap metal in the riverbed, culverts- all make it unsafe to recreate. ▶ Prioritize environmental cleanups and preservation related to the rail and other related parts of building the GRT (e.g., historic sawmill sites, historic train stations). ▶ Want to know how the GRT Master Plan fits into CEQA and prioritize upholding CEQA throughout the process. ▶ The trail needs to feel like it is a safe place to walk.

STAKEHOLDER GROUP	AGENCIES, ORGANIZATIONS, AND INDIVIDUALS	WHAT WE HEARD
Land Trusts and Conservancies	▶ Buckeye Conservancy Board ▶ North Coast Regional Land Trust ▶ The Wildlands Conservancy	▶ Need to engage landowners productively and creatively, to understand how the trail may impact existing ranch operations and seek ways to minimize that impact. ▶ Need to hear and understand adjacent landowners' concerns, as well as the unique and pragmatic challenges associated with the more rugged/remote aspects of the corridor – or risk not being taken seriously and/or opposed. ▶ The Wildlands Conservancy is willing to play a role in development within the canyon outside of their property, connecting the GRT with California Native American organizations and potentially helping acquire more preserves within the Eel River Canyon.
Homeless Service Providers	▶ Affordable Homeless Housing Alternatives ▶ Mayor of Eureka ▶ NEC	▶ Need to involve houseless community members and build trust. Treat houseless people with respect. ▶ Focus on making ALL trail users feel safe. ▶ Trail ideas include signs along the trail with resources for houseless, trash cans, ambassadors with training on houselessness. ▶ Rangers are helpful for connecting people to services. Also consider houseless resource fairs along the trail. ▶ Persistent outreach is needed. ▶ Severe weather is an issue for all users of the trail. Consistent access to water will be critical.
Miscellaneous	Eureka Women's Club	▶ Generally enthusiastic about the trail but skeptical about the ability to build it continuously because of so many different stakeholders and landowners. ▶ ADA access is a top priority. ▶ Desire for charging stations for phones and e-bikes.
	Piner High School Students	▶ The project team presented to students at Piner High School to share information about the GRT, the Master Plan, and the economic impact of the trail. No specific input was documented.

03

Existing Conditions

GRT corridor near Humboldt Redwoods State Park

OVERVIEW

The GRT corridor traverses scenic landscapes including old-growth redwood forests, oak woodlands, vineyards, and the dramatic Eel River Canyon. It passes through urban areas with complex public and private land ownership, as well as expansive rural and backcountry areas adjacent to nonprofit conservation lands and privately owned agricultural, rangeland, and timberlands. The corridor passes through ancestral tribal lands and adjacent to current tribal lands. Sections of the GRT in Ukiah, Eureka, Arcata, and Blue Lake exist already, while others are in the planning stages. Existing conditions of the GRT corridor, including physical and environmental conditions, existing and planned trails, and land use and regulatory contexts, are as follows:

Existing trail in Blue Lake

GRT corridor near Alderpoint

Washout of corridor with suspended track

Physical and Environmental Conditions

GEOMORPHIC CONDITIONS

The GRT corridor has experienced over 250 documented landslides as of 2020, as illustrated in Figure 3. These include retaining wall failures, soil creep, washouts, and other landslides, and range from minor to major impacts to the existing rail line. Additional information about geomorphic conditions along the entire GRT corridor can be found in Section 2.4.2 of the GRT Trail Feasibility Assessment.[1]

The GRT corridor is within the Coast Range, a northwest-trending mountain range that generally parallels the San Andreas Fault. This range extends over 1,000 miles, from the western edge of the Klamath Mountains near the Oregon border to the Transverse Ranges in southern California. The unique geologic material and seismic environment of these mountains creates a suite of geologic challenges related to seismic shaking and slope instability.

The geology underlying the rail corridor is a mixture of marine and river sediments in low-lying areas and outwash plains, consisting of sandstone and clayey rocks (mudstone, siltstone, and shale). The geologic conditions underlying different portions of the rail corridor affect the stability of nearby slopes and the potential for landslides and erosion.

Additionally, there are several active fault lines within five miles of the rail corridor that can produce large earthquakes, including San Andreas faults and the Mendocino Triple Junction. Ground shaking could potentially result in damage or collapse of former railroad structures, as well as landslides or soil liquefaction.

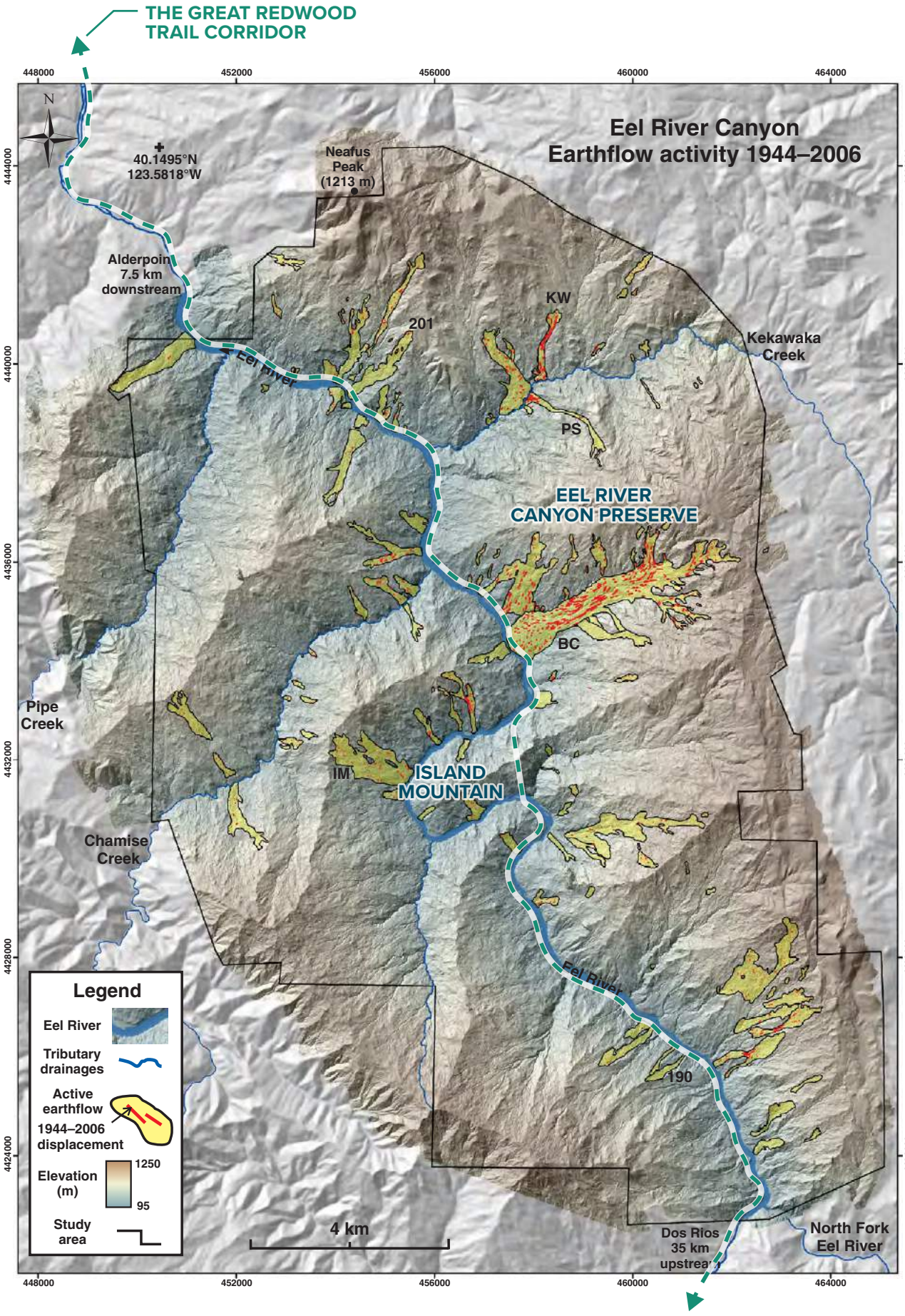
The GRT corridor has varying levels of slope instability, largely due to underlying geologic material and steepness of this mountainous terrain. Although many portions of the GRT corridor are susceptible to slope failure under certain conditions, the greatest risk exists within the Eel River Canyon, due to a combination of unstable bedrock materials and very steep slopes. Massive slow-moving landslides occur along the length of this canyon, combined with rockfalls, washouts, and the risk of sudden slope failure, especially during the rainy winter months. Figure 3 illustrates the GRT corridor and historic landslide patterns within the middle of the Eel River Canyon.[2]

1 Ascent Environmental and Alta Planning + Design. 2020. "Part I: Trail Feasibility Assessment." Great Redwood Trail: Feasibility, Governance, and Railbanking Report. Component of SB 1029 Task Force Assessment. Available from: https://calsta.ca.gov/-/media/calsta-media/documents/appendix-d--cdpr-great-redwood-trail-feasibility-report508remediateda11y.pdf.

2 Mackey, Benjamin H., and Joshua J. Roering. 2011. "Sediment Yield, Spatial Characteristics, and the Long-Term Evolution of Active Earthflows Determined from Airborne LiDAR and Historical Aerial Photographs, Eel River, California." GSA Bulletin 123(7–8):1560–1576. doi: https://doi.org/10.1130/B30306.1.

Figure 3: *Geomorphic Conditions*

Figure 4: *Overlay of GRT corridor on historic earthflow map. Original map credit: Mackey, Ben & Roering, Josh. (2011). Sediment yield, spatial characteristics, and the long-term evolution of active earthflows determined from airborne LiDAR and historical aerial photographs, Eel River, California. Geological Society of America Bulletin. 123. 1560-1576.*



HISTORIC RAIL INFRASTRUCTURE

The GRT corridor includes many structures that were built to support NCRA rail operations, including trestles, bridges, tunnels, and large culverts. Between Healdsburg and Humboldt Bay, there are 84 existing bridges and trestles. Of these, 51 are in good condition or generally intact, 19 have some form of visible damage, nine are either partially or fully collapsed, and five have only piling or remnants of a previous structure remaining, as shown in Figure 5. In the same geographic area, there are 30 tunnels, 17 of which are in good condition or generally intact, eight partially collapsed, and five fully collapsed, as shown in Figure 6. Additionally, there are hundreds of existing culverts within the corridor, many of which are damaged or collapsed. Finally, over 24 train depots (or stations) and "yards" served the NCRA railroad, although only a few depot station structures remain today.

Given the history of operation as a railroad, the GRT corridor has gentle grades across its entire length through, in some cases, quite rugged and mountainous topography. The steepest climb is between Ukiah and Willits, but is still gentle and accommodating for future trail users of all abilities. Further, the historic railbed is generally affected by surrounding geological conditions. In steep canyon areas prone to landsliding or erosion, there are many collapsed or undercut railway embankments. In gentle and moderate terrain, the railbed generally is intact. The GRT corridor includes 11 documented retaining walls, but most were failing due to rotten wood or were damaged by erosion or landsliding.

There are 113 documented locations throughout the GRT corridor with abandoned rail equipment, structures, or debris. This includes 47 locations where one or more rail cars have been abandoned on or near the tracks, eight of which involve multiple rail cars. Additional rail equipment includes a communications tower, track switches, failed culverts and culvert debris, scattered metal debris, and others. It is likely that the abandoned rail equipment has not been removed due to its remote, inaccessible location(s). Abandoned rail equipment poses an environmental constraint or liability, but also provides an opportunity for restoration.

Failed trestle along Humboldt Bay

Failed wall along the Eel River

Abandoned rail car along the trail

Figure 5: *Bridge Conditions*

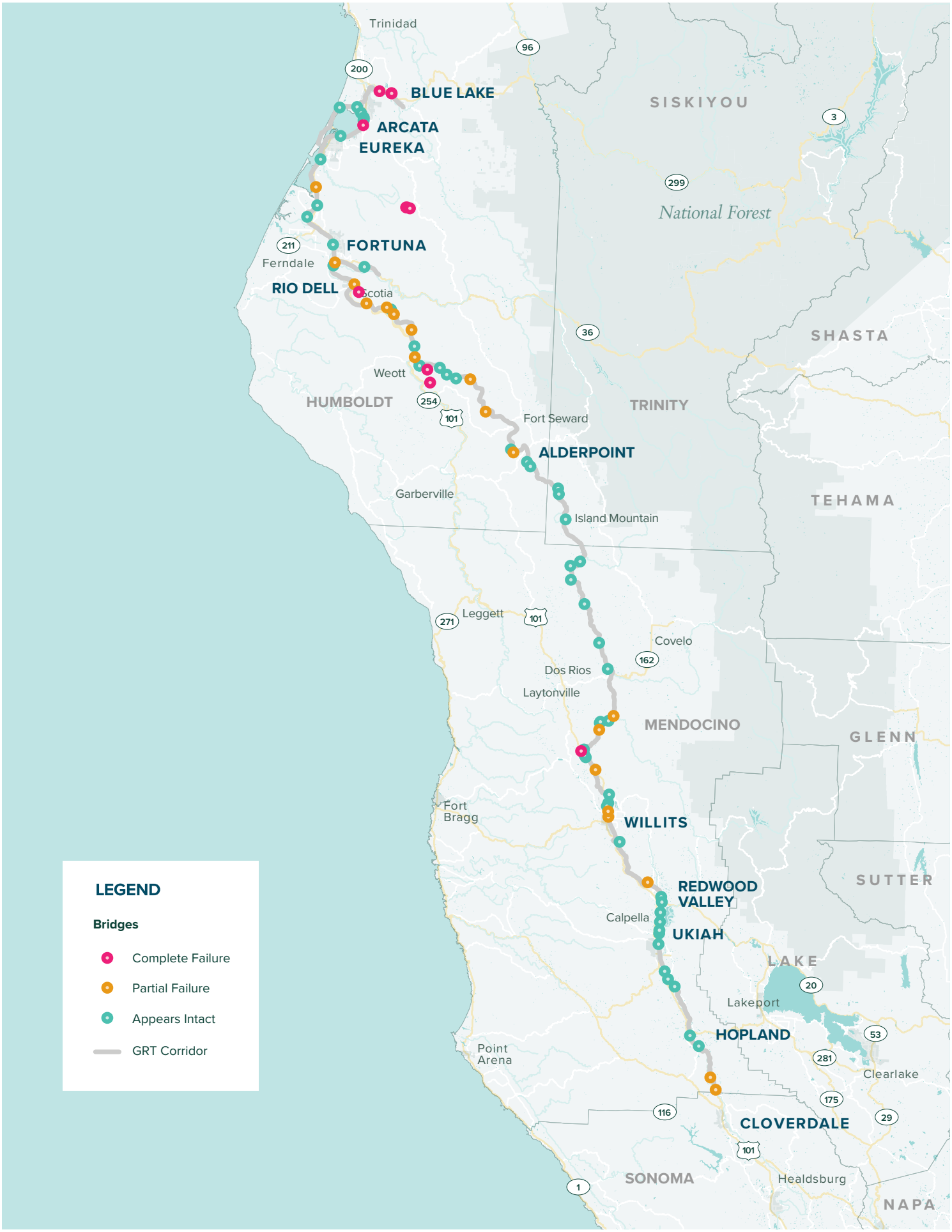
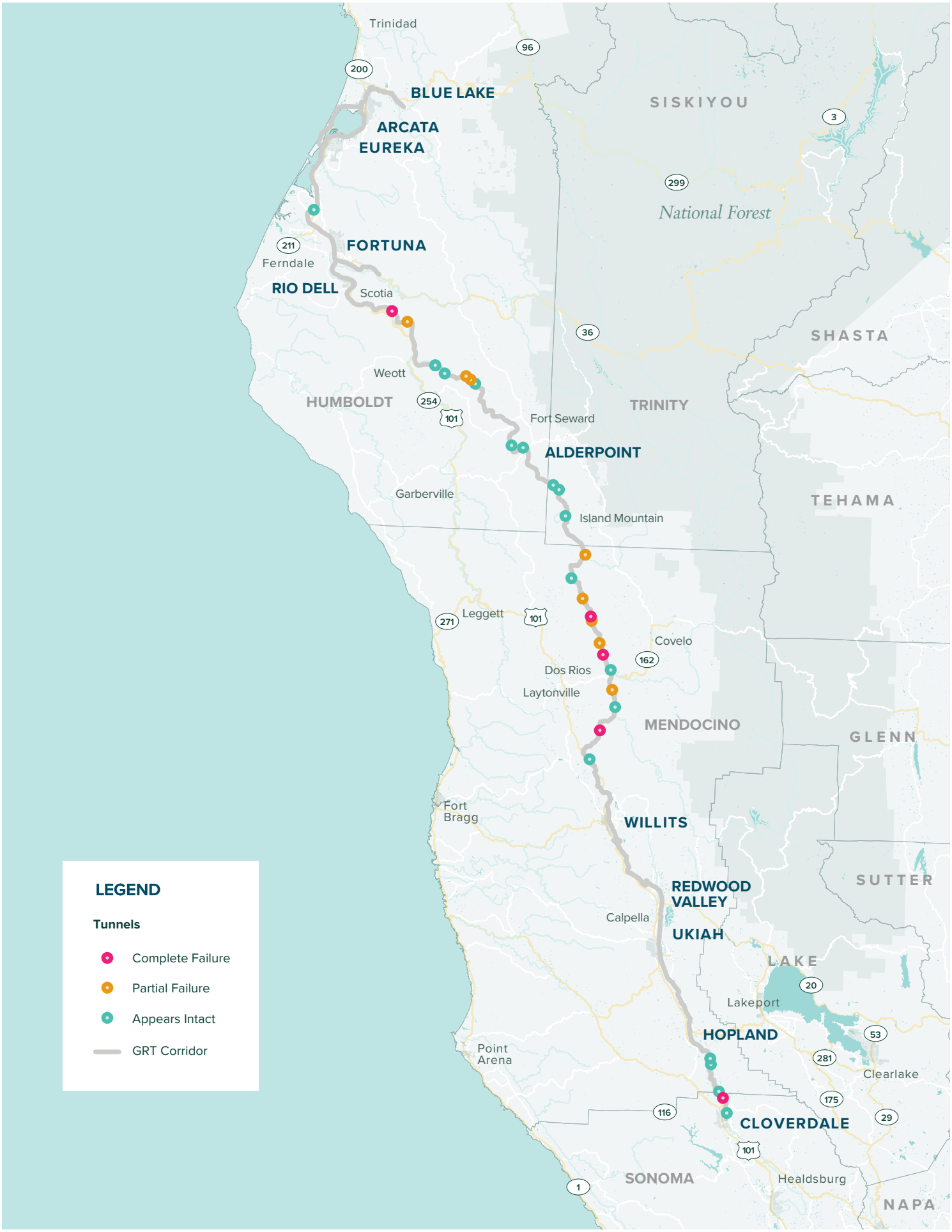


Figure 6: *Tunnel Conditions*



The Eel River running alongside Highway 162

HYDROLOGICAL CONDITIONS

The historical NCRA railroad paralleled north-south running rivers and creeks. Just as most mountain ranges in California run north-south, with rivers in between, so did the railroad. As a result, the GRT corridor follows the Russian River north of the Sonoma-Mendocino County line. Near Willits, the corridor traverses the large, flat plains of Little Lake Valley, an environmentally sensitive area of wetlands that is a headwaters of the mainstem Eel River. From Willits, the GRT corridor follows Outlet Creek, a tributary to the Eel River, to its confluence with the Eel River near Dos Rios. The GRT corridor runs parallel to the Eel River for nearly 110 miles, passing its confluence with the Middle, North, and South Forks of the Eel, before departing from the Eel River just south of Humboldt Bay. The former rail line through Eureka and Arcata, as well as the Samoa Branch through Manila and Samoa are adjacent to Humboldt Bay. In addition, the Annie and Mary (Korblex Branch) line follows the Mad River, while the Carlotta Branch is parallel to the Van Duzen River.

At the heart of the Great Redwood Trail, the Eel River is a federally designated Wild and Scenic River[3], with the mainstem designated for its recreational value, shown in Figure 7. The Eel River is the state's third-largest watershed and supports one of California's largest wild salmon and steelhead runs as well as a diverse ecosystem of oak, mixed-hardwood, fir and redwood forests. The river serves as a recreational destination for rafters between Dos Rios and Alderpoint.

In addition to the Russian and Eel Rivers, the GRT corridor crosses over 239 creeks, streams, and rivers that have been documented by the California Department of Fish and Wildlife.[4] Of these waterways, 76% flow into to the Eel River, 15% to the Russian River, and 9% to the Mad River. These creeks are crossed mostly by bridges and culverts, many of which are damaged or failed.

3 Wild and scenic river designation means the river is "preserved with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations". The Eel River mainstem was designated for recreational value. Source: National Park Service, 2023. https://www.nps.gov/orgs/1912/faqs.htm

4 Creek crossing statistics are the result of an intersection analysis of the GRT corridor and CDFW designated creeks, rivers, and streams.

Figure 7: *Wild and Scenic River Designation and Creek Crossing Locations*

Existing and Planned Great Redwood Trail

There are multiple GRT sections that are already built or to be constructed soon, as shown in Figure 8, including:

- **Ukiah Rail-Trail:** There are 1.7 miles of existing trail and another 1-mile section designed and to be built by December 2024.
- **Willits Rail-Trail:** 1.6 miles of rail-with-trail is planned and designed, with construction estimated to begin in Spring 2024.
- **Humboldt Bay Trail:** Approximately 10 miles of the Humboldt Bay Trail is already built, including portions of the Eureka Waterfront Trail and the Arcata City Trail, and construction of the remaining 4.25-mile Humboldt Bay Trail South section connecting Eureka and Arcata is anticipated to be complete in 2024.
- **Arcata Rail-with-Trail:** Planned trail includes a 1 mile of trail from the northern terminus of the Humboldt Bay Trail to Highway 255. The project began its first phase of construction in 2023.
- **Annie & Mary Trail:** There are 0.5 miles of existing trail in the City of Blue Lake, and construction of another 3.5 miles of trail within the City of Arcata is set to be complete by 2026. Another 1.7 miles of trail are in the planning phase, which will hopefully be complete in fall 2024.

In addition to the established trails listed above, preliminary planning efforts for GRT sections are underway, including:

- 10 to 15 miles of trail along the GRTA corridor adjacent to The Wildlands Conservancy's Eel River Canyon Preserve and Emerald Waters Reserve.
- Several on-street and off-street pedestrian and bicycle improvements in Rio Dell, that will serve as an alternative GRT route in the Scotia Bluffs area.
- A 4- to 4.5-mile Class I shared-use path between College of the Redwoods and Eureka.

The Great Redwood Trail signage at the existing Ukiah Rail-Trail

- Other segments, including Hopland to Ukiah, Ukiah to Redwood Valley, Alderpoint, Fortuna, Loleta, and Arcata to Somoa—have not yet been planned or designed, though the cities and places involved are interested in moving forward in the future. See the GRT Project Plan Table in Appendix B for further information about existing and planned projects related to the GRT.

"CONNECTOR" TRAILS AND THE REGIONAL TRAIL NETWORK

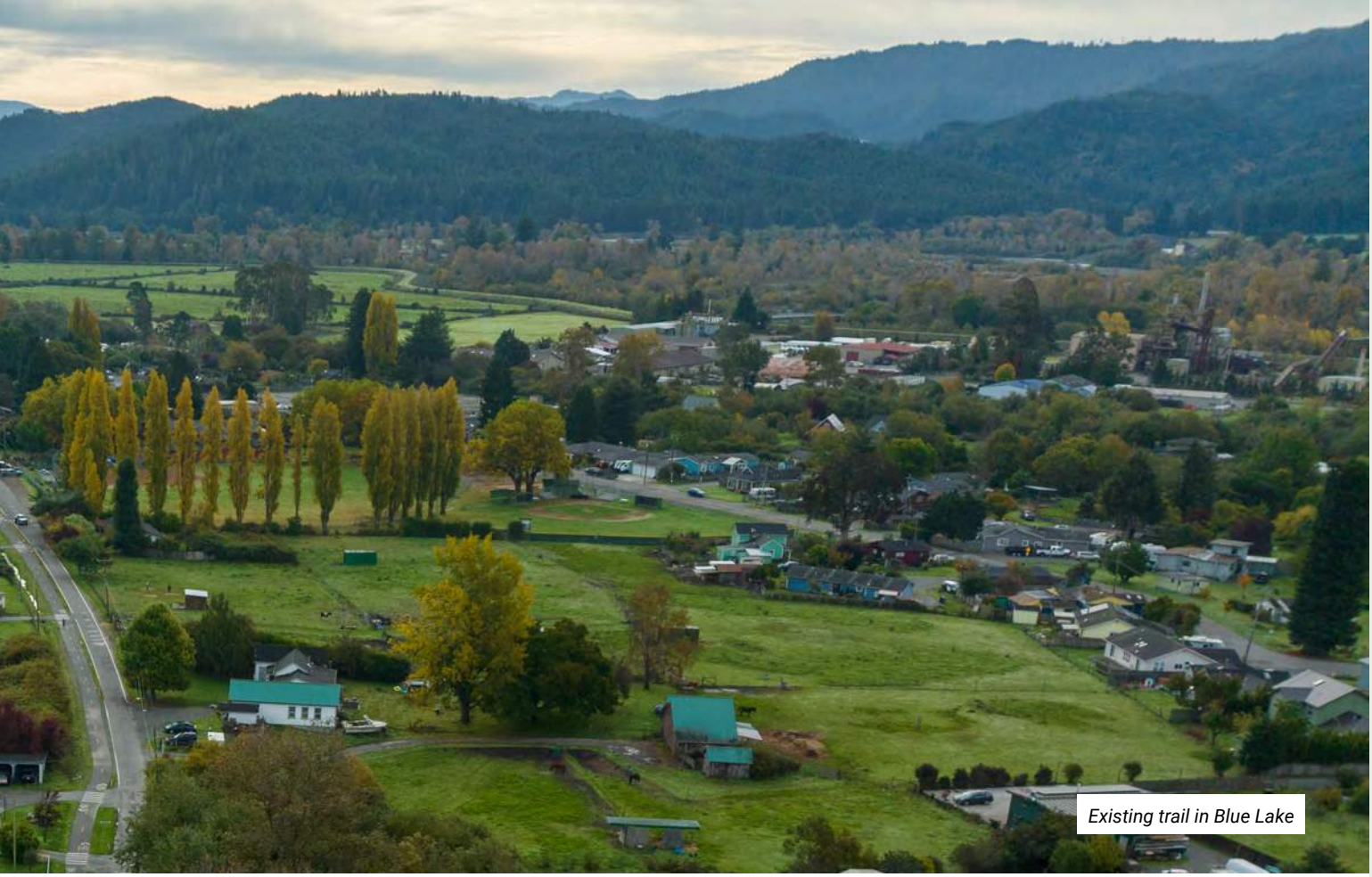
In addition to existing and planned GRT segments, other existing and planned regional trails will connect to the GRT, providing access to additional destinations in areas surrounding the GRT. For example, the Fortuna Riverwalk Trail is an existing two-mile trail on the Eel River levee in the City of Fortuna. Though not in the GRT corridor, this existing trail could provide alternate connections that offer a scenic trail route near Fortuna. Further, the planned 2.75-mile Bay-to-Zoo Trail, set to be constructed in 2026/2027, in the City of Eureka, will offer an inland spur trail east of Humboldt Bay Trail, connecting inland communities to the GRT corridor. Finally, the John Campbell Memorial Greenway and Strongs Creek Trail will be a 2.75-mile trail in the City of Fortuna that will connect residential neighborhoods, shopping centers, and parks to the GRT corridor. See the GRT Project Plan Table in Appendix B for more details on existing and planned trail projects near the GRT.

Figure 8: *Existing, Planned, and Proposed Segments*

Land Use and Regulatory "Environment"

TRAIL PARTNERS AND COORDINATION

At this time, GRTA has not yet identified willing trail partners for planning, construction, operations, and management in the more unincorporated, remote areas of Mendocino and Humboldt counties. GRTA will provide leadership to innovatively and creatively address these current gaps, researching other rail-trail models across the USA that have grappled with similar challenges, and working closely with existing GRT partners to develop strategies, incentives, and sustained funding for the project. Interested Tribes could provide land stewardship knowledge and experience that could greatly benefit the GRT. Trail partners have varying degrees of experience and capacity to plan, design, construct, and maintain the GRT. For example, there is not currently a county parks department in Mendocino County that could build, operate, and maintain the GRT. However, Humboldt County government, through their Public Works Department, has substantial experience and commitment to trail planning, construction, and maintenance, developed through decades of work on the Humboldt Bay and Annie & Mary trail projects. In the City of Eureka, there are dedicated staff who can lead trail development and maintenance.



Existing trail in Blue Lake

Most current maintenance activities in Eureka are performed by the Community Services Department or private contractors hired using the City's General Funds. Eureka also has dedicated park rangers in their police department (two rangers, one law enforcement and one civilian), who patrol all the City's parks and trails.

With a range in GRT partner staff capacity and available funding, the GRTA will need to help fundraise and coordinate activities across the entire trail corridor to support local trail operators, including interested tribes. Both Humboldt and Mendocino counties have experience coordinating sharing of City and County resources, as well as working closely with state and federal agencies and local organizations. Furthermore, there are active trail volunteer groups in Humboldt and Mendocino counties. For example, Humboldt Trails Council and Friends of the Annie & Mary Rail Trail coordinate a volunteer community that performs approximately 20% of county-wide trail maintenance. In Mendocino County, the Ukiah Valley Trails Group manages volunteer groups to help maintain already-constructed segments of the GRT corridor and other inland Mendocino County trails.
These trail partners see the GRT as an asset to the region; many already play a crucial role in operating and maintaining sections of the GRT. There is significant expertise in trail planning, design, and construction in parts of the GRT corridor, but gaps remain in communities and rural and remote areas with fewer resources. Additional funding for operations and maintenance and staff capacity are needed to operate and maintain future GRT segments. Trail operators will need support to build long-term funding streams for long-term O&M. There is a strong partner willingness to collaborate with the GRTA on future trail development. These operators understand the challenges of regional trail projects and are eager to strengthen partnerships to overcome those challenges to successfully design, construct, and operate future GRT trail segments.

LAND MANAGEMENT AND OWNERSHIP

The GRT corridor features a wide variety of adjacent land ownerships across the corridor. While the GRT corridor itself is largely owned by the GRTA, adjacent parcel ownerships include tribal, federal, state, county, special district, city, nonprofit, and private lands, as shown in Figure 9.

The GRT corridor right-of-way width varies by location, but typically ranges from 50-foot to 100-foot on either side of the historic rail centerline, resulting in a 100-foot- or 200-foot-wide linear right-of-way. An example is shown in Figure 10 near Bell Springs.

Adjacent Land Ownership to the GRT

- **81.8%** *privately owned*
- **4.6%** *owned by the GRTA*
- **4.4%** *owned by non-profits*
- **3.5%** *owned by cities*
- **2.1%** *owned by the federal government*
- **1.7%** *listed as vacant*
- **1.5%** *owned by the state*

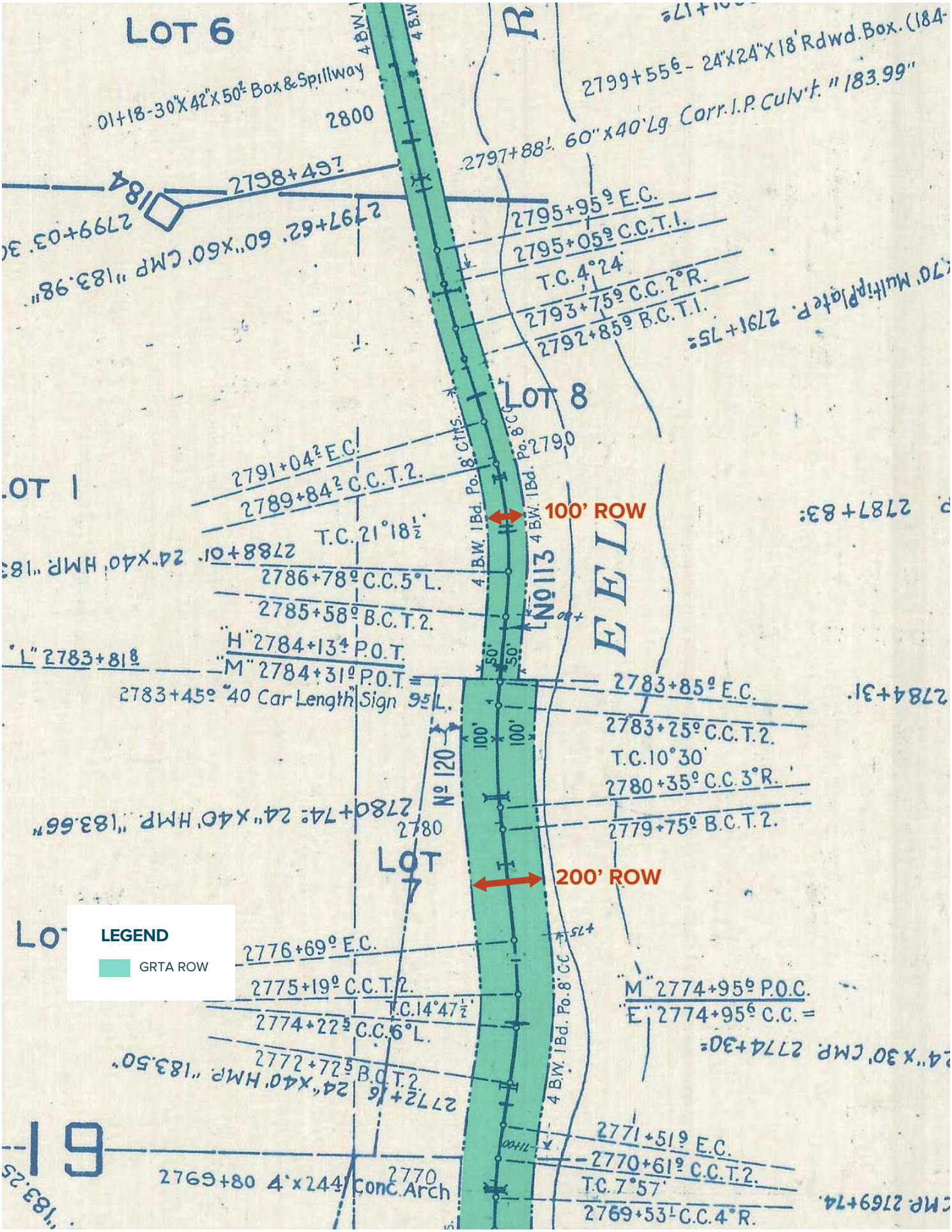
Overgrown GRT corridor south of Fortuna

Table 8: *Land Ownership Directly Adjacent to the GRT*

	GRTA	TRIBAL	FEDERAL	STATE	COUNTY	CITY	DISTRICT	NONPROFIT	PRIVATE	VACANT
HUMBOLDT	3.3%	0.2%	1.9%	1.1%	0.6%	5.0%	2.6%	2.4%	79.9%	2.9%
MENDOCINO	2.6%	0.2%	1.8%	2.2%	0.2%	2.1%	0.3%	0.6%	89.5%	0.6%
TRINITY	4.8%	0.0%	5.5%	0.0%	0.0%	0.0%	0.0%	56.2%	33.5%	0.0%
TOTAL	4.6%	0.2%	2.1%	1.5%	0.4%	3.5%	1.4%	4.4%	81.8%	1.7%

Figure 9: *Parcel Ownership Within Two Miles*

Figure 10: *Zoom in of 100ft to 200ft transition near Bell Springs*



Overgrown GRT corridor in background, north of Willits

In addition to land ownership, zoning across the corridor is shown in Figure 11. While zoning varies slightly between counties, the consolidated zoning for the region provides a general understanding of land use.

Land Uses Adjacent to the GRT

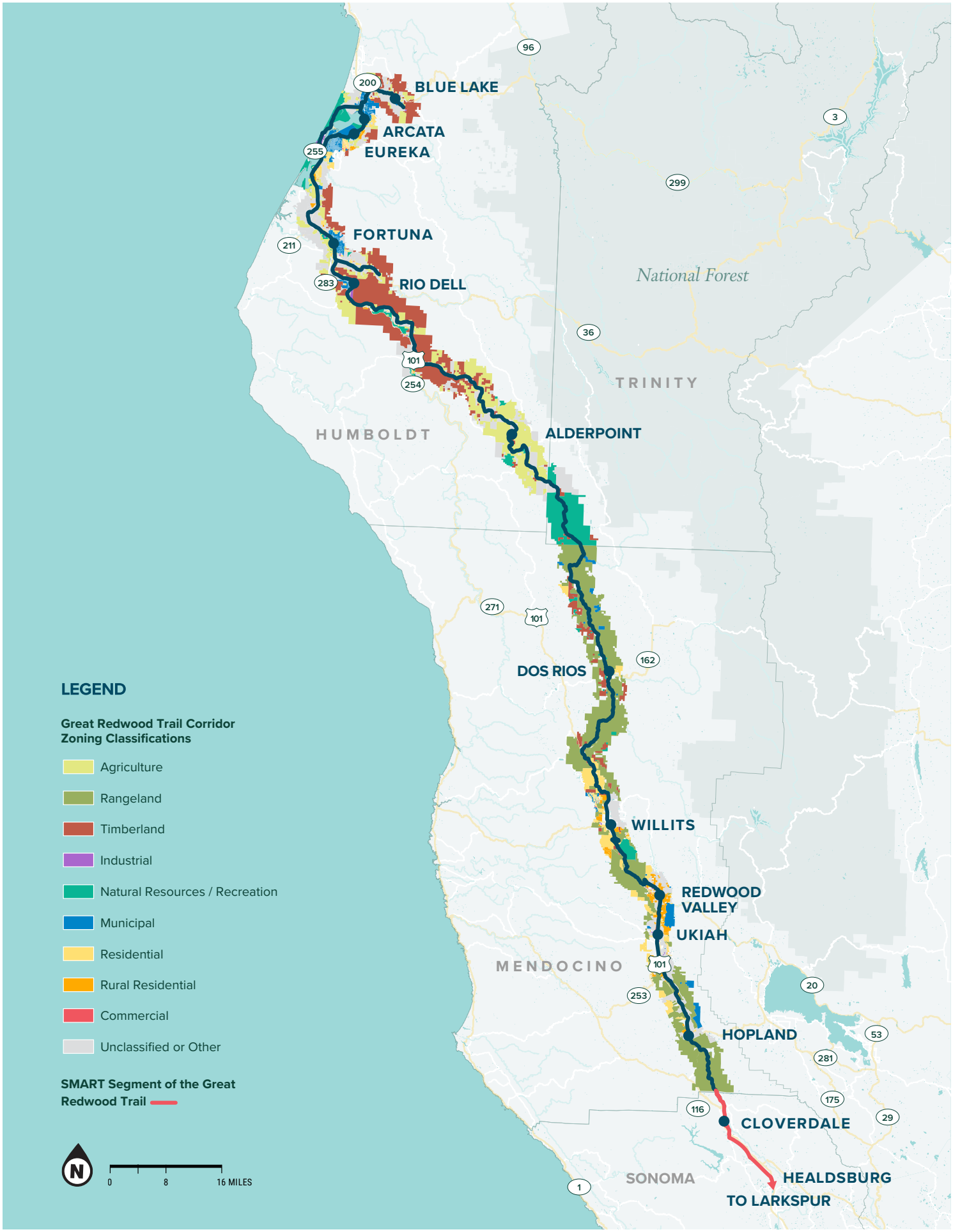
- **24.1%** *are zoned rangeland*
- **17.2%** *are agriculture*
- **15.1%** *are timberland*
- **7.8%** *are municipal*
- **6.2%** *are industrial*
- **6.2%** *are residential*
- **2.0%** *are recreation*
- **1.8%** *are natural resources*
- **18.7%** *are unclassified*

Table 9: *Land Use Zoning Directly Adjacent to the GRT*

	RANGELAND	AGRICULTURE	TIMBERLAND	MUNICIPAL	INDUSTRIAL	RESIDENTIAL	RECREATION
HUMBOLDT	0.0%	24.0%	27.1%	14.4%	8.2%	1.6%	2.8%
MENDOCINO	54.5%	11.3%	1.8%	1.2%	4.6%	12.2%	1.2%
TRINITY	0.0%	1.7%	12.1%	0.0%	0.0%	0.0%	0.0%
TOTAL	24.1%	17.2%	15.1%	7.8%	6.2%	6.2%	2.0%

	NATURAL RESOURCES	RURAL RESIDENTIAL	COMMERCIAL	RAIL	UNCLASSIFIED
HUMBOLDT	3.4%	0.3%	0.5%	1.2%	16.4%
MENDOCINO	0.2%	2.2%	0.8%	0.0%	9.9%
TRINITY	0.0%	0.0%	0.0%	0.0%	86.2%
TOTAL	1.8%	1.2%	0.6%	0.6%	18.7%

Figure 11: *Land Use Zoning Adjacent to the GRT Corridor Within Two Miles*



RAILBANKING

Railbanking is a method established in the National Trails System Act to preserve an out-of-service rail corridor through interim use as a trail. Railbanking allows a trail to be built as a rail-to-trail, where the trail can be located within or on top of the historic rail alignment.

The GRTA is mandated to undertake the process of railbanking the former NCRA rail corridor with the Surface Transportation Board (STB). In 2022, the corridor was railbanked from Willits north to Humboldt Bay, as shown in Figure 12. There are current filings with the Surface Transportation Board (STB) to allow for eventual railbanking filings from Sonoma County to Willits. To learn more, visit: https://thegreatredwoodtrail.org/railbanking/

Existing park in Loleta

Figure 12: *Railbanking Status*

Elk River Restoration Area

ENVIRONMENTAL PERMITTING

The guidelines included within Chapter 4 are intended to inform future trail development. These guidelines reflect typical conditions and are represent a starting point for trail planning and design.

A robust planning and permitting process is required prior to construction of trail segments. Archaeological/cultural, cultural and rare plants (botanical), engineering bridge/tunnel assessments and designs, fisheries restoration assessments, geotechnical, land surveys, review of relevant GRTA licenses and leases, Phase 1 environmental assessments, and threatened and/or endangered fish/wildlife studies may be necessary to compile information needed for required permits and environmental compliance.

Permits and consultations that may be required include:

- Tribal Consultation
- GRTA Encroachment Permit
- CWA or Permit for the Dredge and Fill of Waters of the State
- CDFW 1600 LSAA
- State Water Board NPDES Permit
- Coastal Development Permit
- Caltrans Encroachment Permit
- County Special Use Permit
- County or City Building Permit
- County or City Encroachment Permit
- Grading/Air Quality Permit

For a complete discussion of the permitting process, see "Trail Design and Permitting" on page 409.

04

Trail Use & Design

Existing trail in Ukiah

TRAIL EXPERIENCE

The Great Redwood Trail Experience

The Great Redwood Trail (GRT) will be a continuous trail with a wide diversity of experiences that people can enjoy across its 231 miles in Mendocino, Trinity, and Humboldt counties.[1]

No two trail users are alike. For nearby residents, the GRT can provide a way to exercise and get around in their community. For tourists, it may be an opportunity to access and see an iconic view or a charming small town. For adventurers, it may present the next great backcountry experience in California.

By featuring such a broad range of experiences, the GRT has something for nearly everybody, as highlighted by the five core trail experiences:

- Remote & Scenic
- Trails for Everyday Use
- Equestrian Tours
- Loops & Connectors
- Water Recreation

"Love the idea of going from one end of Willits to the other without having to deal with traffic!"

Local Resident at Community Meeting #2

"I'm most attracted to the planned sections of the trail along the Eel River. These will be spectacular..."

Online Comment

1 The entire GRT is 307 miles long. Sections in Sonoma and Marin counties will be planned and constructed by Sonoma-Marin Area Rail Transit (SMART) and is outside the scope of the Master Plan.

REMOTE & SCENIC

The heart and crown jewel of the GRT is the Eel River Canyon. This 70+ mile extent follows the National Wild and Scenic designated Eel River from Dos Rios to Humboldt Bay. With the wide meandering river, historic rail tunnels and bridges, and sweeping vistas, this experience will provide a destination backcountry opportunity for hikers, backpackers, mountain bikers, equestrians, and rafters.

TRAILS FOR EVERYDAY USE

The most frequent use of the GRT will occur in the populated communities of Mendocino and Humboldt counties. To support everyday transportation and recreational needs, multi-use trails provide a direct and well-connected route for residents who want to walk or bike to businesses, jobs, schools, or recreational destinations.

EQUESTRIAN TOURS

The GRT will create continuous and extensive opportunities for equestrian trips. This will support a diversity of equestrian trips in the front and backcountry areas, for day use, riding groups, and multi-day trips.

LOOPS & CONNECTORS

The GRT is the backbone of a regional trail network. Loops and community connectors create experiences that enable trail users to access communities, connect to other local and regional trail systems, and travel multi-mile loops on and off of the GRT.

WATER RECREATION

The GRT connects multiple great recreational waterways, including the Eel River and the Russian River. Through water access and supportive amenities such as trailheads and campgrounds, the trail will expand water access and support a variety of rafting and kayaking experiences.

TRIBAL AND ENVIRONMENTAL EDUCATION INTERPRETATION

The GRT will travel through ancestral tribal lands that have great significance to California Native Americans. Working with interested tribes and tribal community members, GRTA can create spaces for California Native Americans to tell the stories of their connections, both past and present, to the land including by using native languages and indigenous place names. The natural world also has many stories that could be shared with GRT users.

Look & Feel

The GRT should have a cohesive aesthetic identity across the 231-miles in Mendocino, Trinity, and Humboldt counties. A cohesive look and feel will make the trail more recognizable and easier to use, and create a stronger identity and lasting memory.

The look and feel will impact the design features, amenities, and material selection of the GRT.

Guided by public input, the look and feel of the GRT should feature three primary components:

- **A Trail of Land & Water:** Celebrate local ecology and hydrology, with natural materials and native landscapes.
- **A Trail through Time:** Tell the history of the corridor, through carefully stewarded historic artifacts and materials that celebrate past peoples and industries of the corridor.
- **A Trail of Many Communities:** Embrace the culture, history, and character of each town and local California Native American tribal community, with public art and space for local events.

"I would appreciate the reuse of different rail infrastructure as a fun component to bring in the history"

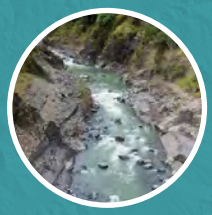
Emily Sinkhorn, City of Arcata

"Emphasize Trail History!"

Community Meeting #1

"The trail will pass through natural areas so [A Trail of Land & Water] seems like a good theme"

Hank Seemann, Humboldt County Public Works



"There is room for culture, environment, and history"

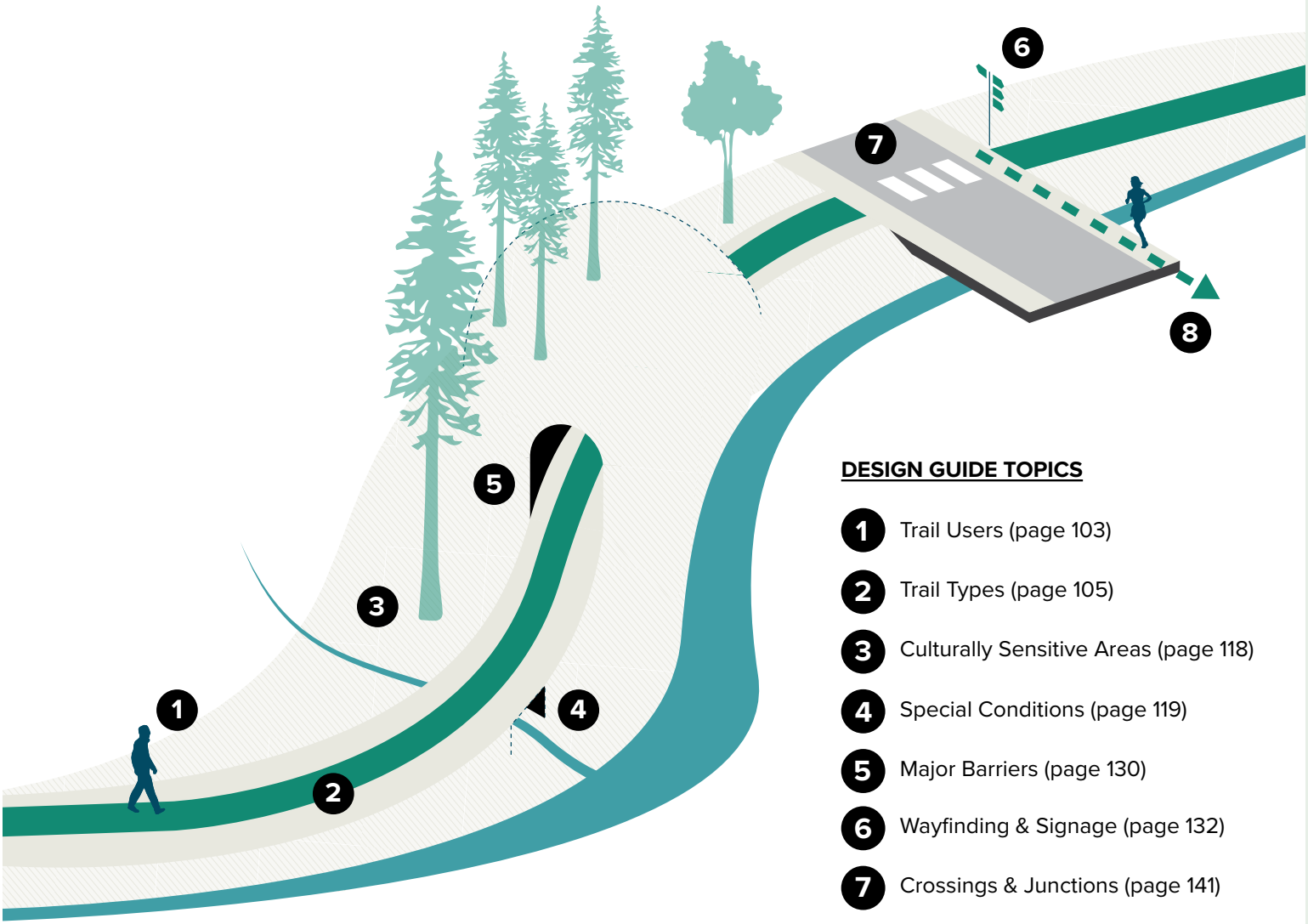
Community Meeting #1

TRAIL DESIGN GUIDE

Using the Design Guide

Throughout the corridor, the trail design will change to respond to constraints and needs of various locations. It is important to understand the trade-offs and conditions for each trail type, in addition to the wide array of elements and design decisions that will contribute to the GRT experience, including how the trail will navigate major barriers, cross roadways, and connect to communities and other trails.

The guidelines within this chapter reflect typical conditions and are represent a starting point for trail planning and design.



DESIGN GUIDE TOPICS

Accessibility

People with mobility-related disabilities experience greater barriers and participate less frequently in outdoor recreation activities than people without.[2] However, these individuals are just as interested to participate in hiking, sight seeing, visiting landmarks and destinations, bird watching, viewing wildlife, fishing, camping, horseback riding, backpacking, and canoeing.[3] Common reasons cited for not participating in outdoor recreation include:

- Personal Health
- Inadequate Transportation
- Concerns with Personal Safety
- Inadequate facilities
- Poorly maintained facilities

THE GOAL

The GRT will be a destination and regional asset for all ages and abilities of trail users. A central goal for the trail design is to create a high quality trail experience with access to previously inaccessible recreational destinations for people with disabilities.

STANDARDS AND REGULATIONS

The legal requirements of the Americans with Disabilities Act (ADA) are a minimum standard for accessibility. These standards emphasize technical details over experiential quality, and can result in places that are still very challenging for people with disabilities to access. In addition to ADA, a number of federal and state regulations, standards, and design guidelines provide technical guidance and best practices for accessible design of trails and recreational amenities.

- Accessibility Guidebook for Outdoor Recreation and Trails, (2012, USFS).
- Accessibility Guidelines for Outdoor Developed Areas (2014, US Access Board).
- ADA Standards for Accessible Design, (2010, US Department of Justice).
- Accessibility Guidelines, (2015, California State Parks).
- Forest Service Outdoor Recreation Accessibility Guidelines (2013, USFS).
- Forest Service Trail Accessibility Guidelines (2013, USFS).
- Wayside Exhibits: A Guide to Developing Outdoor Interpretive Exhibits (2009, NPS).

Accessibility standards, regulations, and design guidelines that will help inform the design of the GRT.

UNIVERSAL DESIGN PRINCIPLES

To go beyond baseline accessibility standards, the GRT should adopt universal design principles. **A trail with universal design creates facilities and experiences that are usable by all people, to the greatest extent possible, without the need for adaptation or specialized accommodations.**

The expectation is not that the entire 231-mile trail will be accessible to all users, as long reaches of backcountry trail through the Eel River Canyon have inherent accessibility challenges and feature long stretches between public access points, natural surface trails, steep and rugged cross-slopes, and limited shade and water. However, the trail should maximize accessible and equitable experiences where practical and avoid barriers to access that are easily avoidable.

2 Williams, R., Vogelsong, H., Green, G., and K. Cordell. (2004). Outdoor recreation participation of people with mobility disabilities: selected results of the national survey of recreation and the environment. USFS.
3 Brown, T.J., Kaplan, R., and G. Quaderer. (1999). Beyond accessibility: preference for natural areas. Therapeutic Recreation Journal.

UNIVERSAL DESIGN FOR THE GRT

Universal design principles are integrated throughout the design guidelines for the GRT, as highlighted below.

TRAIL DESIGN

The trail follows a historic rail line with relatively flat grades. Over 160 miles (68% of total trail) of the GRT is proposed multi-use trail. Multi-use trails offer a more accessible trail experience than single-track or backcountry trails, and are designed per Caltrans and ADA standards for width and surface.

Paved multi-use trails account for 85 miles (36%), and are predominantly located within cities and towns. In high demand areas, these trails are sized to provide a wide enough experience for people rolling, walking, or biking without conflict.

Crushed stone multi-use trails account for 75 miles (32%), and provide a wide and compacted trail that extend from developed areas into natural and rugged environments.

TRAIL SUPPORT FACILITIES AND AMENITIES

The GRT will be supported by trailheads, campgrounds, linear parks, and day-use areas. Across these trail support facilities, amenities including restrooms, seating, potable water, parking, wayfinding, and shade will be provided, among other amenities. Along the trail, designated rest areas with shade and seating will be provided at regular intervals to provide a space to rest as well as respite from heat.

To the greatest extent possible, these facilities and amenities will be universally designed to provide adequate size and space for approach and use, clear communication of amenity locations, and simple and intuitive layouts that are easy to use.

Paved multi-use trails are proposed for 36% of the GRT (Trail Access Project).

Crushed stone multi-use trails are flat, compacted, and accessible by a wide range of users (Trail Access Project).

Seating, such as benches with backs and accessible picnic benches, will be provided at trailheads and along the trail.

ACCESS & ROAD CROSSINGS

The GRT will create a new and safe route across cities and towns for all ages and abilities of people. Where the trail crosses roadways midblock or at intersections, dedicated trail crossings will be provided that prioritize the safety of all trail users through traffic calming, pedestrian signals and beacons, and pedestrian refuge islands. Wide curb ramps with detectable warning surfaces will be provided at all crossings. The trail features numerous underpasses and bridges that will allow trail users to cross roadways entirely separated from vehicles.

Trailheads across the corridor will provide new access to previously inaccessible destinations. Select backcountry trailheads along the Eel River Canyon will create new universally designed viewpoints, day-use areas, and interpretive elements.

WAYFINDING

Wayfinding will be simple and intuitive to use, and not overburden users with excess information. Wayfinding signage will be both universal and usable for the widest possible use and with special consideration for those without English language proficiency or map-reading skills. In many locations, wayfinding may be multi-lingual. Wayfinding will be predictable and consistent, including reliable placement and design of signs (i.e., sign materials, dimensions, colors, and forms). Trail maps will employ consistent symbology, fonts, colors, and style. Fonts will be high contrast and legible for users with limited visibility or color blindness. Wayfinding will provide clear communication of destinations, distances, and difficulty.

At interpretive locations, panels should be made broadly accessible regardless of physical or sensory ability. Audio or tactile communication should be integrated into the design to the greatest extent possible.

Trail crossings will prioritize safety for all trail users with traffic calming features including pedestrian refuge islands and flashing beacons.

Interpretive elements should be accessible via mobility device and may feature audio and tactile elements for more universal access.

Trail Users

The GRT will support a diverse set of users, ranging from day hikers and horseback riders to through bike-packers and backpackers. A detailed breakdown of trail users and their requirements is shown in Table 10.

An existing tunnel along the Eel River Canyon.

Table 10: *Trail user descriptions and requirements*

CATEGORY	USER	DESCRIPTION	PRIMARY SEASON	GROUP SIZE	TRIP TIME	TRAIL DESIGN NEEDS
Pedestrians & Hikers	Pedestrians	Walking for leisure, recreation, or transportation.	Year Round	1 to 4	30 minutes to 2 hours	Paved or crushed-stone surface.
	Pedestrians with Accessibility Device	Walking for leisure, recreation, or transportation while using an accessibility device such as a crutch or wheelchair.				
	Day Hikers	Hiking during the day, beginning and ending at the same point.	Spring, Summer, Fall	2 to 6	2 to 8 hours	Any surface.
	Section Hikers	Hiking a section of the GRT one-way, often backpacking and camping along the way.		2 to 4	8 hours to many days	
	Through Hikers	Hiking all or much of the GRT one-way, backpacking and camping along the way.		4 to 12	Days to months	
	Organized Hiking Groups	Hiking with an organized commercial or educational hiking group, backpacking and camping along the way.			8 hours to many days	
Equestrians	Day Use	Equestrian ride during the day, beginning and ending at the same point.	Spring, Summer, Fall	1 to 8	2 to 8 hours	Crushed-stone or natural earth surface. Separated from other trail users in high demand areas.
	Pack Trains	Hiking while supported by pack livestock (horses, mules, llamas).	Spring, Fall		2 hours to many days	
	Multi-Day Trip	Equestrian multi-day trip, carrying supplies and camping along the way.			Days to weeks	
Cyclists	Cyclists	Cycling for leisure, recreation, or transportation on a conventional bicycle.	Year Round	1 to 10+	2 to 8 hours	Paved or crushed-stone surface.
	E-Bikers	Cycling for leisure, recreation, or transportation on an e-bicycle.		1 to 2		
	Mountain Bikers	Mountain biking along wilderness trails.	Spring, Summer, Fall	1 to 4		Any surface. Preference for crushed-stone or natural earth surface.
	Gravel Bikers	Gravel biking along wilderness trails.				
	Bike-Packers	Mountain or gravel biking multi-day trip, carrying supplies and camping along the way.			Days to weeks	Any surface.
	Touring Cyclists	Road and trail cycling on a multi-day trip, carrying supplies and camping or staying in hotels along the way.		1 to 10+		Paved or crushed-stone surface.
River Users	Kayak/Canoe - Day Use Leisure	Kayaking or canoeing for leisure or recreation during the day.	Spring, Summer, Fall	1 to 8	2 to 8 hours	N/A
	Kayak/Canoe - Day Use Whitewater	Kayaking or canoeing whitewater sections of the Eel River during the day.	Spring, Fall			
	Kayak/Canoe - Multi-Day Use	Kayaking or canoeing on a multi-day trip, carrying supplies and camping along the way.			Up to 3 days at a time	
	Raft Multi-Day Trip	Rafting on a multi-day trip, carrying supplies and camping along the way. Trips may be recreational, commercial, or educational.		2 to 25		

Trail Types

OVERVIEW

The GRT will feature a range of trail types—different widths and surface materials—that vary based on trail users, anticipated demand, and environmental context. Across the entire corridor, there are three categories of trail types. The proposed extents of each trail type are shown in Figure 13.

PAVED MULTI-USE TRAIL

A 8ft- to 16ft-wide concrete or asphalt trail that can accommodate bi-directional flows of cyclists and pedestrians without conflict, and may feature parallel pedestrian or equestrian sidepaths in select locations with available space and user demand. Paved multi-use trails are best suited within cities, towns, and locations with high demand.

CRUSHED STONE MULTI-USE TRAIL

An 8ft- to 12ft-wide compacted crushed stone multi-use trail that can accommodate bi-directional flows of pedestrians, cyclists, and equestrians without conflict. This trail type is best suited for suburban and rural areas with average demand. This trail type may serve as a transition between paved and backcountry trails.

BACKCOUNTRY TRAIL

A 2ft- to 6ft-wide trail constructed of gravel or bare earth material found on-site. This trail type is best suited for rural or wilderness areas with lower demand, frequent landslides, or highly constrained environments such as the Eel River Canyon.

The cross-sections for each trail type are coded as follows, beginning on "Backcountry Trail" on page 108:

- Backcountry (B-series) - page 108
- Crushed Stone Multi-use Trail (C-series) - page 111
- Paved Multi-use Trail (P-series) - page 114

Paved multi-use trail (Existing in Eureka)

Crushed stone multi-use trail

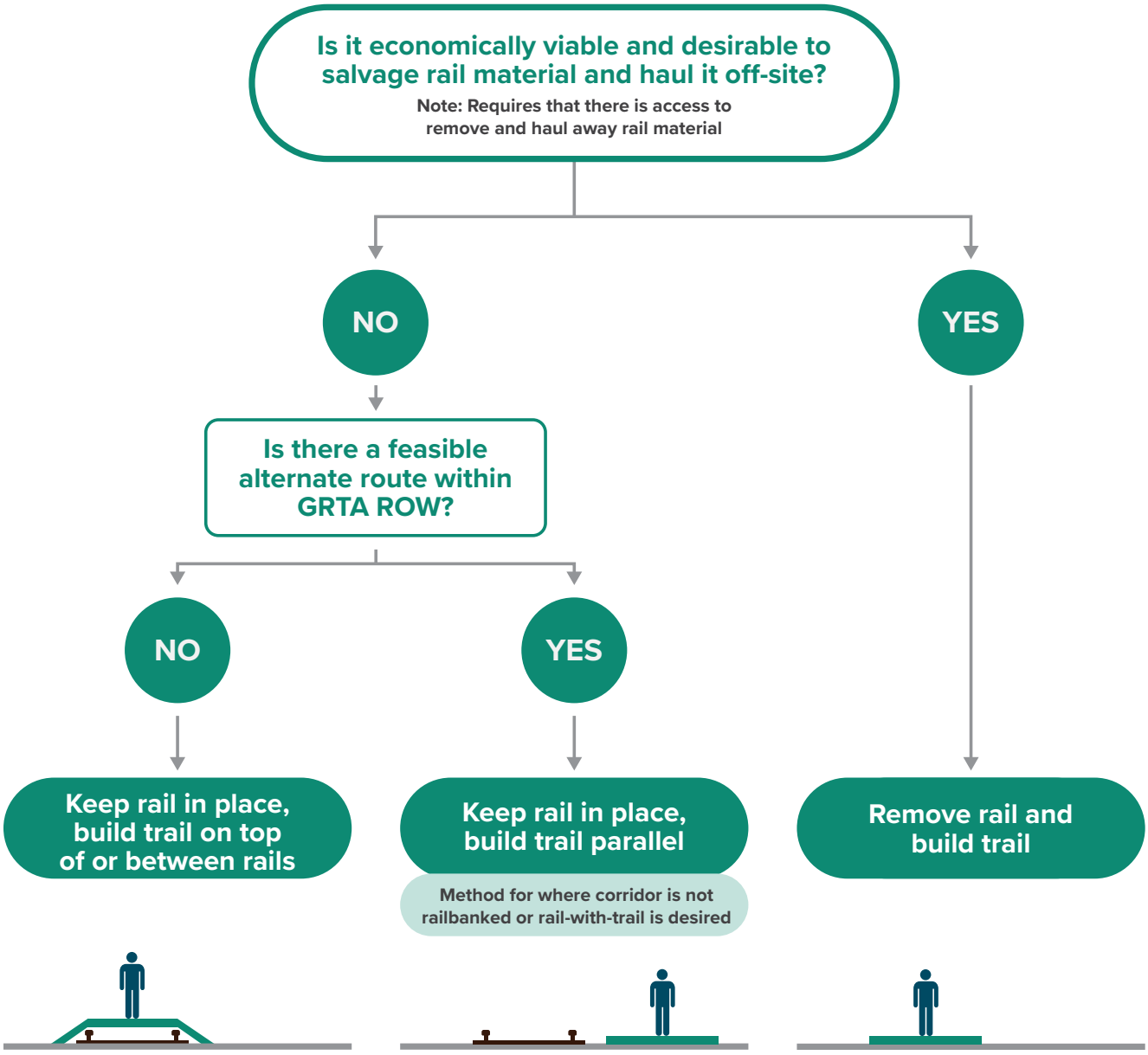
Backcountry trail

Figure 13: *Map of Proposed Trail Types for the GRT*

TRAIL CONSTRUCTION METHODS

In addition to trail type, the GRT design is impacted by context, existing condition of the rail and ties, railbanking status, and the width and condition of the right-of-way (ROW). The flowchart in Figure 14 provides a general approach for determining a suitable construction method.

Figure 14: *Decision-making flowchart for trail construction approaches*



BACKCOUNTRY TRAIL

Backcountry trails are predominantly located in areas with steep cross-slopes along the Eel River Canyon. These areas have frequent landslides and washouts, with limited access to bring in construction materials or equipment.

Typical condition of the backcountry trail is a 2ft- to 6ft-wide natural earth or crushed stone trail, with 2% to 5% cross-slope for drainage, as shown in Figure 15.

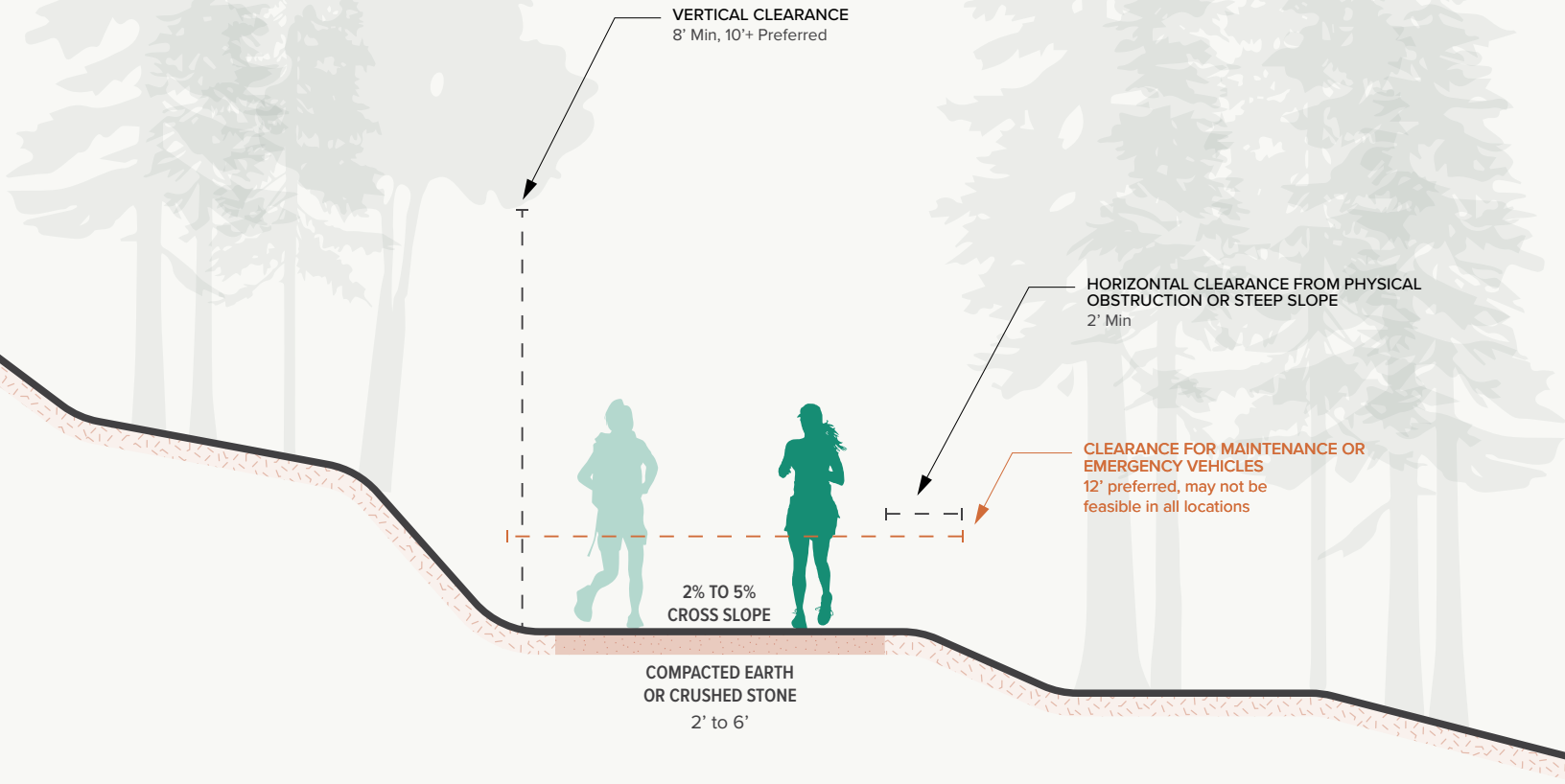


Figure 15: *Backcountry trail - typical section*

RAIL REMAINS, TRAIL PARALLEL TO RAIL

B.1 Trail Parallel to Rails

In locations where there is a wide enough rail bench, the trail can be constructed parallel to the rails within the ROW. This may be relevant in locations where the outboard portion of the rail bench and the rails have been washed out or are unstable.

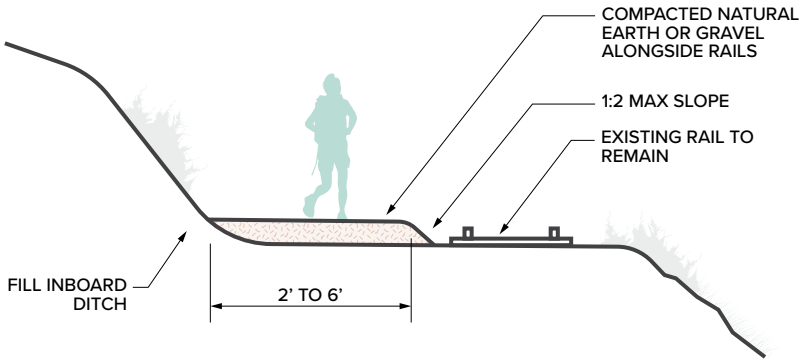


Figure 16: *Backcountry trail parallel to rails - typical section*

RAIL REMAINS, TRAIL ON TOP OF RAIL

B.2 Trail between Rails

This trail design keeps the rail and ties in place, and infills gravel or natural earth material between the rails. This creates a 4.5ft-wide trail between the rails, which remain exposed on the top and outsides. Where feasible, an equestrian sidepath may be maintained adjacent to the trail.

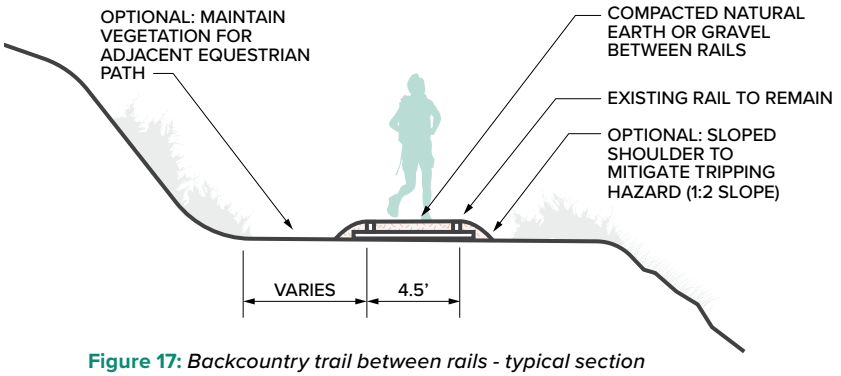


Figure 17: *Backcountry trail between rails - typical section*

B.3 Trail Fill on Top of Rails

This trail design keeps the rail and ties in-place, and buries them underneath infill natural earth material. This option requires greater fill than the other backcountry options.

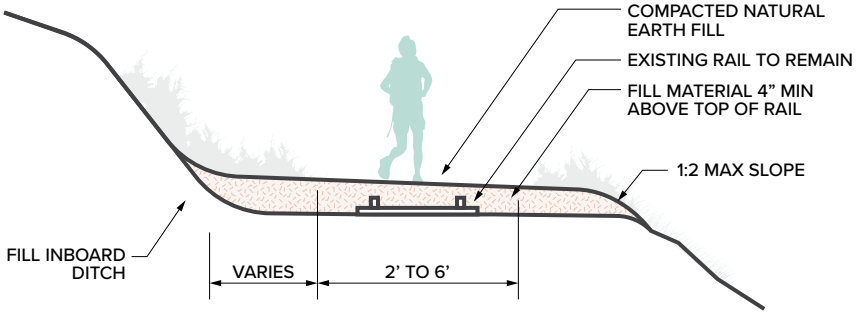


Figure 18: *Backcountry trail over existing rails - typical section*

RAIL REMOVED, TRAIL IN PLACE

B.4 Trail with Rails Removed

This trail design removes the rail to be salvaged or hauled off-site. The rail ties remain buried underneath infill natural earth material. This option is contingent on being able to remove and haul the rails off-site.

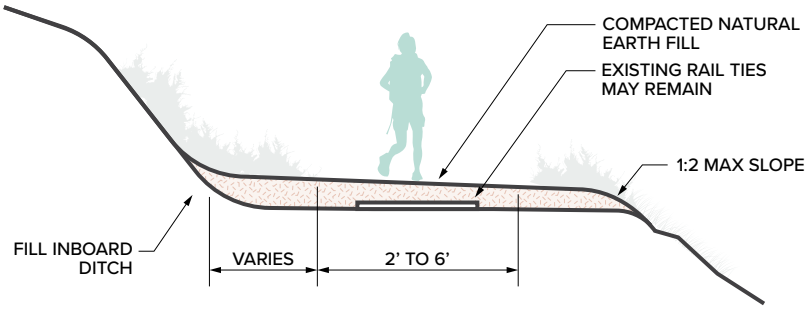


Figure 19: *Backcountry trail with rails removed - typical section*

NO EXISTING RAIL, TRAIL BENCHING

The backcountry trail type traverses numerous sections with frequent geomorphic activity. In locations where the historic rail line has been buried (landslide of material from upslope) or completely eroded (washout of material from downslope), the trail alignment will need a newly constructed bench on which to site.

B.5 Cut Bench

In the event of a landslide, a cut-bench trail is required to navigate around the slide. The full width and design are dependent on the existing slope and stability. Where feasible, the new bench should generally follow the existing contours of the historic rail bed to minimize slopes. Retaining walls constructed of timber, boulders, or other material may be required on the downslope in select locations (not shown).

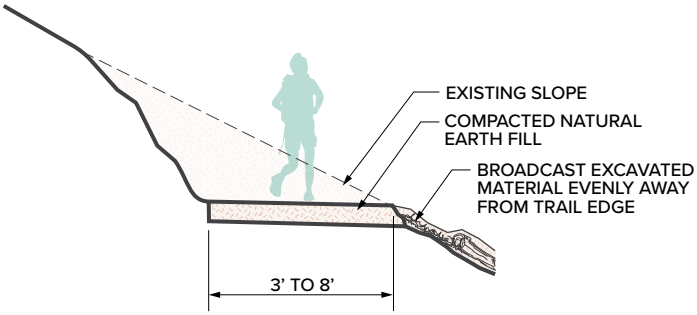


Figure 20: *Backcountry trail cut bench - typical section*

B.6 Fill or Balanced Bench

In the event of a washout, a fill- or balanced-bench trail is required to navigate around the slide. The full width and design are dependent on the existing slope and stability. Where feasible, the new bench should generally follow the existing contours of the historic rail bed to minimize steep slopes and cut into the upslope. Retaining walls constructed of timber, boulders, or other material may be required on the upslope in select locations (not shown).

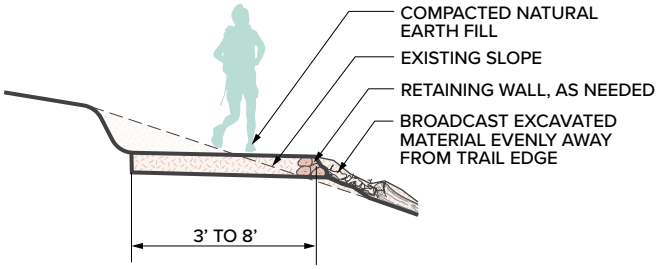


Figure 21: *Backcountry trail fill or balanced bench - typical section*

PARALLEL ROUTE AROUND HISTORIC RAIL ALIGNMENT

B.7 Backcountry Parallel Routes

Locations with active geomorphic activity and failed or unusable structures may feature backcountry parallel routes that route off the historic rail alignment. These trail sections will traverse steep slopes and should adhere to the backcountry trail-building best practice design guidance from *California State Parks Trails Handbook*.

Backcountry parallel routes should follow CA State Park guidance.

CRUSHED STONE MULTI-USE TRAIL

Typical condition of the crushed stone multi-use trail is 8ft- to 12ft-wide compacted crushed stone trail, shown in Figure 22. The trail features a 2% max cross-slope for drainage and increased accessibility.

Surface aggregate for a crushed stone multi-use trail should produce a firm and stable surface. The size and specification of aggregate may vary based on context, intended trail users, and underlying soil condition. Crushed stone or gravel with good gradation (i.e., varying sizes) will have fewer voids once compacted and result in a stronger and more durable trail. Crushed stone or gravel used for the trail surface should be free of organic material and fully compacted.

Per CA State Park guidelines, 3/4 inches or less crushed stone/gravel results in a smooth surface and is preferred for accessible and higher demand multi-use trails. 1.5 inches or less crushed stone/gravel is suitable for pedestrian- and equestrian-only trails and features a more coarse surface. Dimensions of less than 3/8 inches or less are not recommended.

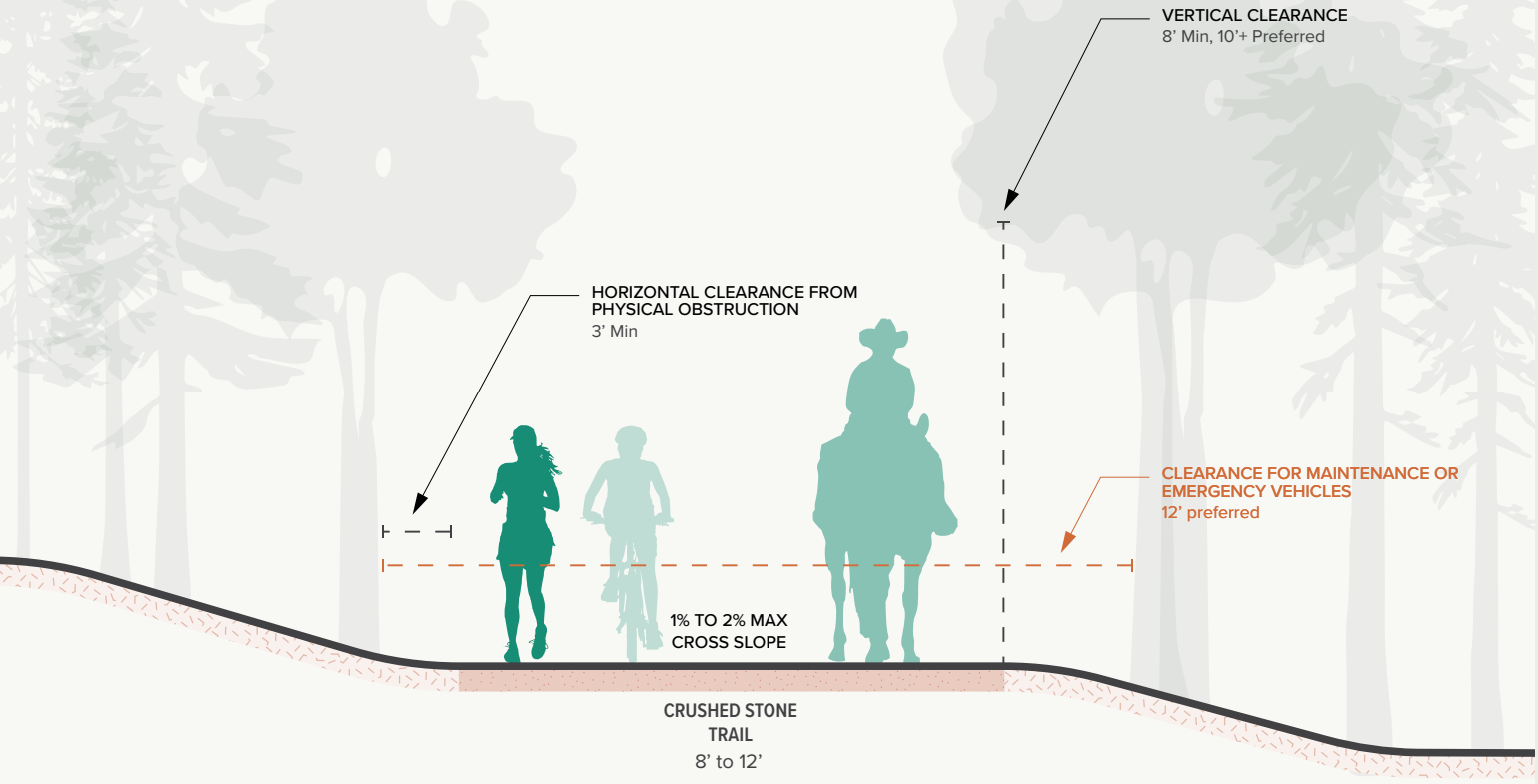


Figure 22: *Crushed stone multi-use trail - typical section*

RAIL REMAINS, TRAIL PARALLEL TO RAIL

C.1 Trail Parallel to Rails

In locations where there is a wide enough rail bench, the trail can be constructed parallel to the rails within the ROW.

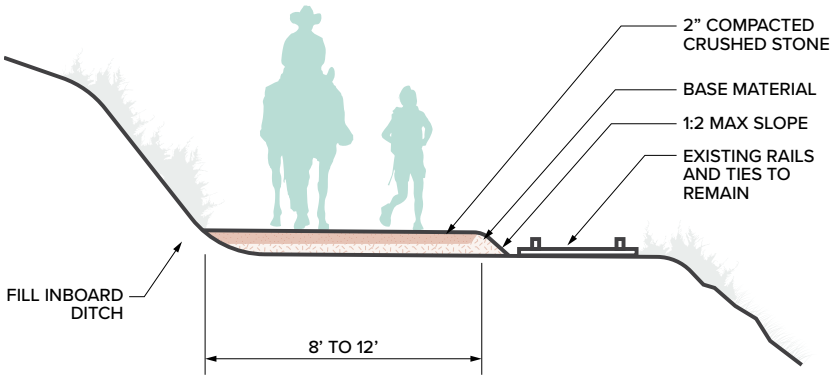


Figure 23: *Crushed stone multi-use trail parallel to rails - typical section*

RAIL REMAINS, TRAIL ON TOP OF RAIL

C.2 Trail Fill on Top of Rails

This trail design keeps the rail and ties in place, and buries them underneath compacted crushed-stone fill. This option requires significantly greater fill than the other crushed-stone trail options, and is most likely for remote sections where hauling the rail salvage away is prohibitive.

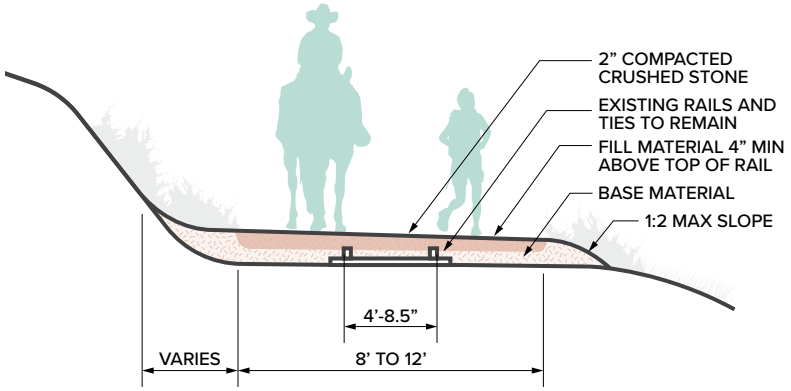


Figure 24: *Crushed stone multi-use trail over existing rails - typical section*

RAIL REMOVED, TRAIL IN PLACE

C.3 Trail with Rails Removed

This trail design removes the rail to be salvaged or hauled off-site. The rail ties remain buried underneath compacted crushed stone fill. This option is contingent on being able to remove and haul the rails off-site.

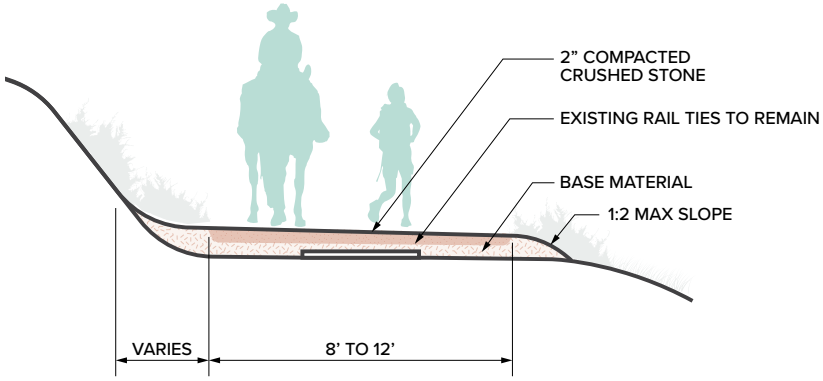


Figure 25: *Crushed stone multi-use with rails removed - typical section*

NO EXISTING RAIL, TRAIL BENCHING

While the crushed-stone trail type is recommended in fewer locations with geomorphic activity than the backcountry trail, there are extents that may require creating a new bench.

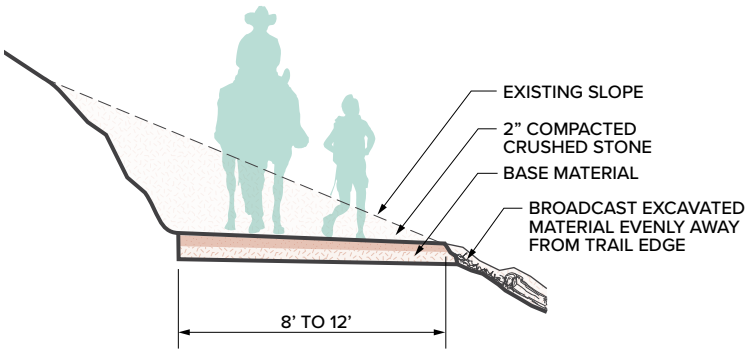


Figure 26: *Crushed stone multi-use trail cut bench - typical section*

C.4 Cut or Balanced Bench

In the event of a landslide, a cut- or balanced-bench trail may be necessary to navigate around the slide. The full width and design is dependent on the existing slope and stability. Where feasible, the new bench should generally follow the existing contours of the historic rail bed to minimize slopes. Retaining walls constructed of timber, boulders, or other material may be necessary in select locations.

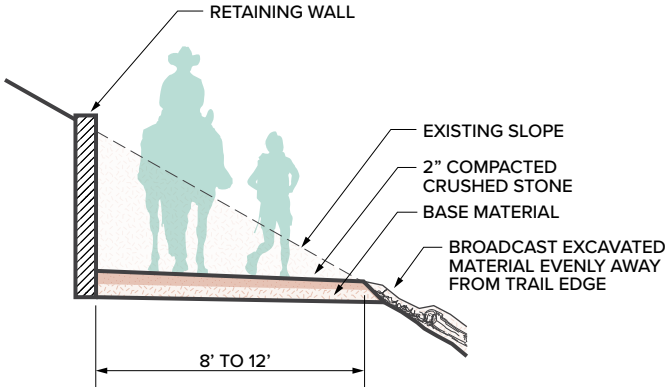


Figure 27: *Crushed stone multi-use trail cut bench with retaining wall - typical section*

PAVED MULTI-USE TRAIL

In contrast to backcountry and crushed-stone multi-use trail types, the paved multi-use trail type is generally located in flatter and more populated areas with infrequent geomorphic activity. Paved multi-use trails should meet Caltrans and California State Park design standards.

The standard paved trail configuration includes a 8ft- to 16ft-wide paved trail with 2ft min crushed stone shoulders, shown in Figure 28. 8ft is the minimum width for constrained or lower-demand areas only. For higher-demand areas with greater diversity of users, a 10ft minimum width is preferred. The trail features a 2% max cross-slope for drainage and increased accessibility. In areas with available ROW, a parallel pedestrian or equestrian sidepath may be considered.

Paved multi-use trails are predominantly conventional asphalt or concrete. Alternative surface materials such as porous asphalt, pervious concrete, or paver systems may be considered in select locations. These alternative surface materials offer benefits for stormwater and sustainability, but are not widely recommended due to higher upfront costs and specialized ongoing maintenance requirements.

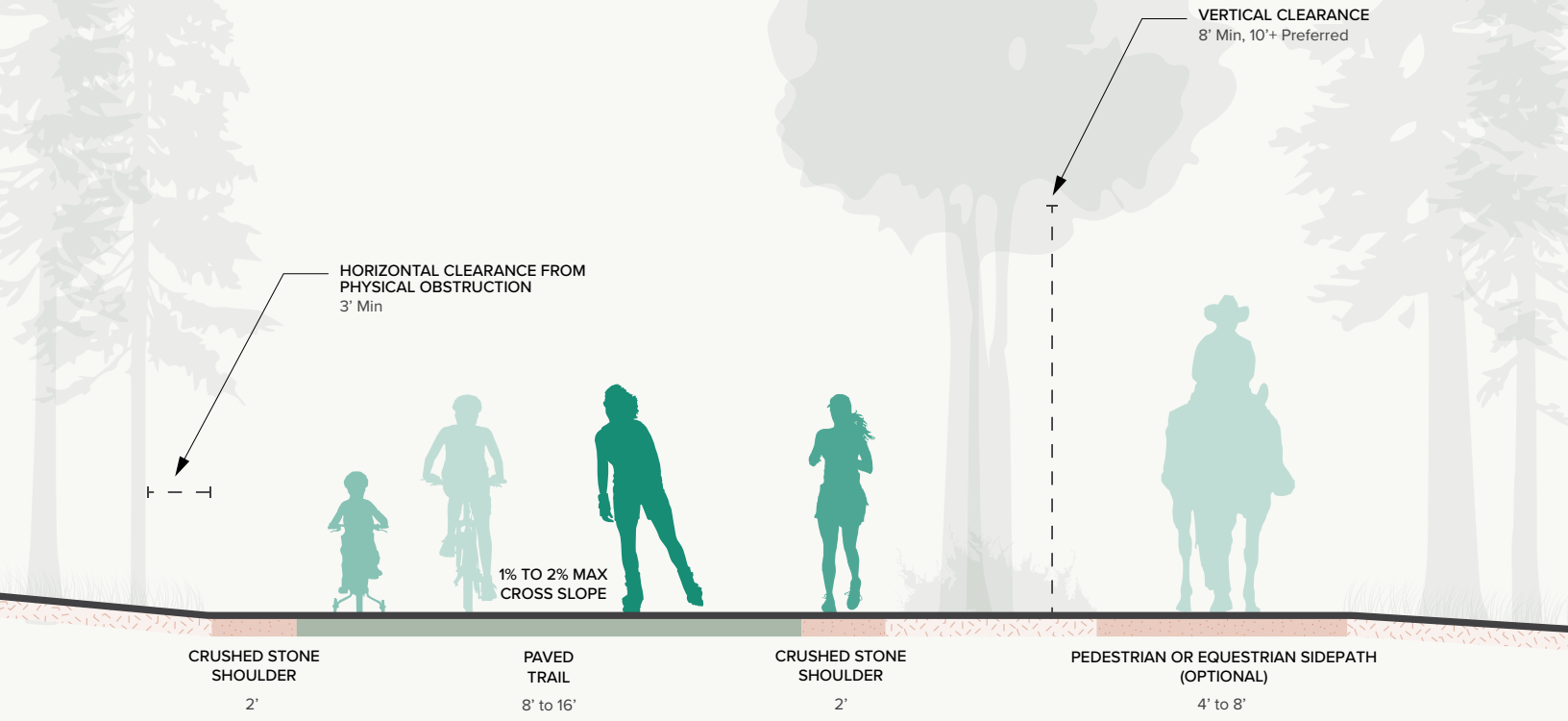


Figure 28: *Paved multi-use trail - typical section with equestrian sidepath*

RAIL REMAINS, TRAIL PARALLEL TO RAIL

P.1 Trail Parallel to Rails

In locations where there is a wide enough ROW or the section is not railbanked, the trail can be constructed parallel to the rails within the ROW. The offset will vary based on the status and use of rail. For locations of trail with active railroad, see Figure 33.

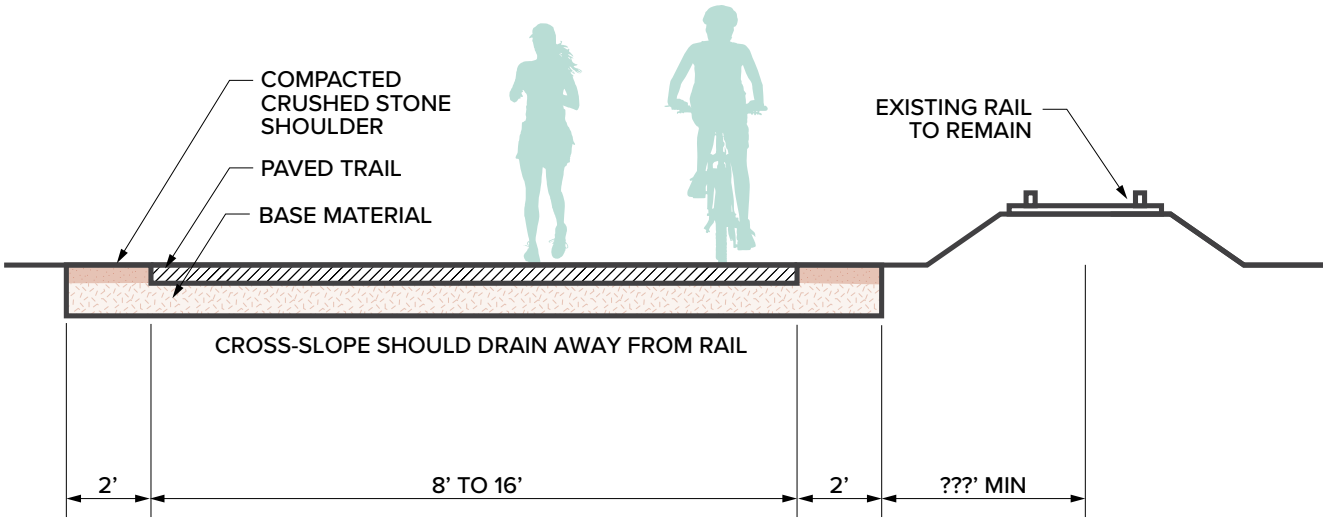


Figure 29: *Paved multi-use trail parallel to rails - typical section*

RAIL REMOVED, TRAIL IN PLACE

P.2 Trail with Rails Removed

This trail design removes the rail to be salvaged or hauled off-site. The rail ties may remain buried underneath the paved trail base material. In many locations, the existing rail line is on a raised rail bed prism that the trail may be constructed on top of.

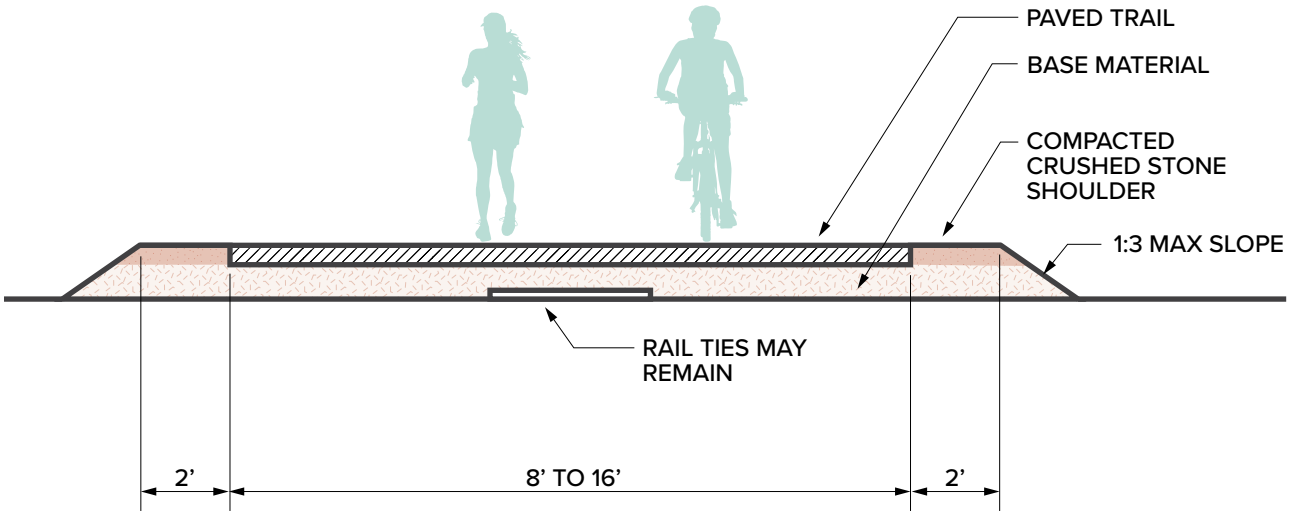


Figure 30: *Paved multi-use trail with rails removed - typical section*

MULTI-USE TRAIL CONFIGURATIONS

The following trail configurations may be applicable in different settings depending on anticipated trail users, context, and railbanking status. Each of these configurations may be combined with P.1 or P.2, where feasible.

P.3 Shared Use with Equestrian Sidepath

This trail configuration includes the standard 8ft- to 16ft-wide paved trail with a parallel 6ft- to 8ft-wide crushed-stone equestrian sidepath. Where feasible this configuration should feature a minimum 5ft-wide natural or landscaped buffer between the trail and sidepath.

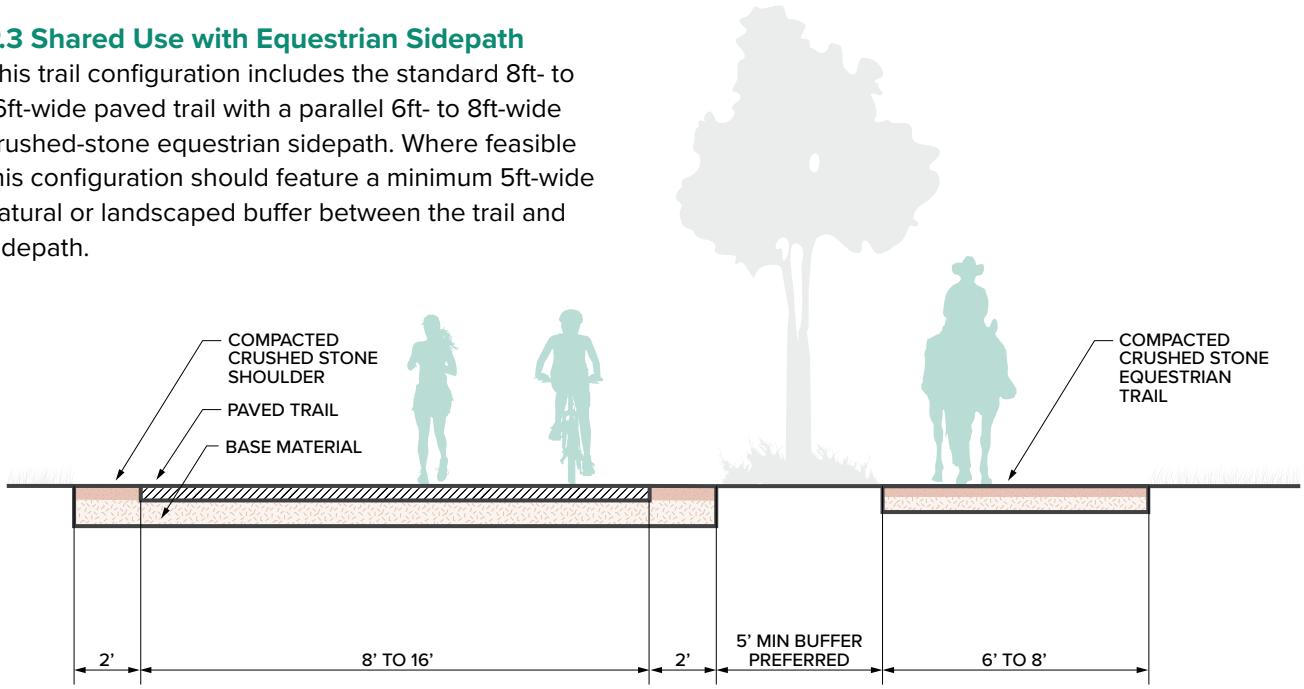


Figure 31: *Paved multi-use trail with equestrian sidepath - typical section*

P.4 SEPARATED USE WITH PED SIDEPATH

This trail configuration includes an 8ft- to 12ft-wide paved bike path with a parallel 4ft- to 6ft-wide crushed-stone pedestrian sidepath. This configuration may feature a minimum 5ft-wide landscaped buffer between the trail and sidepath.

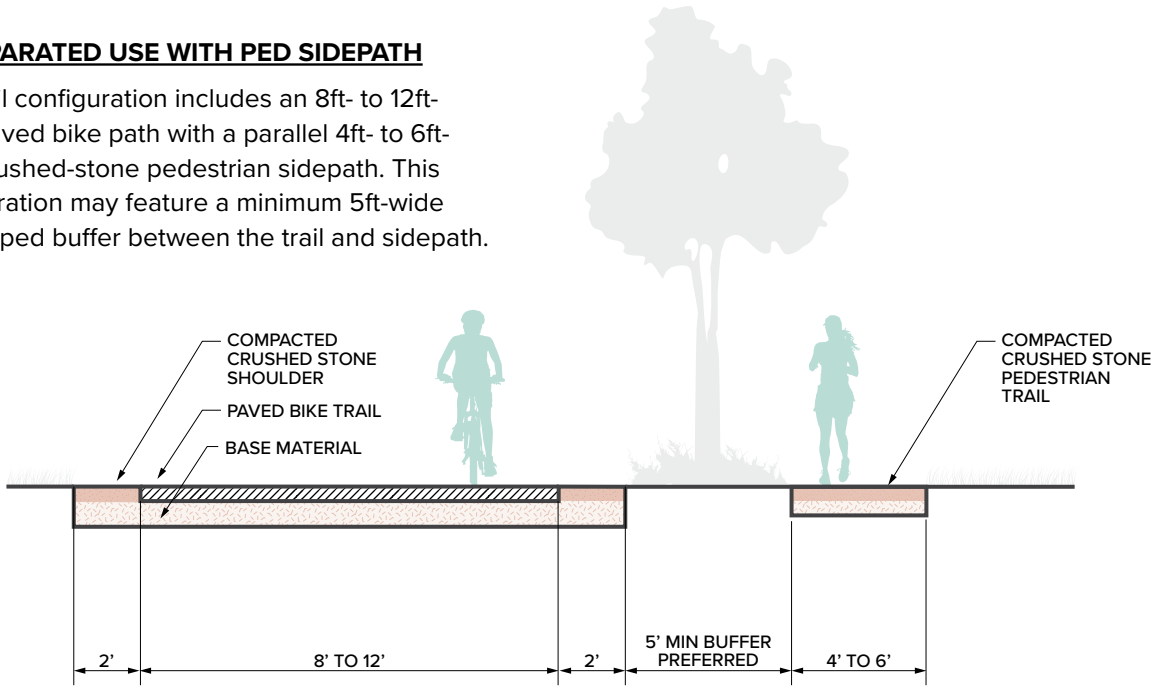


Figure 32: *Paved multi-use trail with paved bikeway and pedestrian sidepath - typical section*

P.5 Rail-with-Trail

In locations where the trail is not railbanked, adjacent to existing railroad, or adjacent to anticipated future rail, a rail-with-trail condition may be required. This configuration includes a standard paved multi-use trail separated from the rail by a security fence.

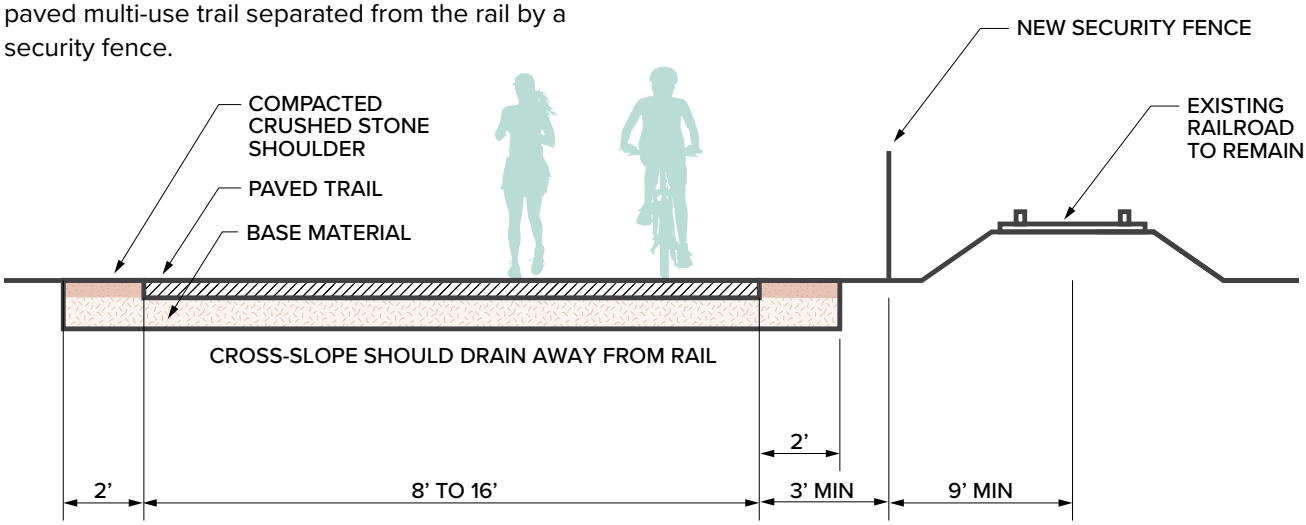


Figure 33: *Paved multi-use trail with rail - typical section*

Quick-Build Trail Options

All of the trail types outlined in this section may serve as a final implemented design for portions of the trail. However, many segments may be phased as quick-build trails that can be implemented with lower costs and a shorter timeline. These quick-build trails may later be improved due to increased funding, expanded access, or higher levels of user demand.

The steps in Figure 34 indicate different levels of development, from the quickest-build (level 0) to the longest timeline (level 5). Not all trails will need a quick-build option while others may skip several levels (e.g., going from a backcountry trail (Level 1) to a paved multi-use trail (Level 3), or from a minimally maintained trail (Level 0) to a backcountry trail with rails removed (Level 2).

These quick build levels are intended to provide general guidance and a range of design options for phased implementation. Quick-build designs are short-term solutions and are not intended to replace or override the proposed trail types outlined in Figure 13.

Level 0: No new trail surface, maintenance only. The existing rails or adjacent GRTA ROW are maintained to provide a navigable trail.

Level 1: Build a backcountry trail without removing the rail ties (B1 or B2, page 109**).**

Level 2: Remove rails and construct a full-width backcountry (B3, page 109) or crushed stone multi-use trail (C1 or C2, page 112).

Level 3: Convert backcountry or crushed-stone multi-use trail to a paved multi-use trail (P1 or P2, page 115).

Level 4: Modify paved multi-use trail to provide pedestrian or equestrian sidepath (P3 or P4, page 116).

Figure 34: *Quick-build options for the GRT*

Culturally Sensitive Areas

Culturally sensitive areas may include tribal ancestral lands, sacred spaces, and sensitive cultural resource sites. Identifying culturally sensitive areas requires ongoing coordination and communication with California Native American tribes throughout the trail design process, from planning stages through construction.

Dyerville Loop

A general approach to culturally sensitive areas along the GRT includes the following:

- Respectfully consult early and often with tribes to build long-term relationships.
- Offer government-to-government consultations to California Native American tribes.
- GRTA staff and board, in collaboration with California Native American tribes, could develop and adopt a protocol for cultural resource protection.
- Early in project implementation planning, work with appropriate tribes to identify culturally sensitive sites and plant species for protection or tribal access. All cultural resources investigations required by AB 52 and by Section 106 of the National Historic Preservation Act will be conducted and paid for by the Great Redwood Trail Agency (GRTA) or local trail development partners and involve tribal participation. Copies of cultural resources survey reports should be shared with the respective tribes listed with the California Native American Heritage Commission (NAHC).
- Where feasible, the GRTA should consider alternate routes to avoid sensitive cultural sites and sacred spaces.
- Early in project implementation planning, identify opportunities for and invite tribal participation in ecological restoration activities and construction monitoring.
- Invite interested California Native American tribes to co-manage portions of the trail that cross ancestral tribal lands.
- Find ways to hire California Native American tribal community members to engage in paid stewardship activities such as construction monitoring, leading tours or performing trail patrols, or maintenance.
- Explore creating jobs for tribal members or having a tribal preference in the hiring process.
- Install interpretative signage and tribal artwork along the trail that is developed by California Native American tribal community members.
- Name portions of the trail using native languages.
- Consider building an interpretive center and/or culturally important buildings. If built, ensure it is located in collaboration with local tribes to avoid trespassing, or identification of and possible damage to sensitive cultural resource areas.
- Take steps to ensure the trail is as safe as possible for all.
- Consider creating a memorial to Murdered and Missing Indigenous People (MMIP).
- Consider forming a tribal advisory committee to provide input and collaboration as the GRT is developed.

Special Conditions

The GRT features a number of special conditions unique to the corridor that require context-specific design elements. Special conditions include:

- **Significant Cultural Resources.** Tribal culturally sensitive areas merit special considerations for trail design and planning. For additional information, reference on "Culturally Sensitive Areas" on page 118.
- **Drainage & Creeks.** Includes a spectrum of solutions for crossing drainage channels or creeks that may be employed in locations with washouts or culverts.
- **Bridges & Trestles.** Includes design guidance for new or structurally intact existing bridges or trestles.
- **Tunnels.** Includes design guidance for retrofitted or structurally intact existing tunnels.
- **Undercrossings.** Includes guidance for existing undercrossing locations.
- **Access Control.** Includes design treatments along the trail to increase security of trail to and from adjacent private properties, as well as private livestock crossing easements across the trail.

Additionally, there are numerous toxic material sites along the corridor that require specific attention. For additional information, reference page 412.

Existing failed culvert

Existing tunnel

Existing bridge

DRAINAGE & CREEK CROSSINGS

Predominantly through the Eel River Canyon and other backcountry areas, the GRT crosses a wide range of hydrological features from rivers to streams to seasonal drainage channels. There is no one-size-fits-all crossing solution and a number of factors should be considered, including drainage flows and frequency, construction complexity and cost, and desired water quality protection.

The drainage and stream crossing options are listed to the right in order from **lower cost and impact** to **higher cost and impact.**

- Dirt Crossings
- Hardened Crossings
- Boardwalks
- Drain Lens
- Culverts
- Stream Restorations

DIRT CROSSINGS

Dirt crossings can be utilized for drainages where flows are spread out and clearly intermittent and where the facility is low-use.

- Applicable to Backcountry Trail

Dirt Crossings - drainage sheet flows across trail

HARDENED CROSSINGS

Hardened crossings are most appropriate for drainages that experience seasonal, slow moving water that would otherwise erode a trail. Trail hardening can be accomplished through a variety of materials such as road base or large flat stones tightly fitted together.

- Applicable to Backcountry Trail

Hardened Crossings

BOARDWALK

Boardwalks are typically elevated up to 4ft above the ground. They are used to span wet, boggy areas but may also be used in areas with chronically standing water or poor soil capability such as sand. They usually consist of sills, piers, joists, soil dams, and decking. Bull rails are used in accessible and equestrian trail designs. Boardwalks should also include posts and railings when higher than 30in off the ground.

Boardwalks are a preferred crossing strategy for drainages with flowing or continuously present water. Where practical, the deck width shall at minimum match the trail width in that location.

- Applicable to Backcountry and Multi-Use Trails

Boardwalk

DRAIN LENS

Drain lens carry water under the trail surface, while maintaining surface flow characteristics. They are used for crossing ephemeral springs or low flow seeps that are less than 30ft in length. A drain lens can also be installed to provide cross drainage when low flows are anticipated. They consist of angular quarry rock of various sizes.

- Applicable to Backcountry and Multi-Use Trails

Drain lens

CULVERTS

Wherever possible, culverts should be removed to promote and restore natural drainage. In locations where steam restoration or bridging is infeasible or impractical, a culverted stream crossing may be considered. Culverts of various types and sizes are the most common existing stream crossing structure employed along the GRT corridor and are subject to failure over time. If used or existing culverts are maintained, design should minimize their impact on water quality, pass design peak flood flows, and provide for passage of fish and other aquatic organisms.

- Applicable to Backcountry and Multi-Use Trails

Existing Standards & References

Culverts need to be properly designed, constructed and maintained to prevent hydraulic exceedance, plugging, overtopping, the diversion of flood flows, and erosion. Designs must following standards adopted by the California Forest Practice Rules (CAL FIRE), the State Water Quality Control Board (and all Regional Water Quality Control Boards), and the Department of Fish and Wildlife, among others.

Existing Culverts

Culverted stream crossings along the route of the GRT were installed many decades ago and have subsequently experienced at least 25 years with no maintenance since the alignment was last used for rail transport in the late 1990s. While many culverted stream crossings are still functioning, a number of stream crossings have already failed and been washed out, and many others are in a state of disrepair and are increasingly subject to future failure. Culverted crossings along the GRT will need to be redesigned and replaced, upgraded, or converted to bridges to prevent future failures.

Culvert failures are frequent along the GRT and should be removed wherever possible to promote and restore natural drainage

Small culvert at trail crossing

Culvert Design or Retrofit

Culverted crossings are naturally susceptible to failure. If possible, culverts should be removed and replaced with a bridge or wet rock-armored crossing instead. Any new or reconstructed stream crossings should be designed and built to prevent the diversion of flood flows if and when the culvert becomes plugged.[1]

The following guidance should be used for the design, retrofit, and maintenance of culverts:

- Stream crossing culverts should have a drainage structure designed for at minimum the 100-year peak storm flow and associated debris. Undersized culverts should be upgraded to current design standards.
- Install debris barriers to capture floating woody debris slightly upstream of the culvert inlet before it can plug the culvert.
- Install wing walls and/or flared culvert inlet to either direct wood and sediment more easily through the culvert inlet or to cause it to be trapped upstream before reaching the inlet.
- Install an emergency overflow culvert higher in the fill (above the primary culvert) as a "relief valve" in case the main culvert becomes plugged. Existing culverts in large, deep fills (greater than backhoe or equipment reach) should have emergency overflow culvert installed to minimize failure potential.
- Maintain culvert inlet, outlet, and bottom to be open and in sound condition.
- Ensure sideslope fills at stream crossing culverts are stable. Unstable fills should be removed or stabilized.

Emergency overflow culvert next to primary culvert

Flared culvert inlet

1 Weaver, W., E. Weppner, and D. Hagans. 2015. Handbook for Forest, Ranch and Rural Roads: a Guide for Planning, Designing, Constructing, Reconstructing, Maintaining and Closing Wildland Roads. Ukiah, CA, Mendocino County Resource Conservation District, 420 p.

STREAM RESTORATION

Stream restoration should be employed for adequate fish passage and the passage of other aquatic organisms. Fish passage is expected and required for all life stages of migratory and resident fish encountering the crossing site.[2] Class I (fish bearing) stream crossings must meet CDFW and NMFS fish passage criteria.[3] Fish bearing streams require replacement of natural spawning gravels, increased channel complexity and reduced stream velocities, and unimpeded fish passage.

- Applicable to Backcountry and Multi-Use Trails

Stream Crossing Options

The best trail design for fish passage maintains the natural stream channel characteristics. The preferred stream crossing design options will maintain or simulate the natural streambed characteristics. They include:

- Bridges
- Boomless arches
- Embedded culverts
- Fords (only suitable in remote low-flow locations)

Bridge over Creek

Arched Culvert with Stream Bottom

2 (same as previous)
3 California Department of Fish and Game (CDFG). 1998. California Salmonid Stream Habitat Restoration Manual, 3rd edition, Part IX Fish Passage Evaluation at Road Crossings.

The Eel River near Humboldt Redwoods State Park

Environmental Restoration

The trail development creates the opportunity for environmental restoration along key waterways. Early in project implementation planning, the GRTA and local partners should identify opportunities for and invite tribal participation in ecological restoration activities.

Not all strategies will be feasible in all restoration locations due to cost, access, and physical constraints of the corridor. Environmental restoration may include the removal of the following:

- Collapsed rail infrastructure, depots, and failed tunnel portals
- Rail cars, cranes, and excavators
- Horse trailers
- Railroad track switches
- Communication poles and lines
- Grease boxes and other toxics
- Displaced culverts and culvert debris
- Scattered metal debris

Erosion Control

The remote Eel River Canyon is geomorphically unstable. Unstable fillslope materials can lead to catastrophic failures and the deposit of large volumes of sediment directly into the Eel River or to its tributaries. As a preventative measure, unstable fillslope material near waterways should be excavated and relocated to a permanent, stable spoil disposal site elsewhere along the alignment.

Slopes should be revegetated and reseeded with native grass and legumes. All plantings need to be natives from locally sourced seed stock.
In most cases, serious erosion problems are confined to a few, isolated locations where stream crossings need to be excavated, unstable sidecast needs to be removed, or the trail crosses unstable terrain and the entire rail prism needs to be removed. However most stream crossings will require simpler, permanent improvements to surface drainage, such as trail surface shaping, additional ditch relief culverts, drainage points, and rolling dips.

Revegetation

Revegetation projects can also prevent erosion, improve aesthetics, stabilize stream banks and provide improved hydrologic and riparian function. However, because it takes time to grow a thick, effective riparian cover, some physical erosion control measures (such as straw mulch, netted blankets or biotechnical methods) are often needed to stabilize restoration sites for the first several years following trail upgrades. Seeding with grass and legumes reduces erosion and can improve soil physical condition.[4] Planting trees and shrubs adds longer lasting vegetative and riparian cover and provides stronger root systems which enhance long term slope stability.

4 Weaver, W., E. Weppner, and D. Hagans. 2015. Handbook for Forest, Ranch and Rural Roads: a Guide for Planning, Designing, Constructing, Reconstructing, Maintaining and Closing Wildland Roads. Ukiah, CA, Mendocino County Resource Conservation District, 420 p.

BRIDGES & TRESTLES

Frequent bridges are needed for the GRT to navigate the constrained conditions of the corridor. Where existing rail bridges are structurally intact, they may be retrofitted for use as a trail. The safety determination of a bridge structure will be made by a licensed engineer on a case by case basis. In locations where an existing rail bridge or trestle cannot be reused, a new bridge will be considered.

In all bridge conditions, the surface material should be concrete for multi-use trails and decking for backcountry trail. Guardrails should be added outside of the navigable trail width. In locations with convenient access to utilities along multi-use trails, integral lighting should be considered.

ADAPTED BRIDGES

Existing rail bridges are constrained by their width, which typically varies from 10 to 15ft wide. The existing rails should be removed where feasible and the surface leveled with a new decking material. Trail width on the bridge should be maximized and at minimum match the width of the incoming trail and shoulders. A licensed engineer will need to assess whether or not the trail can serve emergency or maintenance vehicle access.

NEW BRIDGES

New bridges should provide a continuous trail experience with the adjoining trail, and should match or exceed the width of the trail and shoulders. The design and material of a new bridge structure will vary based on trail type, geomorphic and environmental context, soils, anticipated trail use and loading, and length. The design should prioritize durability and environmental impact. Prefabricated bridge products may be considered, particularly for spans 100ft long or less.

If the bridge is anticipated to handle emergency or maintenance vehicles, the structure needs to accommodate sufficient vehicle loading and clear widths. This guidance is location specific, and will not apply the same to all bridges. All required clearances over roads or waterways should be incorporated into the design.

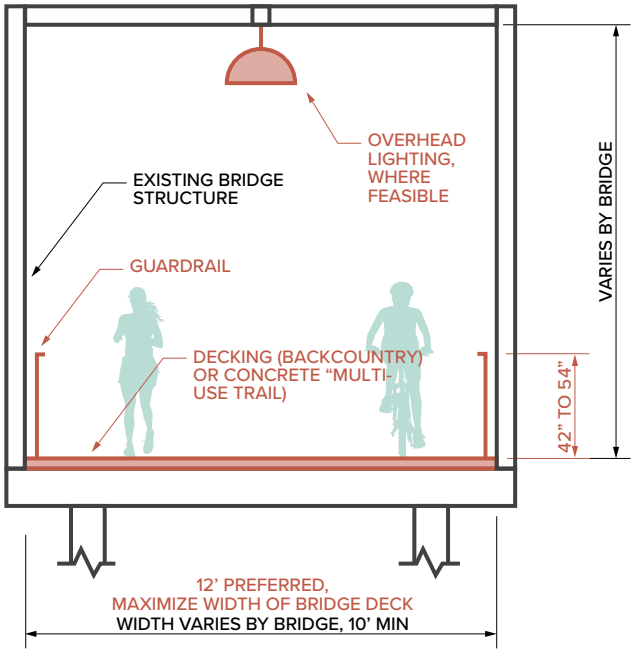


Figure 35: *Adapted bridge - typical section*

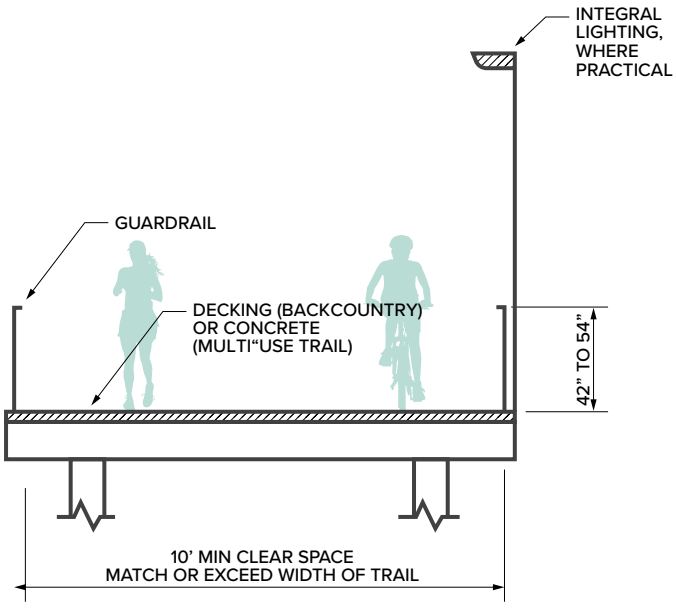


Figure 36: *New Bridge - typical section*

TUNNELS & UNDERPASSES

Where existing tunnels are structurally intact, they may be retrofitted for use as a trail. The determination of a structural tunnel will be made by a licensed engineer on a case by case basis. In locations where an existing tunnel cannot be reused, a new tunnel or parallel route may be considered.

In all tunnel conditions, the surface material should match the trail in that location. In order to improve the user experience of all tunnels, especially the longer tunnels, integral lighting should be prioritized.

ADAPTED TUNNEL

Existing tunnels are typically 15 to 20ft wide and 18 to 24ft tall. The existing rails and ties should be removed and the surface graded to drain to the sides. The trail width through the tunnel should be maximized and at minimum match the width of the incoming trail and shoulders. If the tunnel is expected to serve emergency or maintenance vehicle access, a minimum navigable width of 12ft min should be observed.

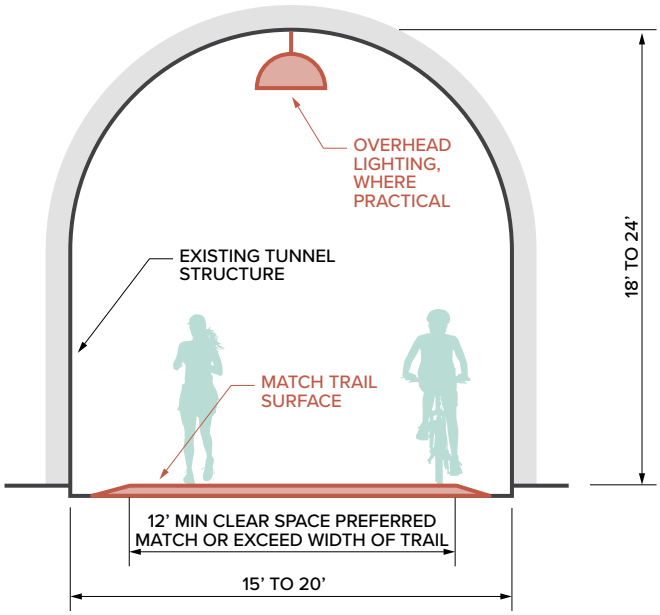


Figure 37: *Adapted Tunnel - typical section*

UNDERPASSES

The GRT passes underneath state and county highways, including US 101 in multiple locations. It is recommended that underpass approaches are straight to allow users to see all the way through. Lighting within and adjacent to the tunnel can further increase users' perceived safety. If possible, the walls should lean outward for higher visibility.

For highway underpasses, Caltrans standards should be observed.

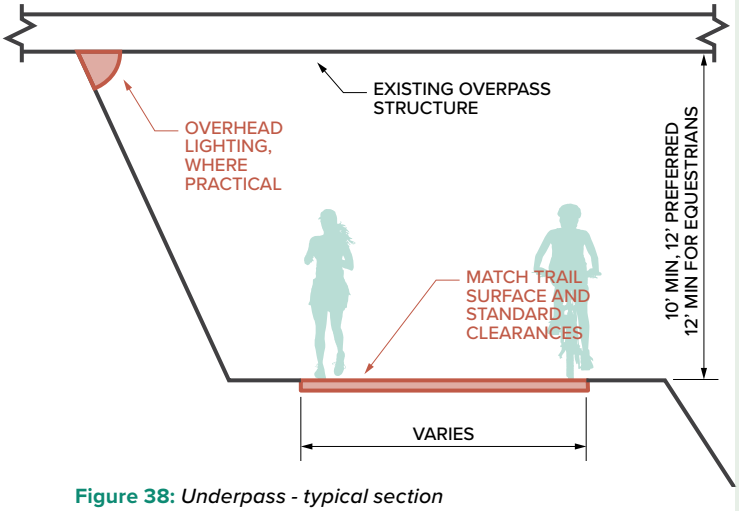


Figure 38: *Underpass - typical section*

ACCESS CONTROL

A sense of personal safety and security is important for GRT users. This generally means being on a trail that is well used, has open visibility, avoids concealed or isolated areas, and may include lighting and/or security cameras. Achieving this goal needs to be balanced with providing security for selected adjacent land uses.

The GRT passes adjacent to a number of non-public land uses, including ranch and agricultural lands, tribal lands, residential areas, and businesses. Trail users tend to stay on the trail except in emergency situations. In most locations along the GRT, there is a wide public ROW and the adjacent terrain is relatively inaccessible, which will further reduce potential trespass.

TYPES OF ACCESS CONTROL

In select locations, such as a narrow public ROW or direct adjacency to businesses or homes, access control may be designed into trail. Typical design tools may include any or all of the following:

- **Setbacks:** Sufficient horizontal distance between the trail and edge of the public ROW. There is no set offset distance, and should be assessed on a location by location basis.
- **Fencing:** Secure fencing along the trail that is visually pleasing. The design of fencing may vary based on context (backcountry vs front country) and jurisdiction.
- **Vegetation and Trees:** Screening with landscape buffers and trees is one the most effective ways to keep users on the trail.
- **Landforms:** Strategic placement of drainage ditches and/or berms along the trail.

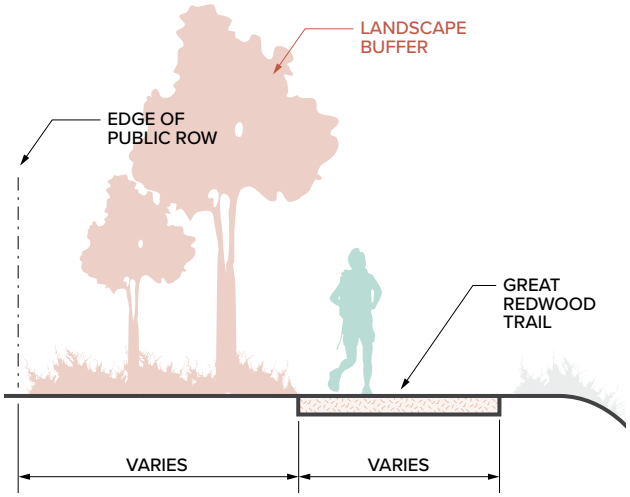


Figure 39: *Landscape buffer - typical section*

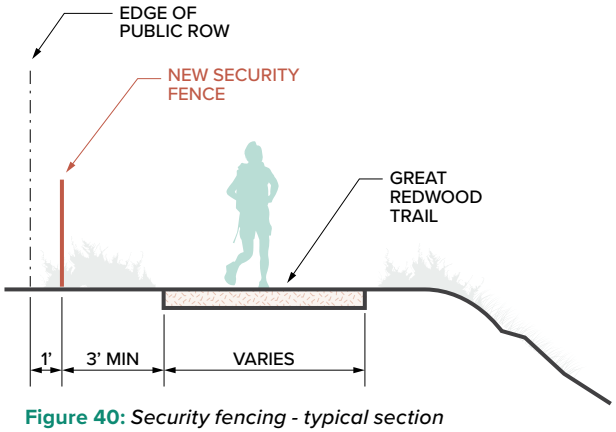


Figure 40: *Security fencing - typical section*

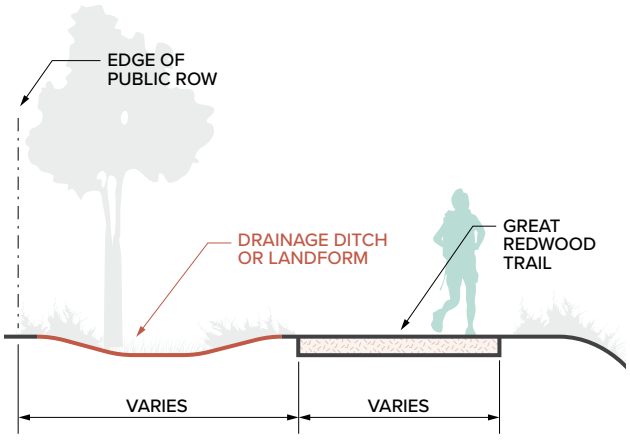


Figure 41: *Landform buffer - typical section*

LIVESTOCK CROSSING EASEMENTS

Select landowners may hold existing easements for livestock crossings across GRT ROW that connect multiple privately owned parcels or provide livestock animals access to water. These crossings may include grade-separated underpasses that pass beneath the corridor and are large enough for livestock.

To acknowledge existing easements, trail managers will work with the easement holder to develop compatible solutions for both trail users and livestock.

Example livestock crossing underpass

Rangeland near Frog Woman Rock Tunnel

Major Physical Barriers

Major barriers to trail development are structural, geomorphic, or environmental that present significant design, permitting, or cost challenges.

Major barriers require a unique approach to the short, mid, and long-term design of the trail, and include:

- Tunnels, Bridges & Trestles (includes complete and partial failures and requires major retrofit or new construction)
- Landslides & Washouts
- Environmentally Sensitive Areas

A preliminary condition assessment of major barriers is shown in the maps on this page. This assessment was performed in 2019 and is based on visual inspection. A more thorough engineering assessment will be required for all major barriers during future project phases.

In addition to physical barriers, culturally sensitive areas may present significant considerations during future project phases. Reference page 118 for additional information.

APPROACHES TO NAVIGATE MAJOR BARRIERS

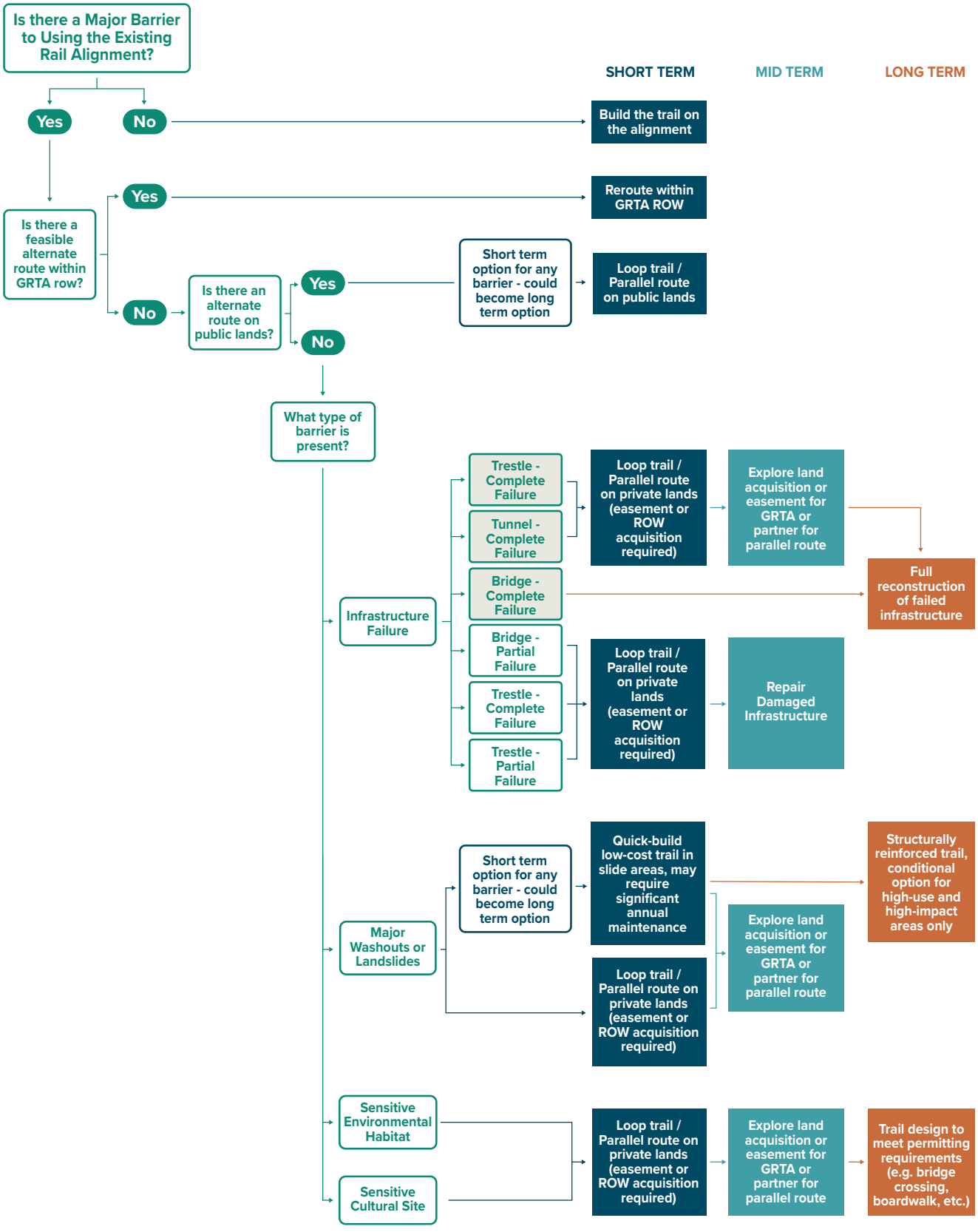
The type and severity of each major barrier, as well as the ROW and adjacent context will impact the preferred strategy for constructing the trail. The decision making chart in Figure 42 is intended to be a starting point for identifying how to navigate major barriers.

Existing failed culvert

Existing tunnel

Existing bridge

Figure 42: *Decision-making flowchart for navigating major barriers*



Existing gateway signage at Scotia Fireman's Park

Wayfinding & Signage

A wayfinding system is an informational system that helps people orient themselves and navigate from place to place. Along the trail, wayfinding will take the form of signage, maps, or environmental graphics.

Wayfinding does more than just provide directions. A cohesive and well-designed wayfinding system can create and reinforce a recognizable identity for the GRT. Additionally, an effective wayfinding system can significantly increase the ease of use and comfort for all trail users.

This chapter includes guidance on the following:

- **Wayfinding Signage:** Custom signage for the GRT that helps users orient and navigate along the trail.
- **Regulatory Signage:** Standardized signage that reinforce safe and legal use of the trail.
- **Etiquette Signage:** Oftentimes temporary or jurisdiction-specific signage to reinforce desired behaviors along the trail.
- **Interpretive Signage:** Custom signage that conveys site and context information to visitors. This type of signage and other interpretive elements are covered later in this chapter.

WAYFINDING OVERVIEW

A wayfinding system should be designed so that people can quickly orient themselves, recognize areas of different character, and intuitively locate and navigate to destinations. The goals for the GRT wayfinding are to:

- Enable trail users to easily find their destination, understand where they are within the broader context, and discover new places and services.
- Create a fun and compelling experience that promotes adventure while being a subtle part of the trail landscape.
- Incorporate off-trail wayfinding to guide users to the trail.

The following guiding principles, based on best practices from around North America, will help create an effective wayfinding system in along the GRT.

CONNECT PLACES

An effective trail wayfinding system should directly connect to places that locals and visitors want to access and enable them to discover new destinations that can be reached with clear communication of destinations, distances, and difficulty. Wayfinding provides benefits that go beyond physical signage. It can cultivate a sense of pride by reflecting community identity and support economic development by encouraging residents and visitors to use local services.

PROMOTE ACTIVE TRAVEL

Wayfinding should encourage active transportation by creating an accessible, clear, and attractive system that is intuitive to navigate. Whether directed towards trail users or indirectly seen by passing vehicles, the trail should be easy to find and easy to understand. An effective wayfinding system supports walking and bicycling as viable transportation options by communicating network connectivity and addressing perceived barriers such as time and distance to destinations.

MAINTAIN MOTION

Wayfinding information should be presented in a way that is quickly understood. Hiking and biking require physical effort, and frequent stopping and starting to check directions may cause frustration, discourage use, or present safety hazards. Information should be provided in advance of where users need to make a maneuver or change in direction so they can maintain motion.

BE PREDICTABLE

Wayfinding should be predictable and consistent. When information is predictable, it can be recognized and quickly understood. Predictability relates to all aspects of wayfinding placement and design (i.e., sign materials, dimensions, colors, forms, and placement). Design consistency ensures continuity of experience as landscapes and contexts change along the trail. Once users trust that they will encounter consistent and predictable information, their level of comfort is raised and new journeys become easier to attempt and complete. Similarly, maps should employ consistent symbology, fonts, colors, and style. Fonts will be high contrast and legible for users with limited visibility or color blindness.

KEEP INFORMATION SIMPLE

Wayfinding should provide clear information in a logical succession, and not overburden users with excess information. Wayfinding signage should be both universal and usable for the widest possible demographic and with special consideration for those without high educational attainment, English language proficiency, or spatial reasoning skills. It is important to provide information in manageable amounts. Too much information can be difficult to process quickly; too little, and decision-making becomes impossible.

WAYFINDING FAMILY

This section outlines a standard suite of wayfinding elements for the GRT. They include:

- Gateway monuments
- Map kiosks
- Decision/Directional signs
- Turn signs
- Confirmation signs
- Mile markers
- Trail markers
- Pavement markings

The following pages describe each element in more detail.

ABOUT THE DESIGN

The wayfinding sign family is inspired by the GRT logo, incorporating an elk and the iconic redwood forest tree line. Similar to the GRT logo, the elk is the main visual element and is used throughout the sign family. The muted red and brown tones used in the signage are inspired by the trunks of the giant redwoods and the industrial history of the trail corridor. The majority of the GRT signage is recommended to be constructed of ethically sourced redwood and weathered steel.

Design Standards

The design of the signs must be legible and accessible. Guided by the MUTCD's Community Wayfinding Guide, the type size for essential text is at least 2" high and set against a background color dark enough to achieve a 70% contrast. Gateways and kiosks are designed to be able to be read by trail users regardless of reading of height or physical ability. All sign placements should observe required horizontal and vertical clearances for the trail.

Co-branding

The design allows for flexible co-branding opportunities for segments where the GRT overlaps with established trails, such as the Humboldt Bay Trail. Local communities can create custom artwork of flora and fauna that is meaningful to their region (see Figure 44 for an example of custom artwork). Co-branding artwork should be based on flora or fauna that can be seen along the trail or is meaningful to the local community. Artwork may be stylized, but should avoid being overly cartoonish. The artwork should be printable in a single color and should not complete with the white text. Co-branding illustrations may only be incorporated for gateways, kiosks, decision, confirmation, and turn signs.

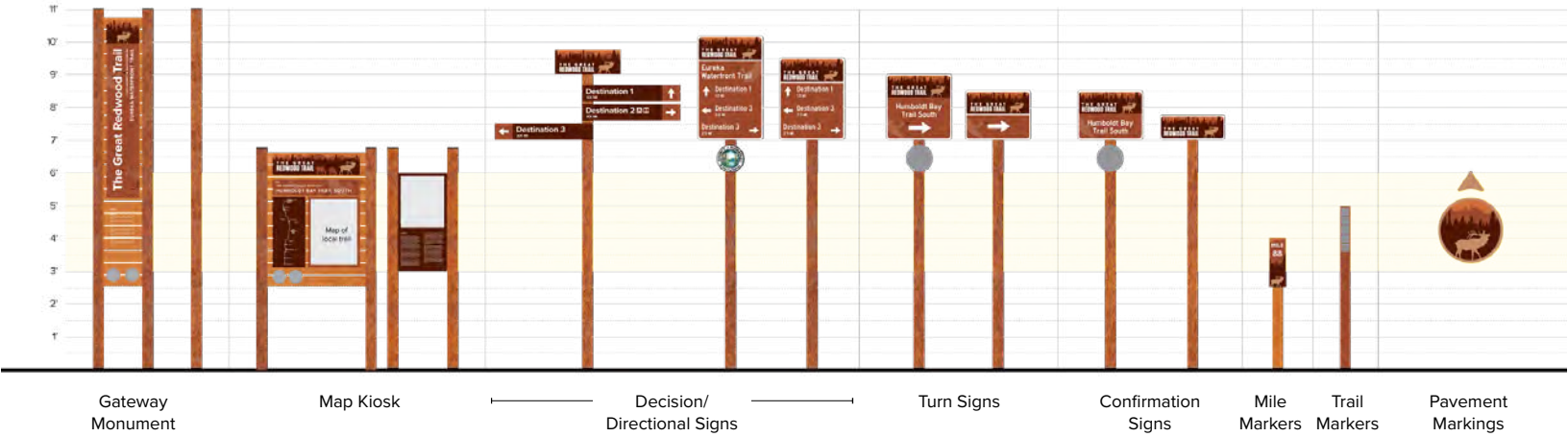


Figure 43: *Wayfinding sign family*

GATEWAY MONUMENTS

Gateway monuments define the entry into a distinct community or mark trailheads, access points, and landmarks. They include the capacity to incorporate trail branding, placemaking and integrated artwork.

- Applicable to community and backcountry trailheads
- Informs users of a community gateway or trailhead
- May include trail regulations, etiquette, safety information, and supporting information to improve access and accessibility

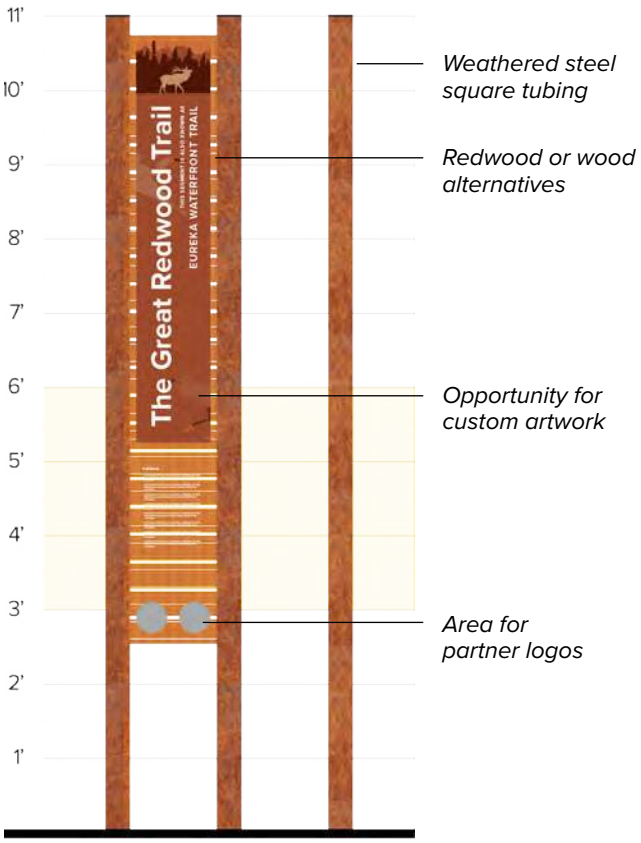


Figure 44: *Gateway monument*

MAP KIOSKS

Kiosks that include area or regional maps provide helpful navigational information. Kiosks are typically located at trailheads or trail junctions and should be located in visible areas near the trail. Sufficient space should be provided around the kiosk to allow people to observe the information without obstructing the trail and meet ADA clear zone requirements.

- Applicable to community and backcountry trailheads
- Includes a regional and/or local trail map highlighting communities, trailheads, destinations and points of interest, and trail amenities
- May highlight nearby business districts or community amenities
- May include trail regulations, etiquette, safety information and supporting information to improve access and accessibility

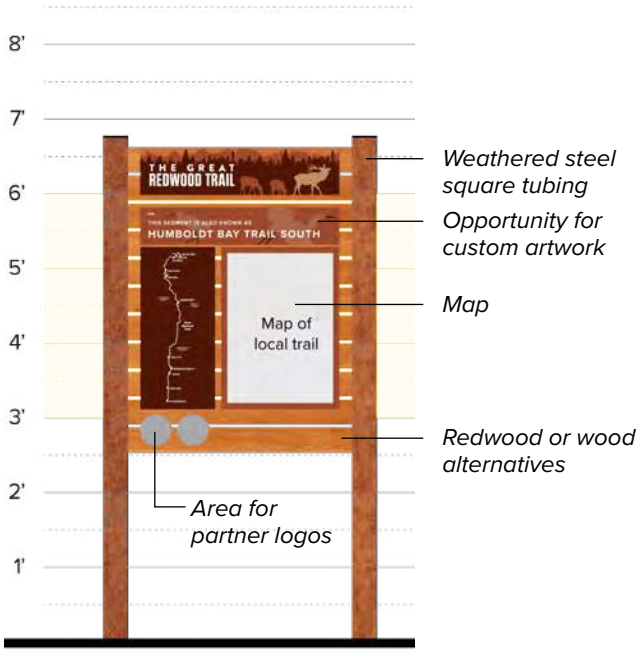


Figure 45: *Map kiosk*

DECISION/DIRECTIONAL

Decision signs are placed prior to the junction of two or more trails, trailheads at roadways, and community connectors, providing directions to nearby destinations. Decisions signs always include destination names and directional arrows, but may also include additional information such as travel distance or travel time. Users can orient themselves along the GRT with key destinations including culturally significant landmarks, place names, and other recreational facilities. Characteristics of decision signs:

- Applicable to multi-use and backcountry trails
- Informs users of designated routes to access key destinations
- Provides direction and distance to destinations
- May include travel times to destinations

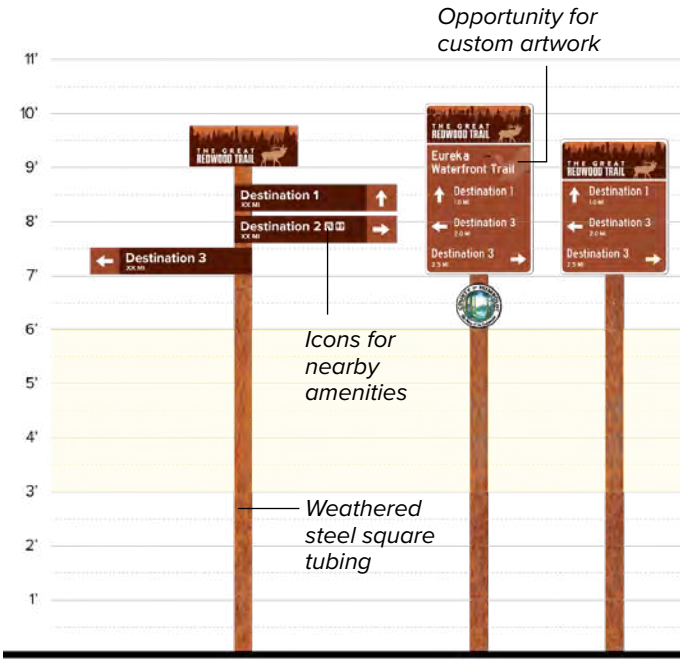


Figure 46: Decision/Directional Sign

TURN

Turn signs indicate a turn where only one route option is available. This includes where the trail features an abrupt change in direction or where a community connector turns onto the trail. Turn signs direct the cyclist where to turn to remain on the designated route, allowing the cyclist to focus on riding safely and responsibly. Characteristics of turn signs:

- Applicable to multi-use trails
- Provides clear direction for trail users where the trail has an abrupt turn or change in direction or where a community connector turns onto the trail

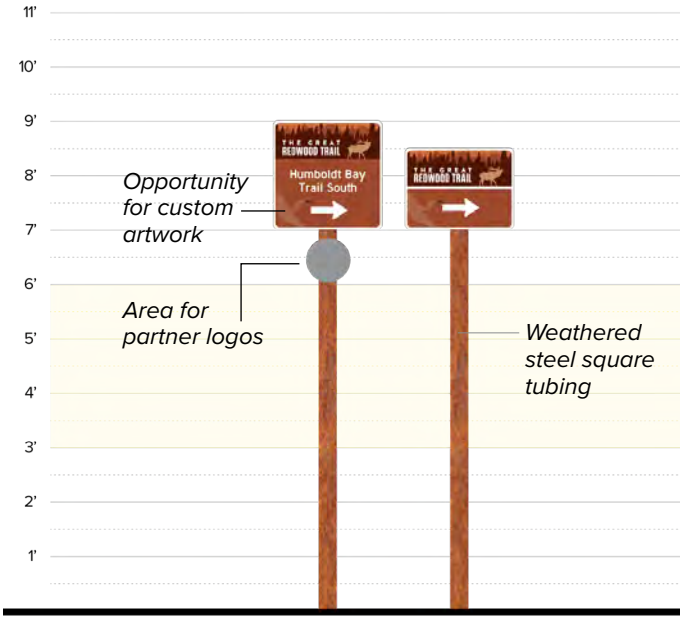


Figure 47: Turn

CONFIRMATION

Confirmation signs are placed after a turn or intersection to reassure path users that they are on the designated route. Confirmation signs may be located after the trail crosses a roadway or changes direction. Characteristics of confirmation signs:

- Applicable to multi-use trails
- Placed after the trail crosses a roadway or changes direction, and coordinated to follow the directions of decision and turn signs
- Spaced periodically along a route or trail to maintain a consistent level of confidence that users are still traveling along the same route
- May include up to one destination or co-branding (e.g., Humboldt Bay Trail South)

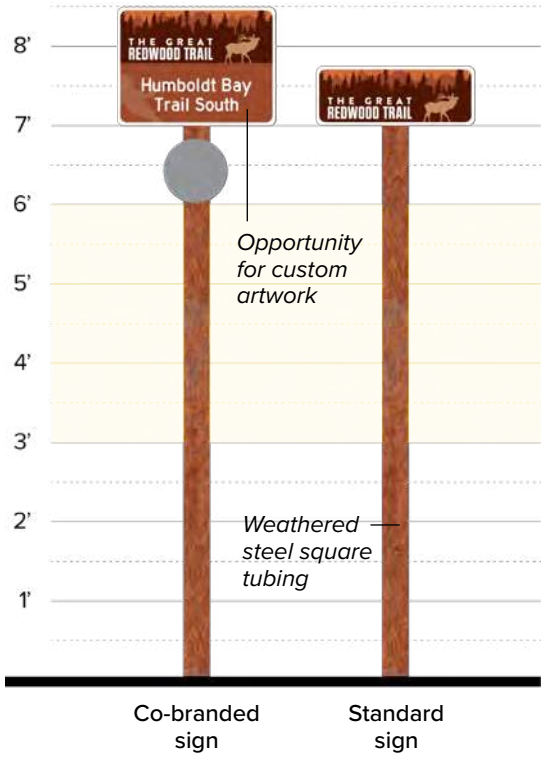


Figure 48: Confirmation Sign

MILE MARKERS

Mile markers are placed alongside the trail at measured intervals to help users understand how far they have gone and how far they have to go to their next destination. They provide pathway managers and emergency response personnel points of reference to identify field issues such as maintenance needs or locations of emergency events. Mile marker locations should be geo-located and supplied to emergency responders so that responders can efficiently respond to incidents on the trail. Mile markers should be spaced at consistent intervals, such as every 1/2 mile, along the trail.

- Applicable to multi-use and backcountry trails

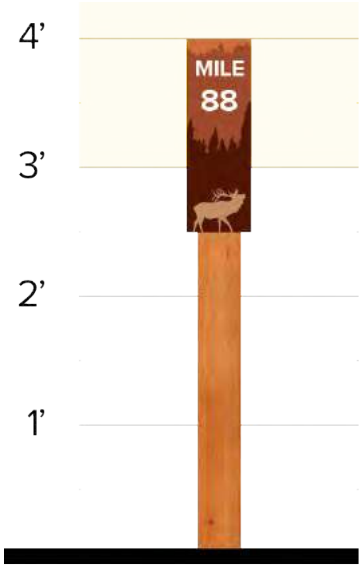


Figure 49: Mile markers

TRAIL MARKERS & BLAZES

Trail markers provide useful information at key decision points along backcountry trails. Trail markers are utilized to assure users that they are on the correct trail, define where connecting trails lead, and indicate mileage, slope, and surface materials.

- Applicable to backcountry trails

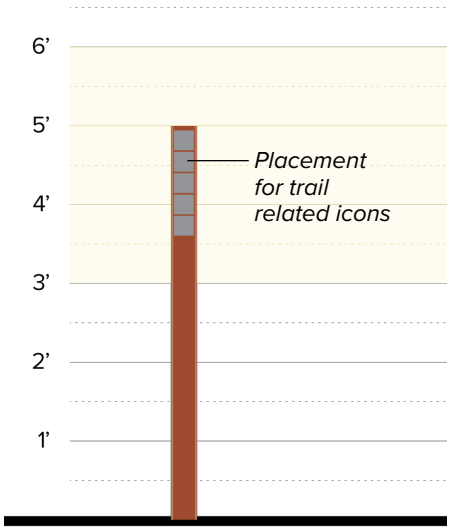


Figure 50: Trail markers

PAVEMENT MARKING

Pavement markings serve a variety of wayfinding purposes for trails and on-street bikeways in urban environments. They can be utilized to communicate direction, route name, and trail branding. Pavement markings may be provided in lieu of standard signs to help reduce clutter. Common materials used for pavement markings include pre-formed thermoplastic, paint, stamped concrete, or embedded metal.

- Applicable to multi-use trails

Figure 51: Pavement marking

TRAIL WAYFINDING ICON SET

Where applicable, suite of icons may be used on wayfinding maps and signage to communicate amenities and destinations. Icons increase the legibility of wayfinding for all trail users regardless of age or language spoken. Additional icons can be sourced from the National Parks Service.[1]

Restroom

Camping

Picnic Area

Lodging

Hospital

Food

Tourist Info

Water

Drinking water

Shopping

Mobile device charging

Bottle filling station

Souvenir shop

Store

1 National Parks Service. (2022). Map Symbols for NPS Maps. https://www.nps.gov/subjects/gisandmapping/map-symbols-patterns-for-nps-maps.htm

Warning signage near Humboldt Redwoods State Park

ETIQUETTE SIGNAGE

Etiquette signs are informal signs intended to communicate trail rules and promote courtesy. Ettiquette signs may be used to educate trail users on how to perform passing and other maneuvers safely.

TRAIL RULES & REGULATIONS

Rules and regulations signs will be incorporated into trailhead kiosks and will communicate rules and regulations of the trail.

ETIQUETTE SIGNS ALONG TRAIL

Potential signs may include 'Pass on Left, 'Slow Down', 'Yield to Pedestrians', 'Use Voice or Bell to Pass'

Etiquette signage may be located at trailheads, crossings, and in response to areas with known issues or conflicts. In general, use of etiquette signs should be limited to strategic placement, to avoid over-signing the trail and cluttering fundamental wayfinding and regulatory signage.

A rules and regulations kiosk

Etiquette sign that instructs bicyclists to yield to equestrians and hikers and for hikers to yield to equestrians.

Etiquette signage for the Humboldt Bay Trail

Crossings & Junctions

OVERVIEW

The GRT intersects with roads, access points, and other trails. As the trail approaches these areas, design tools such as mixing zones, signage, and changes in pavement materials and lighting can warn trail users to slow down and expect a crossing. Consistent trail geometry, materiality, and signage at these locations can further enhance the overall trail identity.

GENERAL DESIGN PRINCIPLES

The intention for this section is to provide a standardized approach for minimizing and mitigating potential conflict points between GRT users and vehicles or other trail users. The following guiding principles were followed:

- Make trail users highly visible at crossing locations and maintain unobstructed sight-lines
- Slow and warn both vehicles and trail users in advance of crossing locations
- Develop a clear hierarchy and delineation of modes at crossing locations
- Create predictable and simple user movements
- Minimize crossing distances across roadways
- Cross roadways at established intersections, where feasible
- Create intuitive designs and minimize the need to clutter crossings with signs
- Establish recognizable crossing designs and features across the entire corridor

BASIS FOR GUIDANCE

The recommendations presented in this section are based upon national guidelines and best practices developed by the American Association of State Highway and Transportation Officials (AASHTO), National Association of City Transportation Officials (NACTO), ADA Accessibility Guidelines (ADAAG), and the Federal Highway Administration (FHWA), as well as state guidelines which are codified in Caltrans' Highway Design Manual, Caltrans' Pedestrian Accessibility Guidelines, and the CA MUTCD.

PLAN DIAGRAMS

Alignment geometry and site elements are depicted and described for typical crossing and junction types along the trail corridor. For illustrative purposes, the GRT is shown as a paved multi-use trail in the diagrams, as it is the most common trail type for crossings and junctions. Wayfinding will be present at most intersection locations, and is covered in more detail in the Wayfinding & Signage section.

The standard types of crossings and junctions explored in this guide include:

- Midblock Crossings
- Intersections
- Driveways
- Trail Junctions

Existing trail crossing in Blue Lake

Existing trail crossing in Blue Lake

MIDBLOCK CROSSINGS & INTERSECTIONS

Midblock crossings are dedicated trail crossings across roadways that are separated from a formal intersection, and are common for the GRT across all 231-miles in cities, towns, and rural areas. These crossing locations range from higher-speed state or county highways to dirt or gravel private roads. In many locations, the historic rail ROW crosses roadways at an angle, which presents additional challenges for sight-lines and visibility. Crossings at intersections for the GRT are more limited than midblock crossings, and tend to be concentrated to cities and towns with closer spacing of roadways.

CROSSING DESIGN CONSIDERATIONS

Midblock and intersection crossings share a number of design features to encourage safe behaviors by vehicles and trail users. These crossings should be designed to universal design standards and be ADA compliant, where applicable. Physical barriers alone, such as bollards, are often ineffective at preventing vehicle access onto trails and create obstacles to trail users. Alternative design strategies use signage, landscaping, and curb cut design to reduce the likelihood of motor vehicle access.

- Bollards or other barriers should not be used unless there is a documented history of unauthorized intrusion by motor vehicles. If unauthorized use persists, assess whether the problems posed by unauthorized access exceed the risks and issues posed by bollards and other barriers.
- Where curbs are present, vertical curb cuts should be used to discourage motor vehicle access.
- Design and maintenance of low landscaping preserves sight-line visibility and emergency access.
- Crossings should align to cross perpendicular to roadway, where feasible.
- “No Motor Vehicles” signage (MUTCD R5- 3) may be used to reinforce access rules.
- Crossings at public roads should be accompanied with wayfinding signs—for more information, refer to the Wayfinding & Signage section of the design guide.

MATERIAL TRANSITIONS AT ROADWAY CROSSINGS

The surface material of the trail and crossings will change based on the trail type and the surface of the roadway being crossed. The diagrams to the right are typical approaches for each combination of trail and roadway surface. These are general guidelines, and site specific solutions should be determined by an engineer during the project planning and design phase.

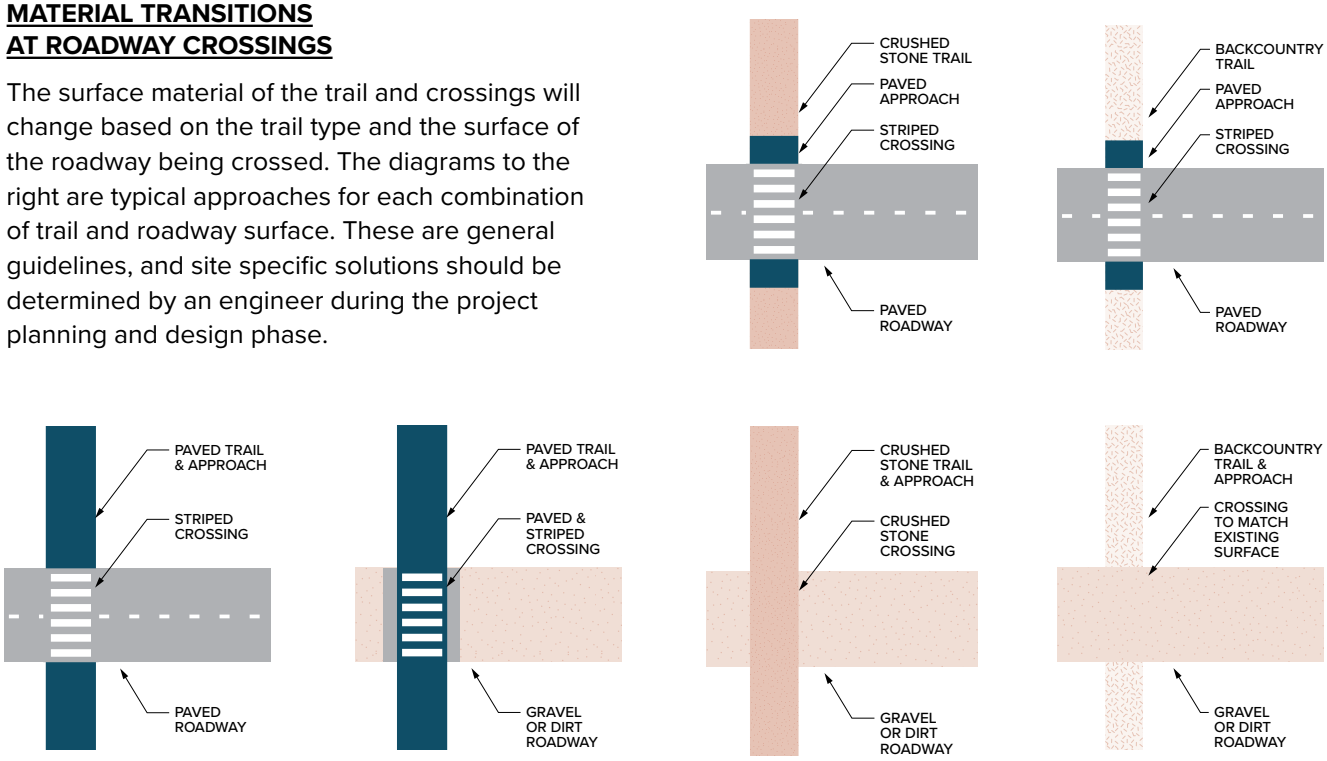


Figure 52: *Material transitions at roadway crossings - plan diagram*

MIDBLOCK: STATE OR COUNTY HIGHWAY

Where the GRT corridor crosses a state or county highway, geometric design, signage, and other design features can provide a safe crossing experience. The path should approach the crossing perpendicular to the roadway to minimize the crossing distance and maximize visibility. All signage and pavement markings should conform to CA MUTCD guidance. Rectangular Rapid Flashing Beacons (RRFBs) or other traffic control devices may be appropriate as determined by engineering study. A directional diverter for trail users at the approach to the crossing can slow trail users and discourage vehicles from accessing the trail. Low plantings at these locations can reinforce trail identity.

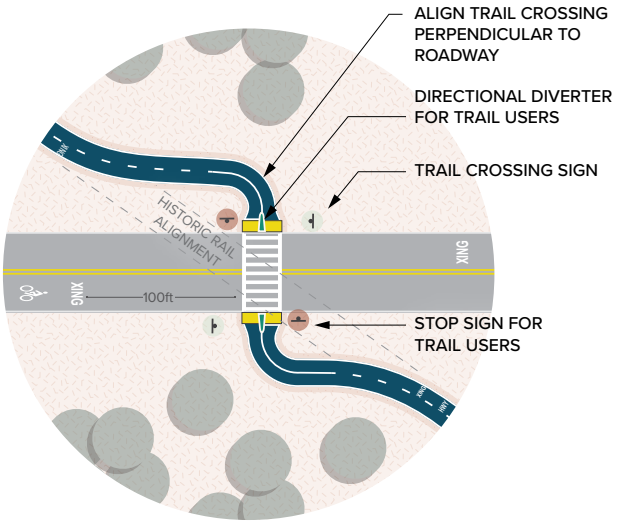


Figure 53: *Midblock crossing of state or country highway - typical plan*

MIDBLOCK: LOCAL STREET

Where the GRT corridor crosses arterial roads or local streets in populated areas, high visibility crosswalks and traffic calming treatments can enhance safety and comfort for trail users. **Trail users should be given priority at crossings with stop signs for vehicles in both direction.** For medium to lower demand areas, or roadways with lower traffic volumes and speeds, yield signs may be coupled with traffic calming measures such as pedestrian refuge islands, raised crossings, or curb extensions.

All trail crossings should be perpendicular to the roadway. All signage, pavement markings, and traffic control devices should conform to standards set forth in CA MUTCD guidance. A flared approach to the crosswalk with a directional diverter can slow and alert trail users before crossing and discourage vehicles from accessing the trail. Low plantings at these locations can reinforce trail identity.

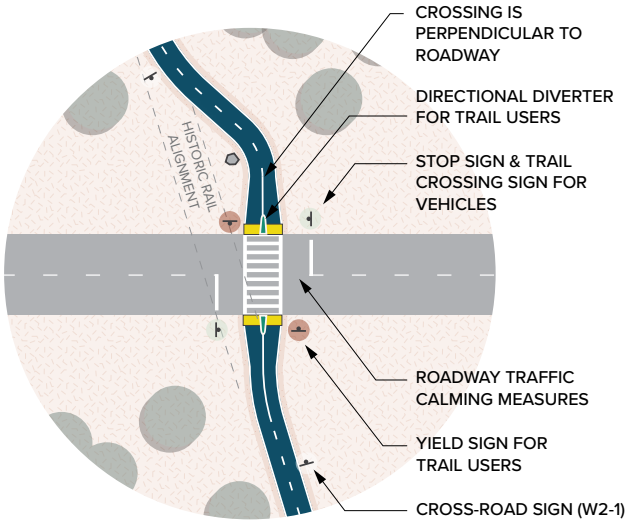


Figure 54: *Midblock crossing of local street with stop signs - typical plan*

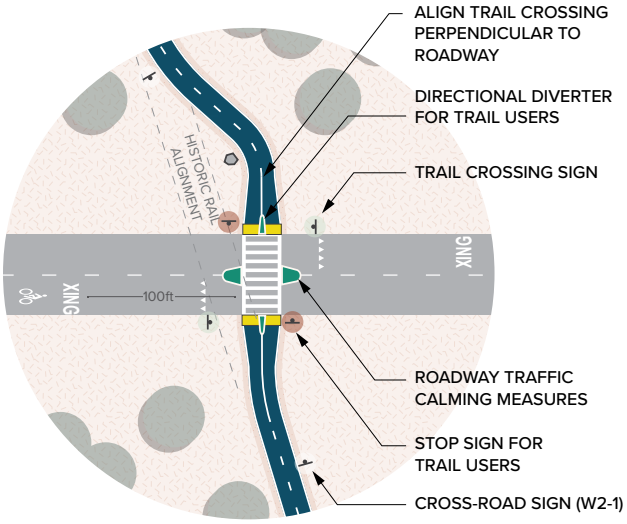


Figure 55: *Midblock crossing of local street with yield and pedestrian refuge island - typical plan*

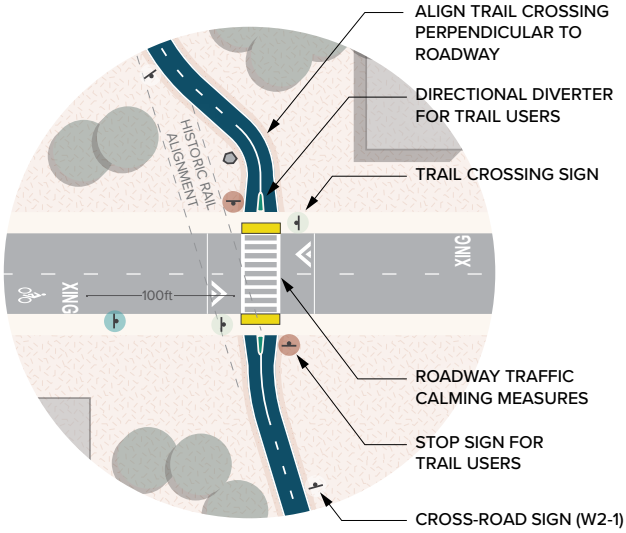


Figure 56: *Midblock crossing of local street with yield and raised crossing - typical plan*

MIDBLOCK: PRIVATE ROAD

While private roadways are not required to conform with CA MUTCD standards, crossing treatments that are consistent with public roadway crossings will encourage trail users to cross with caution. Where the roadway is unpaved, the crossing should be paved. High visibility crosswalks may be used where appropriate. Signage should alert roadway users to the presence of the trail crossing, as well as encourage trail users to respect private property.

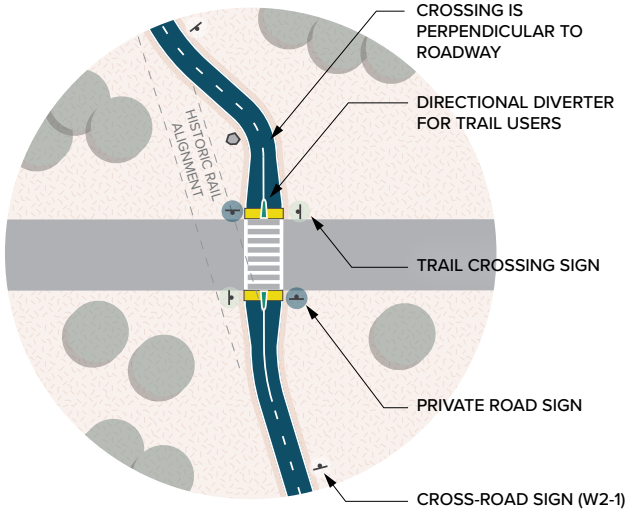


Figure 57: *Private road crossing - typical plan*

ADJACENT INTERSECTION

Where the GRT crosses a roadway adjacent to an intersection, the trail crossing should align with the crosswalk on one leg of the intersection. Where possible, traffic control devices should prioritize the safety of trail users in the intersection. Where the trail connects to other bicycle or pedestrian infrastructure, intersection improvements can enhance safety and visibility of people walking and biking.

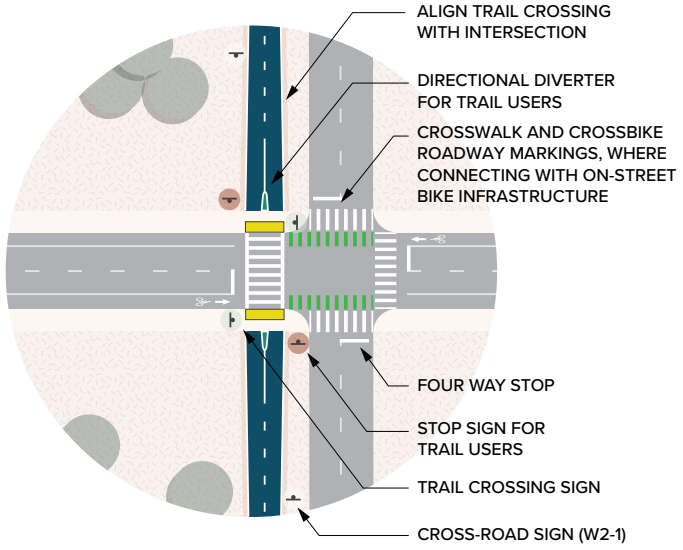


Figure 58: *Intersection crossing - typical plan*

JOG INTERSECTION

Where the GRT corridor crosses roadways at or near an existing intersection, it is recommended that the trail alignment be shifted to align with the crosswalk on one leg of the intersection. Where possible, traffic control devices should prioritize the safety of trail users in the intersection.

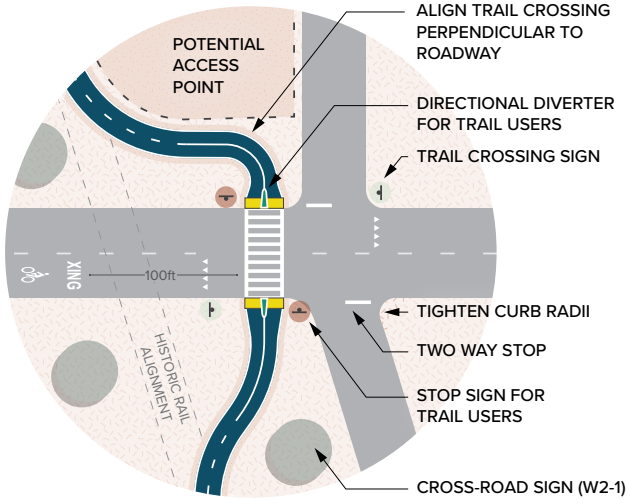


Figure 59: *Intersection crossing with trail jog - typical plan*

ROUNDABOUT

Where the GRT corridor crosses roadways at or near an existing roundabout, it is recommended that the trail alignment be shifted to align with the crosswalk on one leg of the intersection. Extra queuing space may be provided as the trail approaches the crossing.

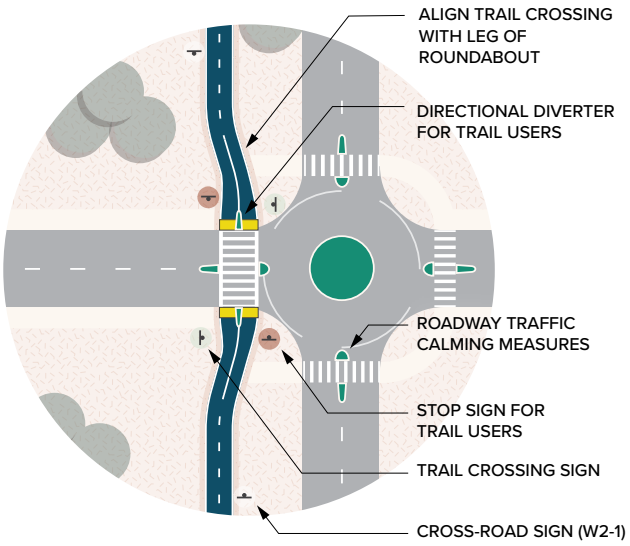
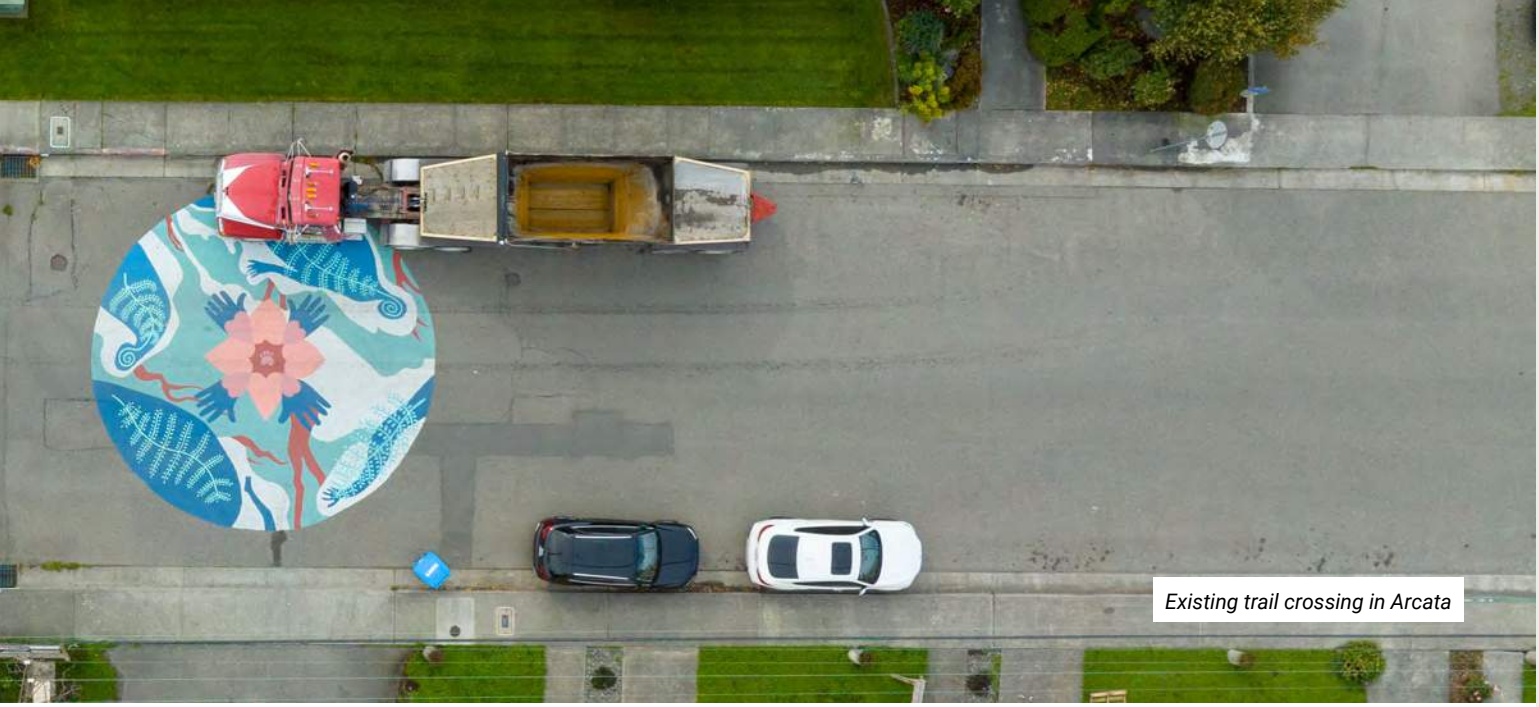


Figure 60: *Roundabout crossing - typical plan*



Existing trail crossing in Arcata

DRIVEWAYS & JUNCTIONS

DRIVEWAYS

There are several treatments that may be applicable where the trail crosses driveways. Driveway crossings typically occur where the trail alignment is parallel to a road with driveway access. Driveways with higher volumes may be candidates for offset crossings or traffic calming treatments such as raised crosswalks.

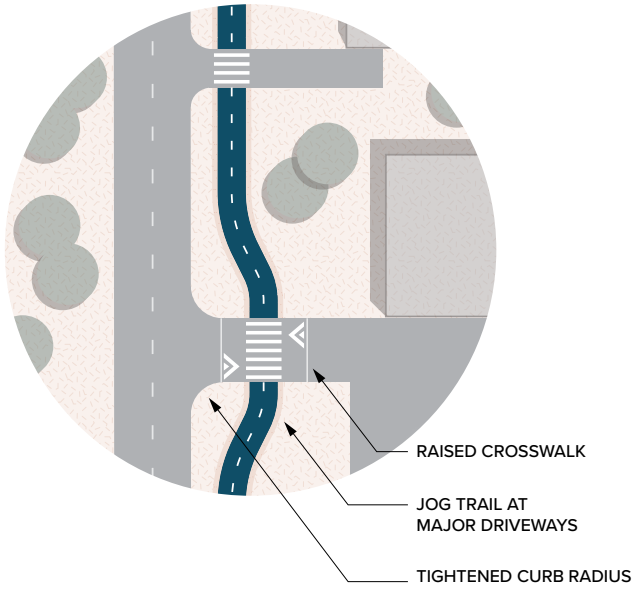


Figure 61: *Driveway crossing - typical plan*

TRAIL JUNCTIONS

Where the GRT meets another trail or multi-use path, design elements should slow and alert trail users to the junction. A change in paving materials can help indicate that other trail users may be present. Geometric design, such as widening the trail surface, can provide additional space to navigate the junction. Wayfinding signage should be visible from all approaches to the junction.

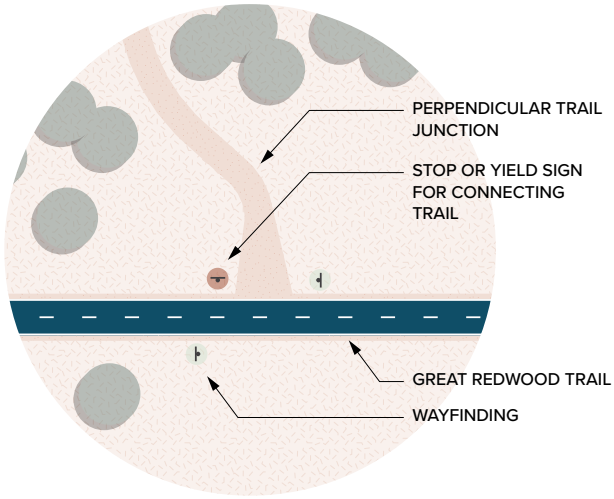


Figure 62: *Trail junction - typical plan*

COMMON CROSSING ELEMENTS

Existing trail crossing signage in Ukiah

MARKED AND SIGNED CROSSWALK

Where the GRT crosses a paved roadway at a midblock location, markings must be used to establish a legal crosswalk. Well designed midblock crossings can provide many benefits for path user safety and comfort.

The simplest marked crossing type uses high visibility crosswalk markings with crossing warning signs.

Existing trail crossing with yield markings in Ukiah

MARKED CROSSWALK WITH YIELD LINES

Where additional awareness and regulatory instruction is desired at marked path crossings, advanced yield lines and yield signs remind people to yield to crossing path users.

Existing pedestrian refuge island in Ukiah

MEDIAN REFUGE ISLAND CROSSING

Median refuge islands are located at the mid-point of a marked crossing and help improve path user safety by allowing pedestrians to cross one direction of traffic at a time. Refuge islands minimize pedestrian exposure by shortening crossing distance and increasing the number of available gaps for crossing.

Raised crosswalk for trail crossing

RAISED CROSSWALK

Raised crosswalks combine a marked crosswalk with raised speed-table geometry to increase yielding rates and clarify road user priority with geometric design.

Flashing beacon with push button

RECTANGULAR RAPID FLASHING BEACON (RRFB)

RRFBs are user-actuated warning beacons to supplement pedestrian warning signs at unsignalized intersections or midblock marked trail crossings.

RRFBs have been shown to increase motor vehicle yielding compliance at crossings of multilane or high volume roadways.

Curb extensions at trail crossing

CURB EXTENSIONS

Curb extensions visually and physically narrow the roadway, creating safer and shorter crossings for trail users. Curb extensions may be applied at midblock crossings or at intersections.

Directional diverter with planted landscape

DIRECTIONAL DIVERTER

A directional diverter is placed where the trail approaches an intersection. The path tread is split into two sections by a median. Solid centerline striping in advance of the median can help alert trail users to the upcoming split. Median landscaping that is low to the ground preserves visibility and emergency access.

Tactile warning strips at curb ramp

TACTILE WARNING STRIP

Detectable warning strips must be at least 24 inches wide, and must be applied at all curb ramps for their entire width, or at any location where pedestrians cross into another modal zone (i.e., bike lanes or vehicle lanes) along a flush transition.

Tightened curb radius at pedestrian crossing

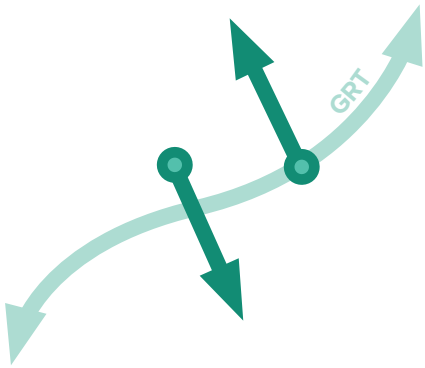
TIGHTENED CURB RADIUS

At an intersection, minimizing corner radii slows vehicle turning speeds and reduces crossing distances for pedestrians and trail users. Corner radii may be defined by curbs, striping, or quick-build materials such as flexible delineators.

Loops, Connectors, & Parallel Routes

The GRT will form the spine of a future statewide trail network. A major feature of the trail will be the connections it makes to communities, recreational destinations, businesses, and other trails. These connections take the form of community connectors, trail loops, and parallel routes.

Existing Annie & Mary Trail in Blue Lake

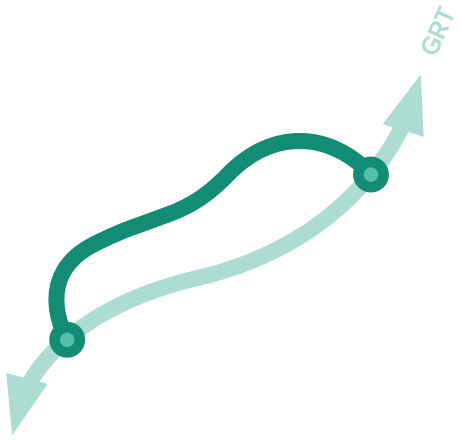


COMMUNITY CONNECTORS

Community connectors are high-quality connections to the trail from nearby or adjacent neighborhoods or community destinations such as parks, schools and colleges, business districts, and populated residential areas. Community connectors will vary based on context and desired users, but will generally include sidewalks, on-street bike infrastructure, or sidepaths.

- **Sidewalks:** Pedestrian-only connectors.
- **On-Street Bike Infrastructure:** Bike-only connectors, frequently combined with sidewalks.
- **Sidepaths:** May include sidepaths for a wide variety of users, including for pedestrians, cyclists, and equestrians.

Community connectors will connect to the GRT at trailheads. Wayfinding and signage will be provided to and from key destinations.



TRAIL LOOPS

Trail loops are planned or existing trails that create a loop with the GRT. Loops create new experience opportunities for users and allow them to begin and end at the same point without retracing their steps. Loops provide different experiences for users depending on the type and location of existing or planned trail. Trail loops will connect to the GRT at trailheads or trail junctions, with wayfinding to and from both the GRT and the trail loop. A few examples of loops that could be created by the GRT include:

- **Avenue of the Giants.** A hiking/cycling loop along the existing Avenue of the Giants roadway through Humboldt Redwoods State Park between Stafford and South Fork.
- **River Road.** A hiking/cycling loop along River Road and the Scenic Russian River between Hopland and Ukiah.
- **Fortuna Levee Trail.** A hiking/cycling loop along the Fortuna Riverwalk Levee Trail within the City of Fortuna.
- **Alderpoint/Fort Seward.** A hiking/mountain biking loop with Alderpoint Road and Fort Seward Road.

PARALLEL ROUTES

Parallel routes provide near-term alternate routes in locations where the GRT will take longer to construct on this historic rail alignment. A few examples of Parallel Routes that could be created by the GRT include:

- **Rio Dell Business District.** A pedestrian/cycling connection through Rio Dell to connect its business district to the trail. The GRT should use existing or planned on-street infrastructure in the near-term to close gaps along the corridor. This parallel route will become a permanent loop upon completion of the Scotia Bluffs trail.
- **Temporary Backcountry Parallel Routes.** A broad category for near-term trail construction in backcountry areas with significant structural or geomorphic barriers. With adjacent landowner permission, these parallel routes could diverge from the historic rail alignment. Upon completion of the longer term structural retrofit or navigation of complex geomorphic activity, the parallel routes may be decommissioned. Parallel routes may also be established as a mitigation measure to avoid significant cultural resources.

TRAIL-ORIENTED DEVELOPMENT & AMENITIES

Trail Support Facilities

OVERVIEW

Trail support facilities are the publicly owned and operated spaces along the Great Redwood Trail that provide valuable amenities for both trail users and local residents. These facilities provide gateways to the trail, places to rest, and community identity and gathering spaces. By providing high-quality amenities including shade and wayfinding, these facilities increase accessibility and create a positive experience for trail users. This section includes guidance on the location and design of these facilities and additional trail amenities.

TRAIL SUPPORT FACILITIES

1. **Trailheads.** Locations to get on and off the trail, ranging from larger community gateways and trailheads to smaller backcountry access points.

2. **Campgrounds.** Includes both developed campgrounds accessible by vehicle and backcountry campgrounds only accessible by the Great Redwood Trail.

3. **Rest Areas & Open Spaces.** Includes rest areas along the trail, as well as larger open spaces co-located with trailheads such as linear parks and day-use areas.

4. **River Access.** Includes background information, management recommendations, and future study topics.

5. **Trail Amenity Toolkit.** Includes a full suite of standard amenities including restrooms, seating, and others that are located across all types of trail support facilities.

TYPES OF SUPPORT FACILITIES

Trail support facilities will vary based on context, available right-of-way (ROW), access, and recommended spacing. These guidelines should serve as a blueprint for locating support facilities along the trail. Table 11 includes an overview of the range of support facilities included in this guide.

Table 11: *An overview of the trail support facilities for the Great Redwood Trail*

CATEGORY	TYPE	CONTEXT	SIZE (SQUARE FEET)	LOCATION & ACCESS	SPACING
 **Trailheads**	Community Gateways	Urban and Rural	15,000 to 25,000	Centrally located in community with access to business district	One per community
	Community Trailheads	Urban and Rural	5,000 to 15,000	At road crossing	No spacing recommendations
	Community Access Points	Urban and Rural	Less than 5,000	At road crossing	No spacing recommendations
	Backcountry Trailheads	Backcountry	5,000 to 25,000	Accessible via road	No spacing recommendations
	Backcountry Access Points	Backcountry	Less than 5,000	Accessible via road, often county road or state highway	No spacing recommendations
 **Campgrounds**	Developed Campground	Backcountry	Greater than 10,000	Accessible via road, co-located with backcountry trailheads	No spacing recommendations
	Backcountry Campground	Backcountry	1,000 to 10,000	Accessible via trail	< 8 miles
 **Parks & Open Spaces**	Rest Areas	Urban and Rural	Less than 5,000	Along trail, located to align with views, shade, or gaps in amenities	1/2 mile in urban and rural areas
	Linear Parks	Urban and Rural	5,000 to 25,000	Co-located with community trailheads or gateways	No spacing recommendations
	Day-Use Areas	Backcountry	5,000 to 25,000	Co-located with backcountry trailheads or access points	No spacing recommendations
 **River Access**	River Launch	Rural and Backcountry	N/A	Accessible via road, co-located with trailheads, where feasible	No spacing recommendations
	River Access	Rural and Backcountry	N/A	Accessible via trail, co-located with rest areas or backcountry campgrounds, where feasible	< 15 miles
 **Restrooms**	Developed Area Restroom	Urban and Rural	N/A	Co-located with trailheads, campgrounds, linear parks, and nearby trail-oriented development, where feasible	Access to one per community
	Backcountry Restroom	Backcountry	N/A	Co-located with trailheads and campgrounds and along the trail, where feasible	< 8 miles

Trailheads

OVERVIEW

The Great Redwood Trail will feature a range of different trailheads that vary based on location, function to the trail network, and significance to the adjacent community. These trailheads are organized by context (Developed Community or Backcountry) as well as by size and amenities.

COMMUNITY GATEWAY

Community gateways are the largest trailhead type and function as gateways into the adjacent communities and business districts.

COMMUNITY TRAILHEAD

Community trailheads are large trailheads in developed areas.

COMMUNITY ACCESS POINT

Community access points are local trailheads in developed areas.

BACKCOUNTRY TRAILHEAD

Backcountry trailheads are major trailheads located in backcountry areas. They could serve as starting or ending points for backcountry trips.

BACKCOUNTRY ACCESS POINT

Backcountry access points are minor trailheads in backcountry areas with access to roadways.

For an overview of details for each type of trailhead, reference Table 12.

Community Gateway

Community Access Point (Existing in Ukiah)

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Backcountry Trailhead

Backcountry Access Point

Table 12: *Trailhead types and associated size, context, and amenity recommendations.*

FEATURE/ AMENITY	COMMUNITY GATEWAY	COMMUNITY TRAILHEAD	COMMUNITY ACCESS POINT	BACKCOUNTRY TRAILHEAD	BACKCOUNTRY ACCESS POINT
Size (Square Feet)	15,000 to 25,000	5,000 to 15,000	Less than 5,000	5,000 to 25,000	Less than 5,000
Context	Urban and Rural Areas	Urban and Rural Areas	Urban and Rural Areas	Backcountry Areas	Backcountry Areas / Roadside
Restroom	Strongly Recommended	Encouraged	N/A	Recommended	N/A
Potable Water	Strongly Recommended	Strongly Recommended	Encouraged	Recommended	Encouraged
Lighting	Strongly Recommended	Strongly Recommended	Recommended	Recommended	N/A
Seating	Strongly Recommended	Strongly Recommended	Strongly Recommended	Strongly Recommended	Recommended
Bike Parking	Strongly Recommended	Strongly Recommended	Recommended	Encouraged	N/A
Bike Fix-It Station	Recommended	Encouraged	Encouraged	Encouraged	N/A
Trash Receptacles	Strongly Recommended	Strongly Recommended	Recommended	Strongly Recommended	Recommended
Shade Trees or Structures	Strongly Recommended	Strongly Recommended	Recommended	Strongly Recommended	Recommended
Landscaping	Strongly Recommended	Strongly Recommended	Recommended	Recommended	Encouraged
Green Infrastructure	Strongly Recommended	Strongly Recommended	Encouraged	Recommended	Encouraged
Interpretive Elements	Strongly Recommended	Recommended	Encouraged	Recommended	Encouraged
Public Art	Strongly Recommended	Recommended	Encouraged	Recommended	Encouraged
Gateway Monuments	Encouraged	Encouraged	N/A	Encouraged	N/A
Parking	Strongly Recommended	Strongly Recommended	N/A	Strongly Recommended	Encouraged
Wayfinding	Strongly Recommended	Strongly Recommended	Strongly Recommended	Strongly Recommended	Strongly Recommended
Backcountry Sign-In Kiosks	N/A	N/A	N/A	Strongly Recommended	Strongly Recommended

ADDITIONAL AMENITIES

The list of amenities at trailheads in Table 12 is not exhaustive. Additional amenities, such as charging stations, may vary based on context and anticipated trail users. For example, trailheads that serve as a starting point for equestrians users are recommended to provide manure bunkers. Similarly, trailheads along sections of trail that permit dogs on leashes are recommended to provide stations with dog waste bags.

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COMMUNITY GATEWAY

Community gateways are the largest trailhead type. In addition to being a major entry point onto the Great Redwood Trail, they serve as a gateway into the adjacent community. Most communities are likely to have, at most, one community gateway located in the center of town. A generic layout plan is shown in Figure 63, with a corresponding cross-section in Figure 64.

LOCATIONS

- Centrally located near a city or town center
- In close proximity to existing or planned business districts
- Large GRTA or publicly owned parcels, or wide GRTA ROW following historic rail alignment
- Along sections of multi-use trail

DESIGN GUIDANCE

- Community gateways could be up to 25,000 square feet in size and may be co-located with linear parks.
- Restrooms are strongly recommended at community gateways, where feasible. Additional strongly recommended amenities include parking, lighting, trash receptacles, public art, seating, shade, drinking fountains, native landscape, bike parking, and wayfinding kiosks.
- The design of community gateways would ideally reinforce the identity of the Great Redwood Trail, as well as highlight the character of the adjacent community. This may be achieved through public art, interpretative panels, and choice of materials and color.
- Where community gateways are directly adjacent to a business district, direct access to or from adjacent businesses is encouraged.
- The design and amenities at each community gateway will vary based on anticipated user groups. Locations with heavy equestrian use will require specific amenities.

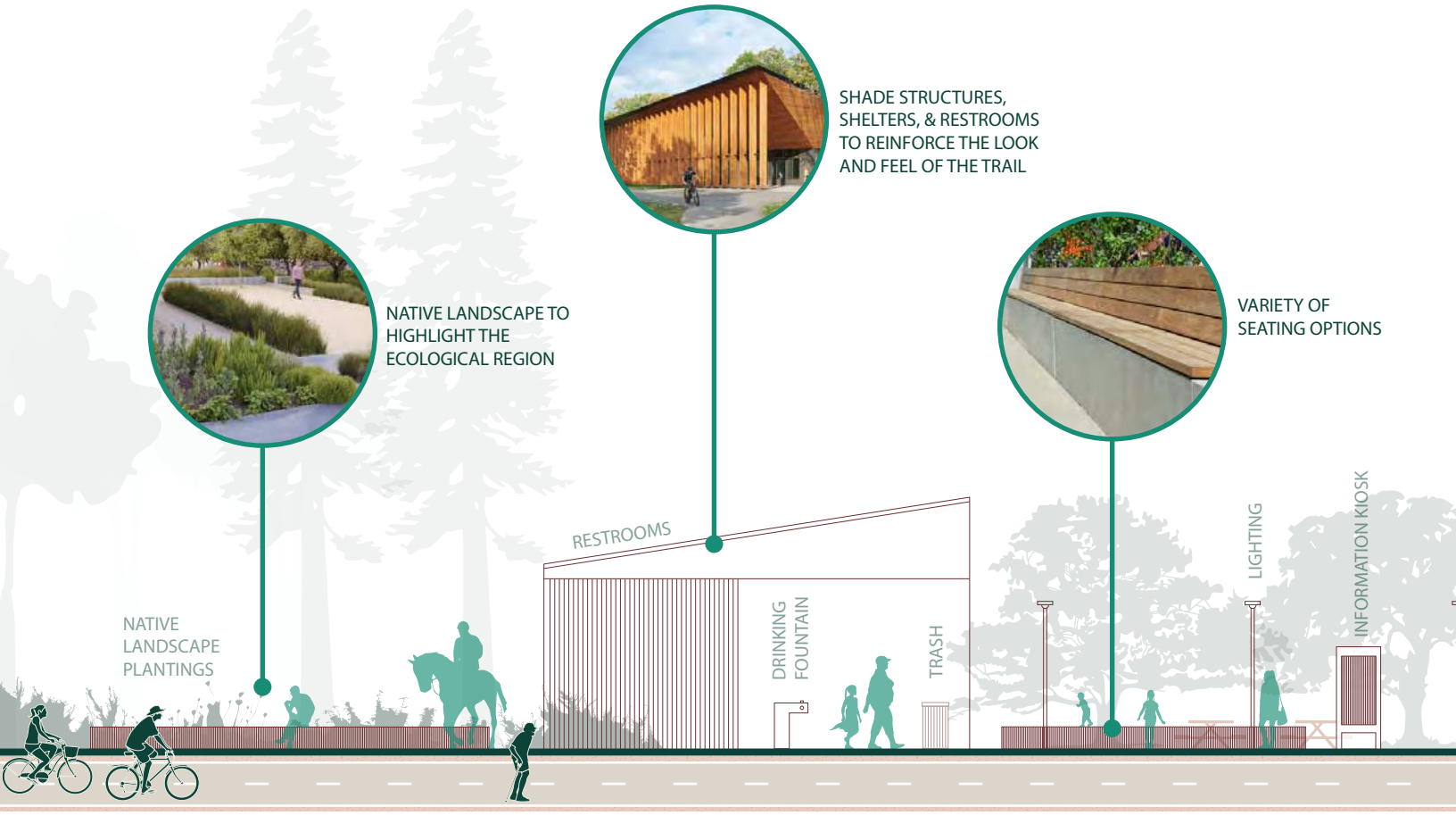


Figure 63: *Community gateway trailhead - generic layout plan*

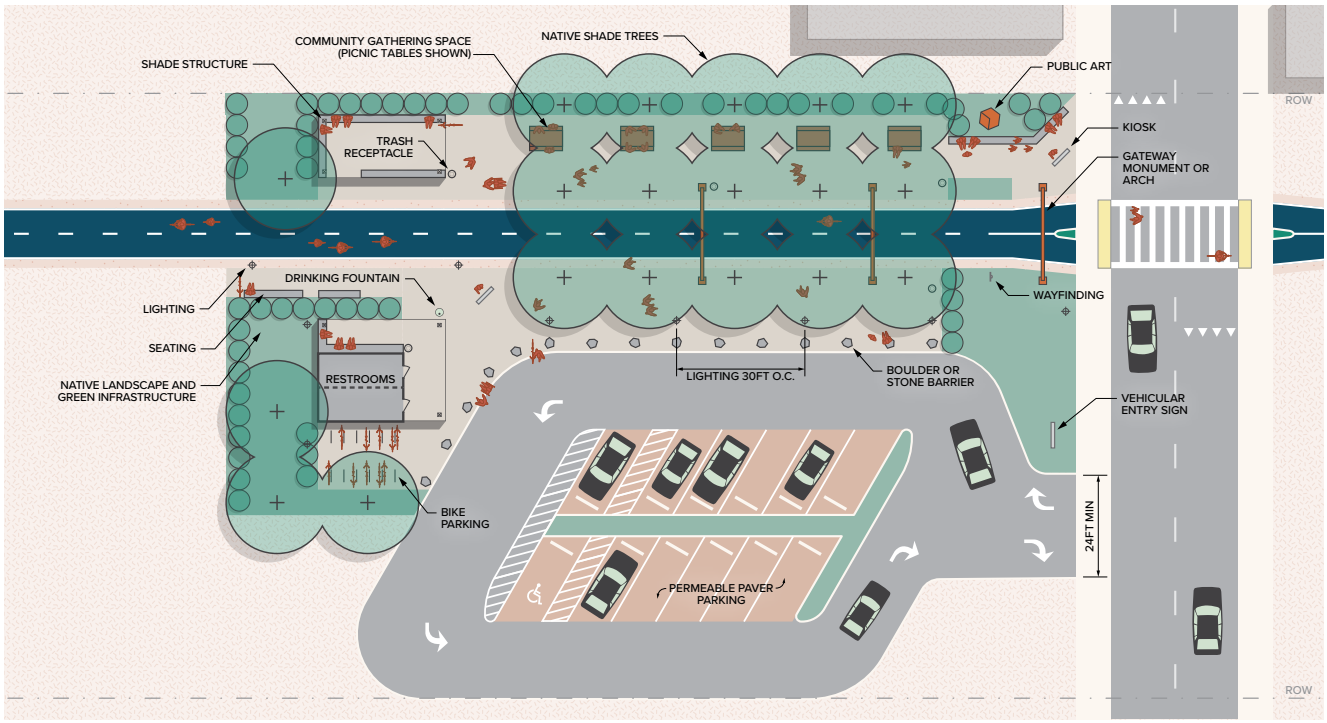
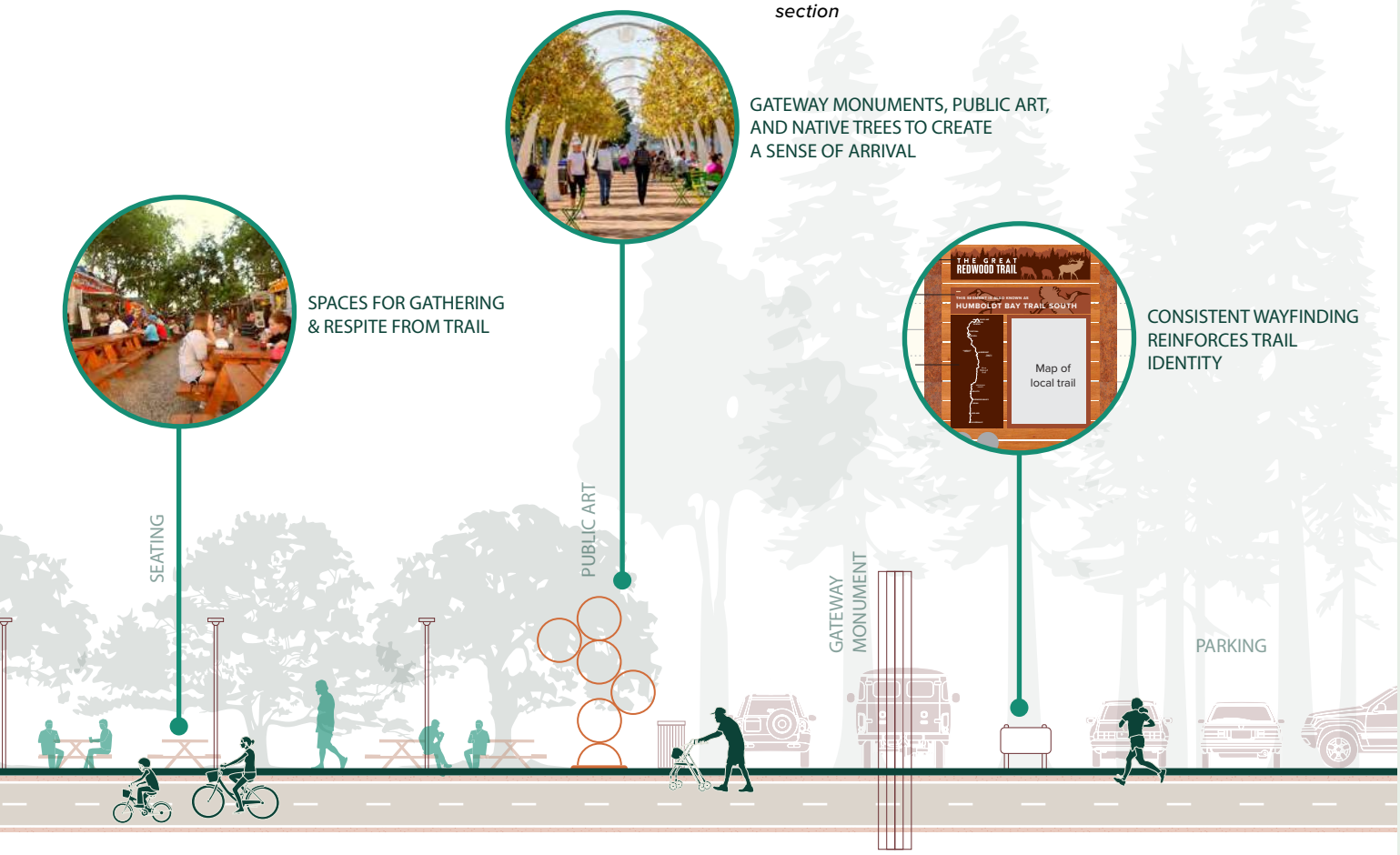


Figure 64: *Community gateway trailhead - generic cross-section*



COMMUNITY TRAILHEAD

Community trailheads are large trailheads in developed areas. Along with community gateways, they serve as the primary entry points onto the Great Redwood Trail for local and regional visitors. A generic layout plan is shown in Figure 65.

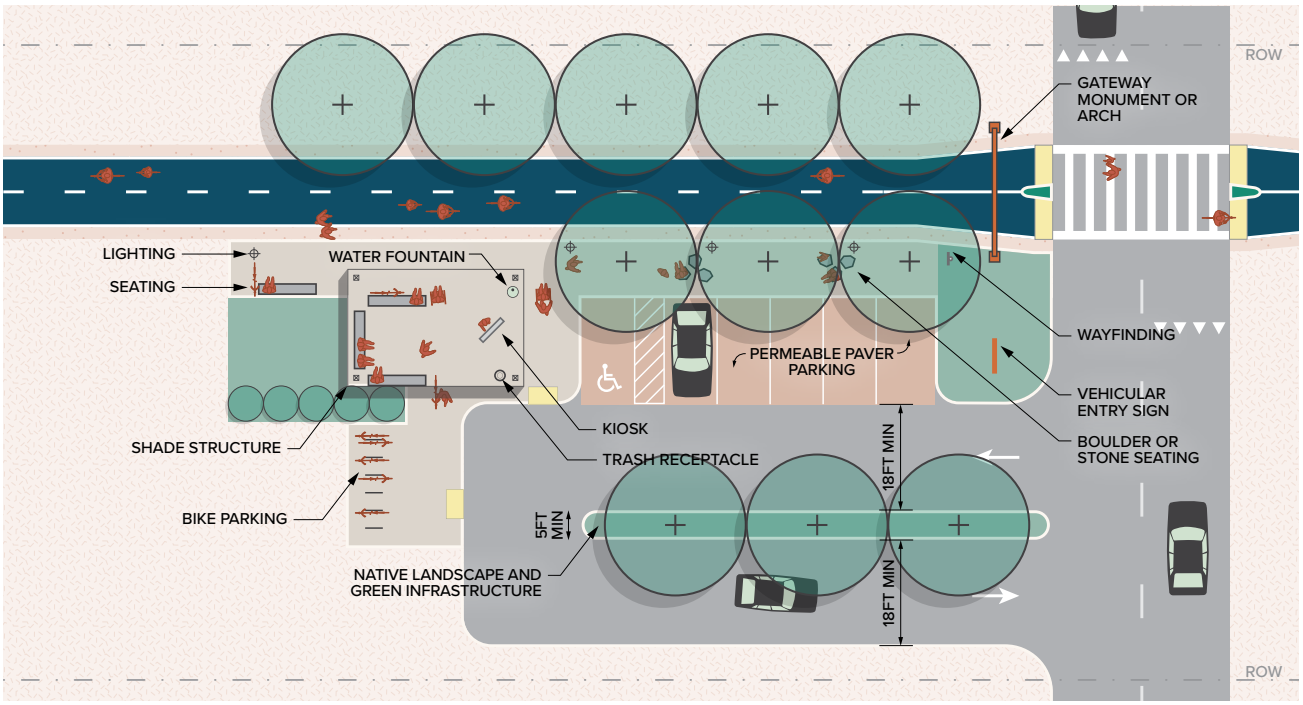
LOCATIONS

- Located within the GRTA ROW adjacent to a minor or major road crossing
- Along sections of multi-use trail

DESIGN GUIDANCE

- The spacing of community gateways and trailheads should be strategic and consider anticipated trail demand and existing gaps in access with parking.
- Community trailheads could be up to 15,000 square feet, and larger community gateways may be co-located with linear parks.
- Community trailheads are strongly recommended to include parking, lighting, trash receptacles, seating, shade, drinking fountains, bike parking, native landscape, and wayfinding kiosks.
- Additional amenities may include restrooms, public art, interpretive elements, and green infrastructure.
- Where community gateways are directly adjacent to a business district, direct access to or from adjacent businesses is encouraged.
- The design and amenities at each community trailhead will vary slightly based on anticipated user groups. Locations with heavy equestrian use will require specific amenities.

Figure 65: *Community trailhead - generic layout plan*



COMMUNITY ACCESS POINT

Community access points are local trailheads in developed areas. They are smaller than community gateways and trailheads, and primarily serve local populations arriving by horse, bike, or mobility device, or on foot. A generic layout plan is shown in Figure 66.

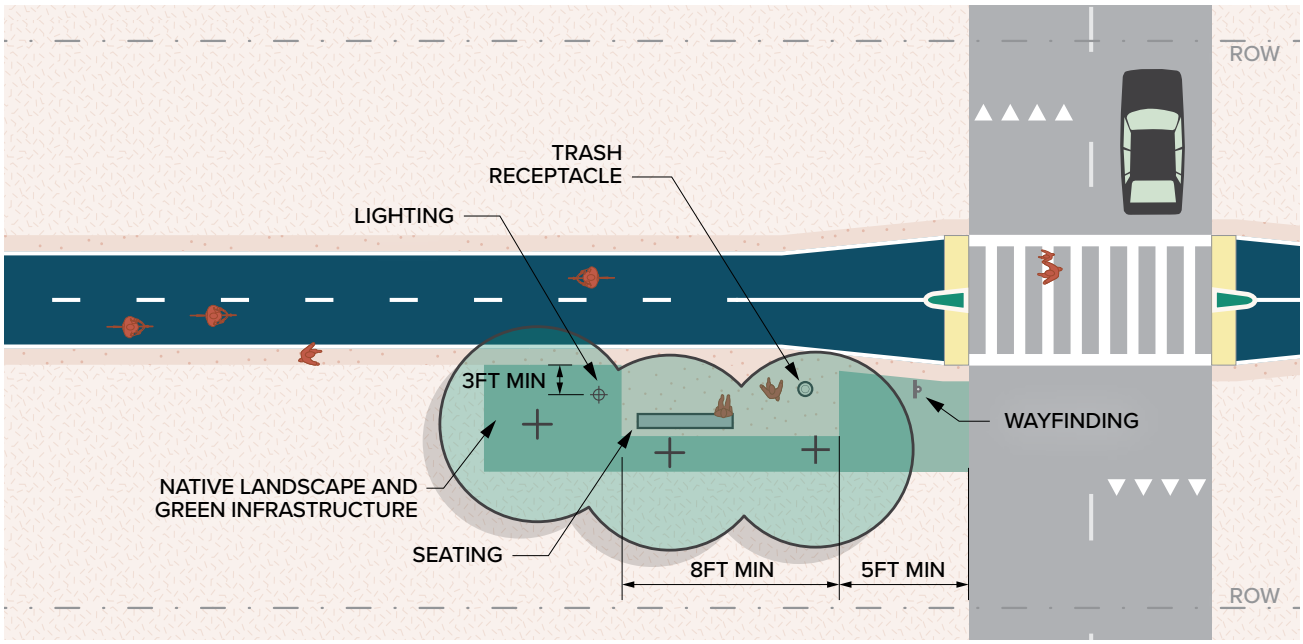
LOCATIONS

- Located within the GRTA ROW adjacent to a minor or major road crossing
- Along sections of multi-use trail

DESIGN GUIDANCE

- Community access points could be located at most public road crossings in urban and rural areas.
- Community access points could be up to 5,000 square feet.
- Community access points are strongly recommended to feature, at a minimum, wayfinding and seating.
- Additional access point amenities may include lighting, seating, shade, and native landscape.

Figure 66: *Community access point - generic layout plan*



BACKCOUNTRY TRAILHEAD

Backcountry trailheads are major trailheads located in backcountry areas of the Great Redwood Trail. They could serve as starting or ending points for backcountry trips.

LOCATIONS

- Large GRTA or publicly owned parcels along the Great Redwood Trail
- Widened flat areas within the historic rail ROW
- Along sections of backcountry trail, or transition points between multi-use and backcountry trail

DESIGN GUIDANCE

- The location of backcountry trailheads will depend on the availability of existing or planned roadway access to the trail corridor.
- Backcountry trailheads could be up to 25,000 square feet.
- Backcountry trailheads are strongly recommended to be co-located with day-use areas or linear parks.
- As backcountry trailheads are critical points for multi-day trail users, it is strongly recommended that they provide trash receptacles, seating, shade, sign-in kiosks, wayfinding, and parking. Backcountry trailheads that serve as start or end points for multi-day trips should accommodate overnight parking.
- Backcountry trailheads are also recommended to include restrooms, potable water, lighting, public art, and interpretive panels.

CC Image courtesy of Intermountain Region US Forest Service on Flickr

Backcountry trailhead precedent

BACKCOUNTRY ACCESS POINT

Backcountry access points are minor trailheads located in backcountry areas of the Great Redwood Trail. They serve as potential pickup or drop-off locations for backcountry trail users, as well as emergency access points. A generic layout plan is shown in Figure 67.

LOCATIONS

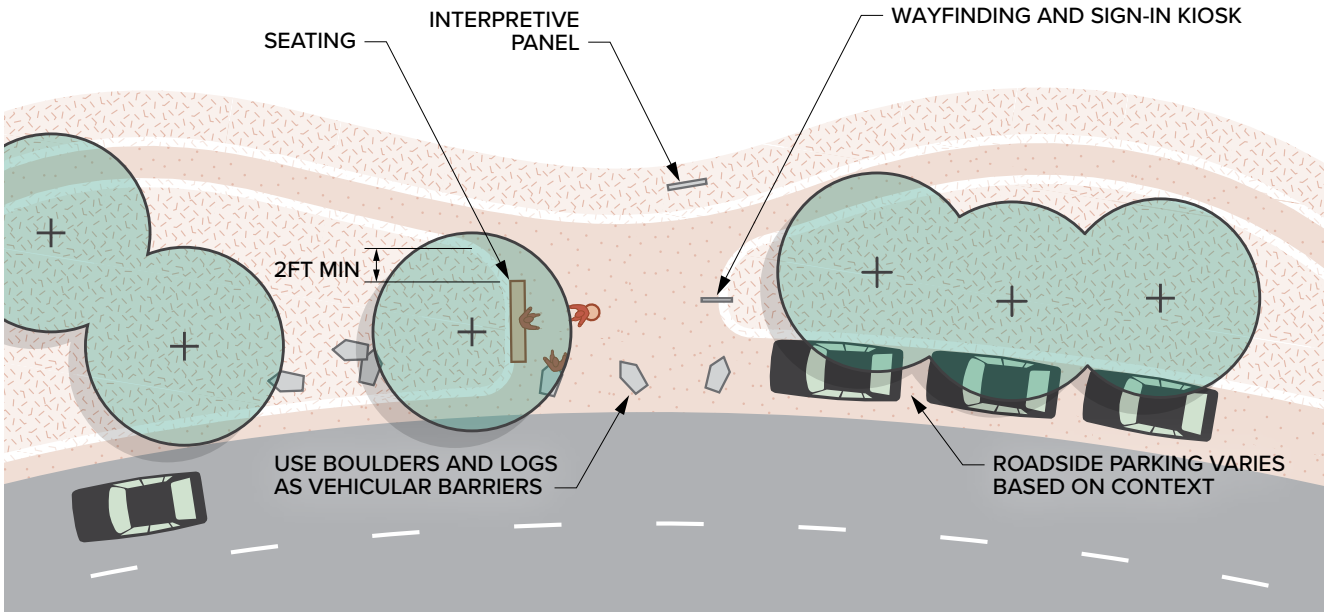
- Along backcountry trail sections with direct or adjacent road access

DESIGN GUIDANCE

- The location of backcountry access points will depend on the availability of existing or planned roadway access to the trail corridor.
- Backcountry access points may be up to 5,000 square feet.
- Backcountry access points are strongly recommended to feature wayfinding and sign-in kiosks.
- Amenities may include seating, trash receptacles, and shade. Depending on adjacent context and roadway, a few parking spots may be located alongside the road.

Backcountry access point precedent

Figure 67: *Backcountry access point - generic layout plan*



Campgrounds

OVERVIEW

Campgrounds along the Great Redwood Trail could expand trail use and make it possible for trail users to enjoy remote sections of backcountry trail. In general, campgrounds along the trail could be organized into two categories:

DEVELOPED CAMPGROUNDS

Developed campgrounds are directly accessible by roadway and vehicle, or have campsites within a short walk of a parking lot. Accessible campgrounds vary based on user type and could serve a wide range of potential trail users.

BACKCOUNTRY CAMPGROUNDS

Backcountry campgrounds are only accessible via the Great Redwood Trail or an adjacent waterway. They serve through-hikers, cyclists, equestrians, or river users on multi-day trips.

REFERENCES

- Accessibility Guidelines, California State Parks
- Campground Design Guidelines, NPS
- Equestrian Design Guidebook, USFS
- Guide to Bicycle Camping, Adventure Cycling Association

Developed campgrounds feature more campsites and vehicle access (CC Image courtesy of U.S. Forest Service, Southwestern Region, Coconino National Forest on Flickr)

Backcountry campgrounds have limited amenities

Equestrian campgrounds may feature corrals and hitches (CC Image courtesy of Bureau of Land Management on Flickr)

RECOMMENDATIONS PER TRAIL USER

The design of campgrounds should vary based on access and anticipated trail users, as detailed in Table 13. Intended trail users may vary between sections of the trail and should be considered where applicable.

Table 13: *Campground recommendations by trail user type.*

USER/ FEATURE	DEVELOPED CAMPGROUND	BACKCOUNTRY CAMPGROUND
Access	Directly accessible by roadway and vehicle, with parking area	Only accessible via the Great Redwood Trail or adjacent waterway
Reservation System	Reservable sites and non-reservable hiker/biker sites	Limited by backcountry permits
Restrooms & Potable Water	Restrooms and potable water strongly recommended	Restrooms strongly recommended
Spacing Recs	None	Varies by User Group
All Ages and Abilities	▶ Campgrounds and support amenities should be as accessible as possible to all users. ▶ Furniture such as picnic tables, tent pads, and parking lots should meet the diverse needs of visitors, including people with physical disabilities, parents with small children, and larger families. ▶ Campsites should maintain a relatively flat surface to increase accessibility and comfort, as well as reduce erosion. ▶ Americans with Disabilities Act (ADA) compliant sites should be provided, where feasible.	▶ Spacing: No spacing recommendation. ▶ Backcountry campgrounds should feature universal design principles wherever feasible. Where a backcountry campground is accessible via a paved or crushed stone multi-use trail, it is encouraged that there should be at least one accessible campsite for users. ▶ Due to remoteness, backcountry campgrounds inherently serve fewer people.
Hikers and Cyclists	▶ Most hiker/biker sites are recommended to be non-reservable and set aside for those users arriving on foot or by bike. ▶ Shared sites are a good alternative to individual campsites for these users. These sites could feature shared amenities such as group picnic areas, lockers, and electrical outlets. Longer-term parking may help accommodate hikers and cyclists participating in multi-day journeys. ▶ Cyclists may benefit from additional amenities such as bike parking and bike repair stations near the campsite.	▶ Spacing: 8 miles max for hikers, 40 miles max for cyclists. ▶ Through-hikers and touring cyclists require minimal space and resources. Flat tent pads should be provided. ▶ Posts to lock bikes should be provided.
Equestrians	▶ Pull-through sites or back-in sites are best for equestrian campers, making sites easier to navigate with a trailer in tow. Parking areas for additional vehicles and trailers are recommended. ▶ Amenities include a living area for the horses with tie-up posts away from roadways. The horse area should be level, placed downwind of the main camping area, and with adequate shade by trees or a shelter. Manure-specific collection areas or signs indicating that visitors are to individually haul manure out of the park are recommended.	▶ Spacing: 25 miles max. ▶ Hitches should be provided.
River Users	▶ Additional parking space may be required to serve campers who are rafting or boating (e.g., large parking areas for vehicles transporting watercraft by trailer). ▶ Longer-term parking at start and end points may help accommodate rafters participating in multi-day journeys, who need to leave vehicles at the start and end point of their trip.	▶ Spacing: 15 miles max. ▶ River access via public lands is strongly recommended.

DEVELOPED CAMPGROUND

Developed campgrounds are accessible by roadway and vehicle. For the Great Redwood Trail, developed campgrounds are limited to front-country areas in and around communities.

LOCATIONS

- Large GRTA or other publicly owned parcels that connect to the Great Redwood Trail that are accessible by road. There are limited locations where developed campgrounds are feasible.

DESIGN GUIDANCE

- Local, state, and federal design standards take precedence for all campground facilities.
- The design may vary based on the operating agency and public land it is located on. In general, California State Parks guidance should be followed.

Campsites should be clustered by user group and type, as shown in Figure 68. The four most common types of campsites in a developed campground include:

- Vehicle and tent campsites. These sites are roughly 3,000 square feet total, including parking and space between campsites.
- Group sites. These sites vary but average roughly 1,000 square feet for one person. This includes parking, restrooms, water, and group campsite features. Group loops accommodating more than 200 people may have more condensed spaces available per person.
- Walk-in or bike-in campsites. These sites typically are roughly 2,000 square feet total.
- Equestrian / Large RV campsite. The lengths allowed will vary by campground. These sites are roughly 4,500 square feet of space (or more), including parking.

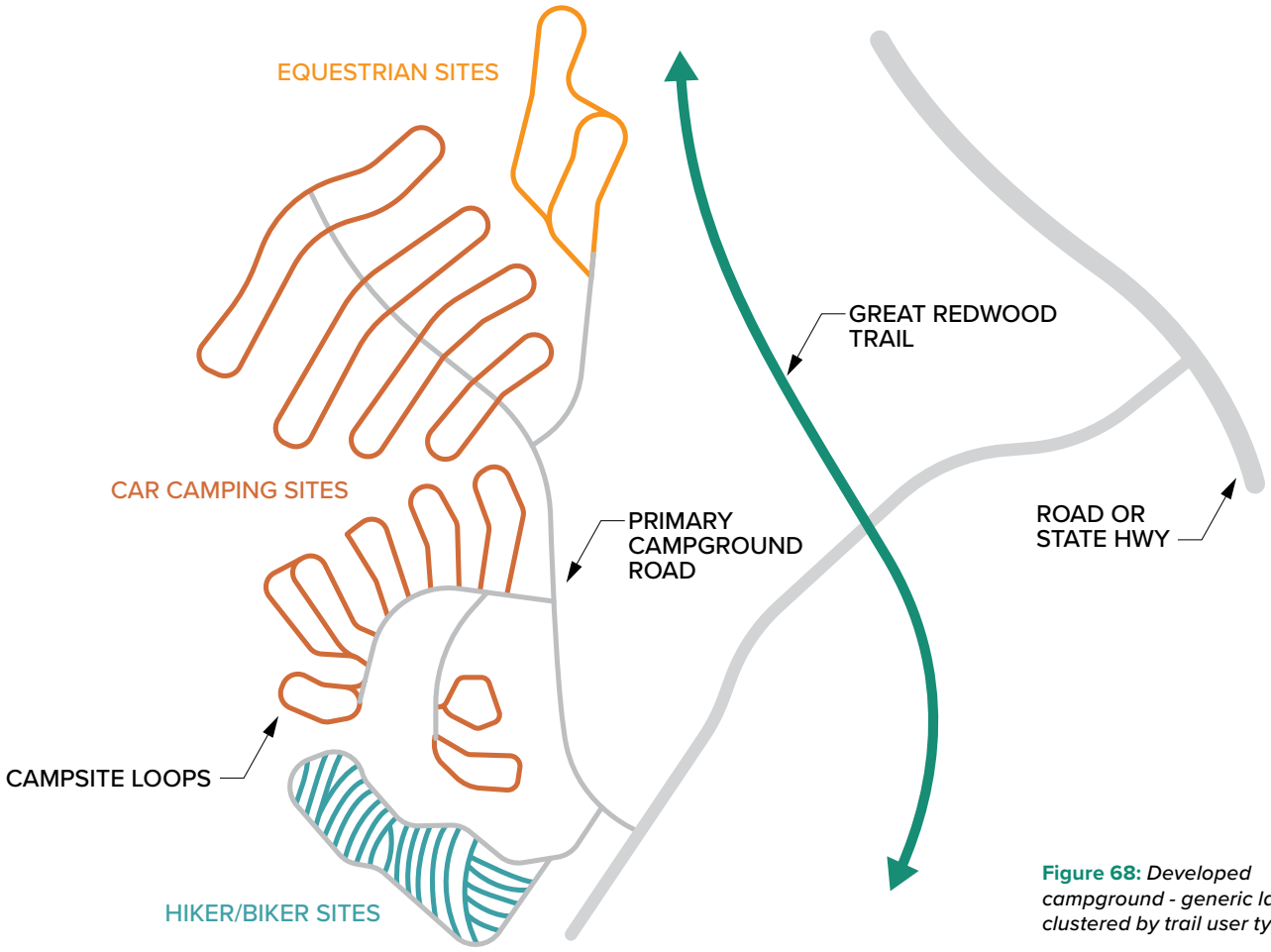


Figure 68: *Developed campground - generic layout clustered by trail user type*

BACKCOUNTRY CAMPGROUND

Backcountry campgrounds are only accessible from the Great Redwood Trail or adjacent waterway. These campgrounds should be low-impact, small, and typically lack significant amenities. A generic layout plan is shown in Figure 69.

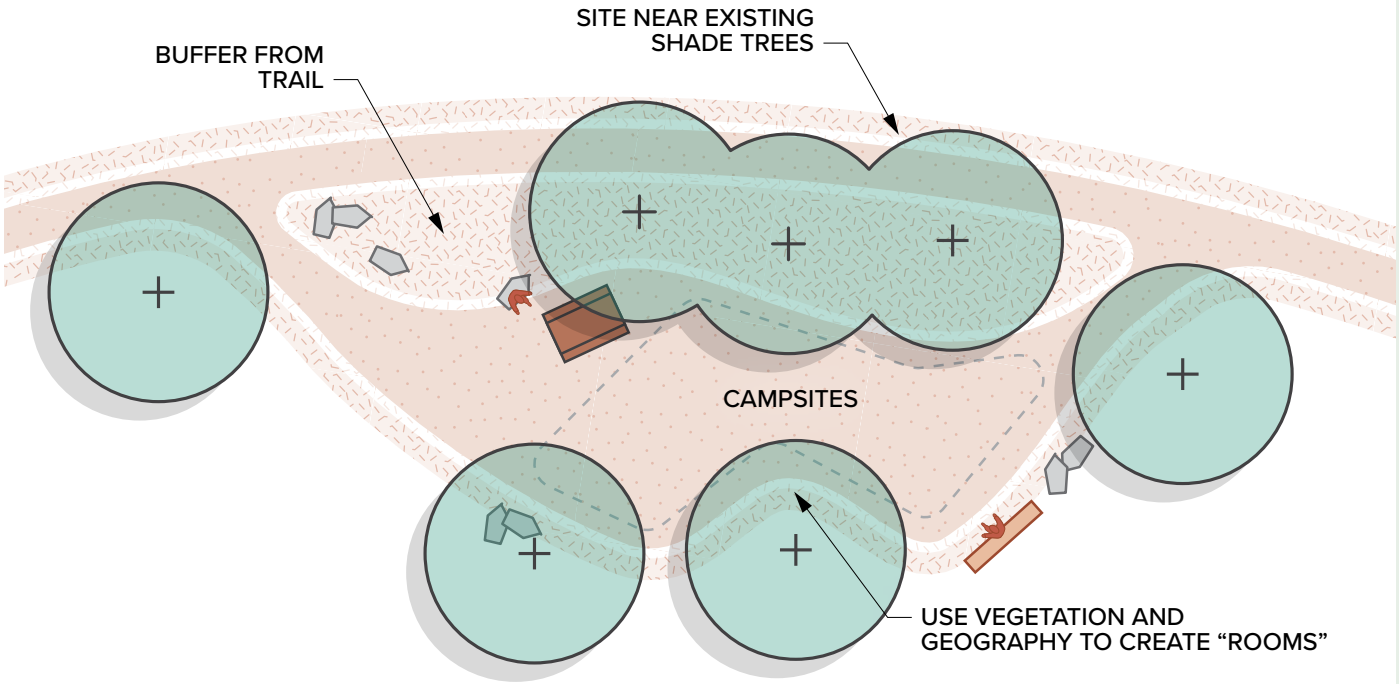
LOCATIONS

- Large GRTA or other publicly owned parcels along the Great Redwood Trail in backcountry areas
- Widened flat areas within the historic rail ROW

DESIGN GUIDANCE

- The spacing and size of backcountry campgrounds should be strategic and consider existing gaps in camping. In general, backcountry campgrounds could be spaced a maximum of 8 miles apart.
- Basic features for all backcountry campgrounds include flat spaces for tents and seating elements such as logs or boulders.
- Where space allows, the campsites should be buffered from the trail by existing vegetation or accessible via a short path.
- There is no standard for the number of tents a backcountry campground should accommodate, as it varies based on context and terrain. For larger backcountry campgrounds, natural features such as existing vegetation or topography should be used to create implied "rooms" for groups.
- Backcountry campground should use natural materials, like stone or logs anchored into the ground, as delineation to prevent campsite enlargement and potential resource impacts.
- All backcountry campgrounds should accommodate hikers. Select backcountry campgrounds may accommodate equestrians, bikers, and/or rafters as well. These campgrounds should be strategically located based on user needs and provide supporting amenities such as hitches or river access.
- Additional amenities may include picnic tables or toilets, where feasible.

Figure 69: *Backcountry campground - generic layout*



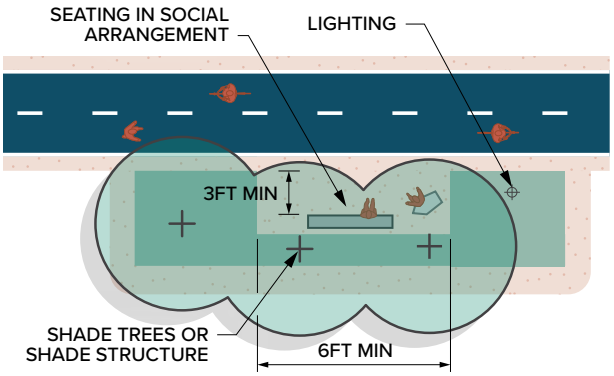
Rest Areas & Open Spaces

REST AREAS

Rest areas provide trail users a place of respite along the trail. In addition to providing seating, they offer trail users shade and protection from extreme heat and solar radiation.

In urban and rural areas, rest areas should be spaced roughly every 1/2 mile, and may include amenities such as lighting, trash receptacles, landscape, and drinking fountains, where feasible. A generic layout plan is shown in Figure 70.

Figure 70: *Rest area*



OPEN SPACES

Large public open spaces along the trail may take the form of linear parks in urban and rural areas or day-use areas in rural and backcountry areas.

LINEAR PARKS

Linear Parks make use of the former railroad ROW, which in urban and rural areas is often flat and up to 200 feet wide for significant linear distances. Linear parks may be accessed from the trail which could be located alongside or within the park. The park may include areas for passive recreation, active play areas, exercise equipment, or landscape areas.

Linear parks expand recreational and gathering space for the community as they are primarily used by local residents. The design and distribution of linear park features is recommended to be driven by community preference.

DAY-USE AREAS

Day-use areas include facilities that support short-term use of a trailhead or other areas along the trail in rural or backcountry areas. Day-use areas could include picnic areas, seating, shade, and waste receptacles. Where feasible, restrooms, shelters, and playgrounds could support increased visitor usage. Day-use areas should be co-located with a trailhead and typically feature parking.

Day-use areas are used by local and non-local visitors, and provide recreational activities that expand the use of the trail such as picnicking, swimming, or barbecuing.

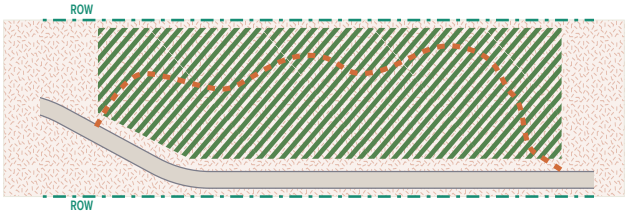
ALIGNING THE TRAIL TO OPEN SPACES

At linear parks and day-use areas, the Great Redwood Trail alignment may shift or bend to maximize the function of the open space. Any open space design will need to observe legal requirements related to railbanking and avoid severance.

Figure 71: *Layout options for the trail through an open space*

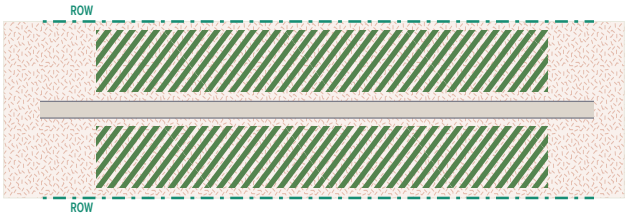
Edge-Running Trail

By aligning the trail near the edge of the ROW, the size of the park is maximized. This supports programming that requires large spaces, such as event lawns, sport courts, or a meandering pedestrian sidepath.



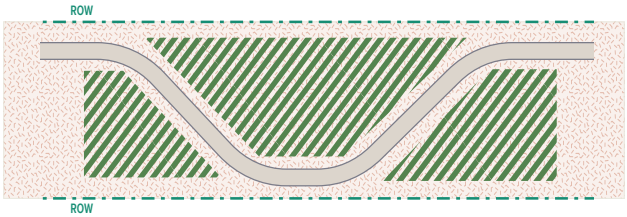
Center-Running Trail

A center-running trail bisects the park into two linear open spaces. This could support different programming on each side, such as more passive or natural uses on one side and more active uses on the other.



Meandering Trail

A meandering trail could be used to create smaller park spaces within a larger park. This allows for a great division and diversity of programming, as well as smaller scaled gathering areas.



CASE STUDY: MILTON STREET PARK

Milton Street Park is a 1.2-acre linear park alongside the Ballona Creek Bike Trail in Los Angeles, California. The design features green stormwater infrastructure, including stormwater swales and native planting. Amenities include seating, bird-watching platforms, bike parking, and small community gathering spaces.

CASE STUDY: JEAN SWEENEY OPEN SPACE PARK

Jean Sweeney Open Space Park is a 25-acre community park located in Alameda, California. The park site is a former railroad property that is bisected by the Cross-Alameda Trail. The park includes large playground, outdoor pavilion, picnic area, restrooms, parking lot, barbecues, drinking fountains, and a network of walking trails.

River Access

The GRT right-of-way runs parallel to the Russian River or Eel River and their tributaries for most of its length. The following info on river access focuses on the Eel River system. The Eel River, California's third-largest watershed, is uniquely remote, rugged, and spectacular. The Eel River flows north through four counties to the Pacific Ocean past oak savannah, dramatic canyons, redwood forests, and lush dairy pastures. It was designated as a Wild and Scenic River (WSR) by the State of California in 1972 and the federal government in 1981. The WSR status is jointly managed by the Bureau of Land Management's Arcata Field Office and the National Park Service's Seattle office.

Approximately 95 miles of the Eel River parallel the GRT corridor, and the success of the GRT is interwoven with river access and recreational use in this section. Recreational and commercial boating use of the Eel River Canyon during the spring and summer months has been steadily increasing. Lacking a requirement for public permits or fees and featuring a rafting "put-in" located a half-day's drive north of the greater San Francisco Bay Area, it is a popular destination for its accessible whitewater and stunning scenery.

River access is the primary current public use within the Eel River Canyon. The GRT will impact river access, and vice versa. Existing river access points are unimproved, difficult to access, and often involve trespass over private land. Proactively developing management goals and strategies for adjacent GRT and river uses is essential; this process should include listening, researching other rivers with similar opportunities and challenges, and collaboration between all interested parties. However, while planning and construction of the Great Redwood Trail adjacent to areas actively used for river recreation should consider current river use, GRT planning and development should not be delayed by collaboration with river recreational users.

Incorporating California Native American leadership and knowledge into the management of the GRT corridor from an early stage is a shared interest. Numerous sacred and cultural sites exist in the canyon that have been difficult or impossible for California Native American tribal communities to access due to their location on private land, and some are being defaced. These sites need to be carefully and confidentially considered in public access planning and management.

Eel River by the Community of Eel Rock

The Eel River Canyon (and beyond) is predominantly privately owned, including the most popular segments for multi-day spring whitewater rafting/kayaking between Dos Rios and Alderpoint. Other popular segments include day or overnight summer canoeing, floating, and swimming below Outlet Creek and from Alderpoint to the Founders Grove area of Humboldt Redwoods State Park.
In the WSR system, these river segments adjacent to the GRT corridor are designated “recreational” whereas upstream and along the North Fork Eel River segments are designated “wild” or “scenic.”

Multi-party conversations are key to successfully managing river access. The Bureau of Land Management’s Arcata Field Office holds and manages land-locked parcels along the GRT corridor and shares responsibility for Eel WSR management with the National Park Service. The Round Valley Indian Tribes own 14 miles of mainstem Eel River frontage and the Wildlands Conservancy owns the next 15 downriver miles in the canyon.

Little is documented about current Eel River use. During robust GRT public engagement in the Eel River Canyon, residents and visitors provided clear guidance about priorities for river access management. The need for human and solid waste management is a top priority for local communities, ranchers, and landowners. Neighbors are also concerned about the demands on them to manage trash and other types of trail-related maintenance, which is already an issue in high summer-use areas along Outlet Creek, Dos Rios and downriver from Alderpoint.

Many parcels between the trail corridor and the river are privately-owned, so directing river access to publicly-owned land along the river is very important to neighboring landowners. The need for improving and managing access points is also often identified as a need. Public access in most GRT-adjacent sections of the Eel River is infrequent, and there is need for an acquisition strategy to provide river access at necessary intervals.

PUBLIC RIVER ACCESS AND TRAIL COORDINATION

There are opportunities and priorities for the GRTA and its partners to manage river access in a way that reduces impacts, prioritizes local employment for development and management, and maintains a safe and sustainable user experience. This effort should include support for collaboration with California Native American tribes by building communications and partnerships between managing agencies and tribes with interest and capacity for river access co-management.

Alderpoint Water Access

ISSUES TO ADDRESS

- How to minimize trespassing on private property while facilitating public access at appropriate locations? Identify the locations and parcels in highest demand and the ownership, safety, access, and management considerations for each in context with the overall GRT.
- Strategy to meet access and safety needs associated with a variety of river uses in spring (whitewater rafting and kayaking) and summer (swimming, floating, and paddling).
- Strategy for protecting sensitive natural and cultural resources related to river access.
- Strategy for proactively addressing human waste and litter problems related to river access.
- How to facilitate access to clean water and limit fire hazards in the dry months.

POTENTIAL PARTNERS

- GRTA
- National Park Service (NPS)
- Bureau of Land Management (BLM)
- California Native American tribes
- The Wildlands Conservancy
- River Management Society
- American Whitewater
- Friends of the GRT
- Volunteer Fire Departments

The GRTA should collaborate with a nonprofit with expertise in WSRs. Ongoing multi-organizational coordination with interested agencies, tribes, and organizations to identify opportunities for collaboration for coordinated management of river access and the GRT.

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Trail Amenity Toolkit

RESTROOMS

Restrooms are critical amenities for trail users, extend the duration of trips, and help to prevent misuse of the trail. Careful consideration should be given to a number of factors before locating restrooms including available land, size of gateway or trailhead, frequency of use, existing restroom facilities within the trail system, utility availability, and user need.

Developed Area Restroom - Flush toilets with integrated shade structure

Backcountry Restroom - Vault toilet with structure (NPS)

RESTROOM TYPES

Restroom design and guidance will vary between developed area and backcountry restrooms.

DEVELOPED AREA RESTROOMS

Restrooms in urban and rural areas should include flush toilets and potable water, where feasible. Other options include vault, composting, or portable toilets.

- May be located at community gateways, community trailheads, linear parks, or day-use areas. In general, trail users should have access to at least one restroom per community.
- Prioritize restrooms at strategic and high-usage locations, and review gaps for placement at other trailheads or locations along the corridor.
- Secure partnerships with adjacent private business to increase frequency of restroom and water facilities for trail users.
- Locate restroom structures adjacent to trailheads and parking lots for security, maintenance, and access to water and sewer (unless they are self-composting or portable units).
- The space required for each restroom building varies based on the number of toilets to be provided. The number of toilets should reflect the anticipated trail demand.
- Place bicycle parking close to restroom structures so that bicyclists do not impede trail access. If along an equestrian route, provide hitches and adequate space to tie up a horse off the path of travel.
- Maintenance access to restrooms should be a strong consideration when planning for restroom buildings. Regular restroom maintenance and service should be conducted by the local trail manager or agency.

BACKCOUNTRY RESTROOMS

Backcountry restrooms, due to distance from utilities, are unlikely to feature flush toilets or running water.

- **Pit toilets** are a pit in the ground with a platform or structure around it. Pit toilets do not break down human waste and require significant maintenance or relocation of toilets when full. Pit toilets are not recommended due to potential pollution to hydrology.
- **Vault toilets** are similar to pit toilets but utilize a sealed vault for waste. They require routine pumping to remove waste. Due to maintenance requirements, vault toilets are only feasible in locations that could be accessed by roads.
- **Composting toilets** have multiple above-ground chambers to collect human waste. They utilize natural ventilation and oxygen-loving (aerobic) bacteria to decompose human waste. They require several years to naturally compost waste. Composting toilets could be considered in limited-access backcountry areas.
- Backcountry restrooms may be located at backcountry trailheads, campgrounds, or day-use areas along the trail. Review gaps for placement at locations along the corridor.
- Locate toilets downwind of high-usage areas such as campgrounds, trailheads, or populated areas. Proper airflow and ventilation are critical to minimizing noxious smells.
- Locate toilets away from the trail for privacy if possible. For high-usage locations, provide an enclosed structure.
- Regular restroom maintenance and service should be conducted by the local trail manager or agency.

DESIGN GUIDANCE

- Local, state, and federal codes take precedence for all restroom facilities.
- Prior to undertaking any restroom building design, consultation with a structural and civil engineer, state building codes, health and safety codes, 2010 US Department of Justice Standards for Accessible Design, and local development codes (Unified Development Ordinance) is required.
- Use wayfinding guide signs to indicate location and distance to the next available restroom.
- Restrooms should make use of natural light and ventilation to the extent possible.
- Restroom facilities should always be located outside of flood prone areas.

ACCESSIBILITY CONSIDERATIONS

- Restrooms should feature restroom stalls that are wheelchair accessible, where feasible. Maps and wayfinding should clearly identify locations of accessible restrooms.
- Access to backcountry restrooms should be convenient from the trail and should avoid steep slopes or stairs.

REFERENCES

- Backcountry Sanitation Manual, Appalachian Trail Conservancy, 2014
- Planning and Design of Developed Recreation Sites and Facilities, US Forest Service (USFS), 2018
- Accessibility Guidelines, CA State Parks, 2015

POTABLE WATER

Access to potable water is an essential amenity that is crucial to the safety and comfort of all trail users.

LOCATIONS

- Community gateways and trailheads
- Linear parks and day-use areas
- Campgrounds

TYPES OF POTABLE WATER

- **Drinking fountains** are typically connected to the municipal water supply and located in developed areas. Drinking fountains should feature a bottle fill or spigot option.
- **Potable surface water** includes water collected from rivers and creeks that is then treated to make it safe for consumption. For backcountry areas, users will need to filter water using a portable filter, UV light, chemical treatment, or equivalent product. Legal access to the potable water source will need to be considered.

DESIGN GUIDANCE

- Prioritize location of drinking fountains at strategic and high-usage locations, and review gaps for placement at other trailheads, campgrounds, or locations along the corridor.
- For urban and rural areas, identify potable sources of water along the trail alignment with spacing of 5 miles or less. Provide shorter spacing wherever feasible. For backcountry areas, access to sources of potable water may range from 5 to 15 miles.
- Where possible, wayfinding signs should be placed to indicate if the distance to the next potable water source is greater than 5 miles.
- Wayfinding signs should inform users of additional potable water sources that may be accessible through public spaces such as nearby parks, stores, restaurants, and other trail-friendly businesses.
- For drinking fountains, include hose bib connections for maintenance purposes. Schedule regular inspections to monitor leaks, clogged drains, cracked pipes, and vandalism.

ACCESSIBILITY CONSIDERATIONS

- Drinking fountains should be selected for wheelchair access.

Drinking fountain along trail with bottle fill and wheelchair access
Photo credit: Elkay

Example of backcountry water source. Photo credit: NPS

LIGHTING

Lighting for trails should consider safety needs, sensitive habitats, trail function, adjacent land uses, and maintenance. In general, lighting is not appropriate for trails in backcountry areas, trails with low use, or where there is little to no development. Street lighting could improve visibility of the crossing and trail users for motorists. Lighting may also be necessary for day-time use in trail tunnels and underpasses.

LOCATIONS

- Community gateways and trailheads
- Parking areas
- Urban and rural restroom facilities
- Linear parks
- Major trail intersections and street crossings
- Bridges, underpasses, and tunnels
- Sections of trail in urban or rural areas with high demand or safety and visibility considerations

DESIGN GUIDANCE

- Consult local jurisdiction ordinances to determine lighting recommendations and limitations.
- Solar powered lighting is an option where utility connection is difficult or when alternative energy sources are desired. Daylight hours should be analyzed per season prior to specifying solar lighting, which may be a viable option in both developed and backcountry areas.
- Design of lighting should be at pedestrian scale (20-foot height maximum); 30- to 50-foot spacing is typical along the trail.
- Lighting should avoid trees and be placed outside canopy edge where possible.
- Lighting placement and fixtures should be dark-sky compliant in order to minimize light pollution for adjacent communities and environments.
- Specialty lighting should be considered for tunnels and bridges, and for limited backcountry areas.

ACCESSIBILITY CONSIDERATIONS

- Avoid light fixtures at eye level that could impair visibility.
- Design lighting levels will vary based on the desired function and context of each location. Provide sufficient lighting at key locations including wayfinding kiosks, restrooms, and roadway crossings.

REFERENCES

- International Dark Sky Association
- Illuminating Engineering Society

Solar lighting along a trail

Tunnel lighting

SEATING

Seating along trails provides a place for trail users to rest, congregate, contemplate, or view nature along trails and throughout the trail system. Seating should be designed for function and comfort, and to complement the trail identity.

LOCATIONS

- Trailheads
- Campgrounds
- Rest areas
- Linear parks and day-use areas

SEATING TYPES

- **Prefabricated benches** provide standardized seating that could be applied to almost any context. To maximize comfort and use for the broadest set of users, include backs on benches. Avoid dividers as they restrict flexibility of use for groups of people, and provide a variety of seating with and without arm rests.
- **Seatwalls and stone blocks** provide a seating element that is durable and customizable to the Great Redwood Trail or another local identity. Prefabricated toppers may be used to add a metal or wood surface or back to a seatwall.
- **Picnic tables** provide places for trail users to congregate for meals or to relax in small groups, such as at larger trailheads, campgrounds, linear parks, or day-use areas.
- **Logs, stumps, and boulders** are seating options in backcountry areas where natural materials are available. Backcountry seating elements should be selected for flat and stable surfaces and placed to provide a range of seating options.

DESIGN GUIDANCE

- Use a consistent design of seating elements across the entire Great Redwood Trail to provide a standard level of comfort and design identity. Alternatives may be considered if they align with an existing standard for a local jurisdiction.
- Align seating selections with the trail type and anticipated use of each location.
- Where small or large groups are anticipated and space allows, place seating in clusters as opposed to in a row. This supports more comfortable socialization.
- Seating and other amenities are recommended to be located a minimum of three feet from the edge of the trail, where feasible. Locate seating a minimum of four feet from restroom access and drinking fountains and a minimum of two feet from trash receptacles, light poles, and signposts.
- Place seating in shaded areas, especially where there is minimal shade available.
- Drainage should slope away from the seating and the trail.

ACCESSIBILITY CONSIDERATIONS

- Provide benches with backs to maximize comfort for seniors and all users.
- Seating should have an unobstructed and accessible path from the trail.
- Place seating on level ground.
- Where picnic tables are located, a wheelchair accessible picnic table should be provided.

Seatwalls with wood toppers provide a durable and customizable option for community gateways and trailheads

Arrange a variety of seating options in clusters to support small groups and socialization

Wood benches should use locally sourced timber

Natural stone seating

Picnic tables for community gateways, trailheads, and linear parks should feature extended top for wheelchair access

Boulders may be used as informal seating or vehicular barriers (NPS)

BIKE PARKING

Short-term bike parking is meant to accommodate users departing in two hours or less. Racks should be placed at community gateways and trailheads. The Association for Pedestrian and Bicycle Professionals provides standards for bike rack design, spacing, and placement. Consult local, state, and federal codes for additional count requirements and installation regulations.

LOCATIONS

- Community gateways and trailheads
- Select community access points and backcountry trailheads
- Linear parks

DESIGN GUIDANCE

- All bike parking spaces should permit the locking of the bicycle frame and one wheel with a U-type lock; support the bike in a stable horizontal position without damage to wheels, frame, or components; and provide two points of contact with the bike's frame.
- Securely anchor bike parking facilities so they cannot be easily removed and use facilities designed to resist vandalism and theft.
- The quantity and type of bike parking will vary by location based on anticipated use. In more populated areas, bike parking should consider longer recumbent bikes, hand-cycles, bikes with trailers, and cargo bikes that may take up more space.
- Provide bike parking for locations where people are anticipated to park their bike and walk to another destination, such as adjacent to a park or business district.
- Consider bike parking at backcountry trailheads. These are common locations for users to bike to and then proceed on foot.
- Consider covered bike parking in regions with higher frequency of rain or locations where longer-term bike parking is anticipated.
- Consider charging stations for e-bikes.

Custom bike racks improve identity and character of the trail

Bike racks should be clustered together

BIKE REPAIR STATION

Bike repair stations are self-serve kiosks designed to offer a complete set of tools necessary for routine bicycle maintenance.

LOCATIONS

- Select community gateways, trailheads, and access points
- Linear parks
- Select trail junctions

DESIGN GUIDANCE

- Bike repair stations could be grouped with other amenities such as drinking fountains and bike parking. They should be in urban and rural areas that are well monitored and easily accessible by foot or bicycle.
- Bike repair stations should be at least 6 feet from trail edge to allow room to repair bicycles.
- Stations should be secured to a durable pad, such as concrete.
- Bike repair station tools are secured by high security cables but will still be an attractive target for theft. Placement in areas of high activity is one key strategy to reduce potential vandalism. Identifying a partner to take responsibility for maintaining the bike repair station is essential to its success.

Bike repair station including tools and a pump

TRASH RECEPTACLES

Trash and recycling receptacles provide for proper maintenance and appearance of the trail system.

LOCATIONS

- Community gateways and trailheads, and backcountry trailheads
- Select community and backcountry access points
- Parking areas
- Select rest areas and campgrounds
- Linear parks and day use areas

DESIGN GUIDANCE

- Wildlife are drawn to trash and recycling receptacles. In rural areas or areas with high concentrations of wildlife, consider animal-proof receptacles.
- Receptacles need to be accessible to maintenance personnel and trail users.
- At most locations, one trash and recycling receptacle will suffice. At large or high-demand locations, multiple receptacles may be required.
- Per recent legislation, 3-bin collection systems may be implemented including compost/food waste. Signage and design of bins should be consistent with the local maintaining jurisdiction.
- In backcountry locations, locate trash receptacles at backcountry trailheads and select campgrounds.
- Exact placement of receptacles will depend upon the location of other amenities and programming. Receptacles should be intuitively located close to the trail and paths of travel.
- Receptacles and all trail amenities should be a minimum of 3 feet from the edge of the trail.
- Consider receptacles with a lid in regions with high rainfall.

ACCESSIBILITY CONSIDERATIONS

- At trailheads and in urban and rural areas, trash receptacles should be ADA compliant.
- Trash receptacles should be easily accessible from the trail to provide ease of access and reach for all users regardless of age or ability.

Trash receptacle example for trailheads in urban and rural areas

Animal-proof trash receptacles for backcountry trailheads

SHADE STRUCTURES

Whether it be protection from the rain or a place to rest during a sunny day, shade structures and shelters create comfort and protection for all trail users. Shade structures should be sensitive to context and designed to integrate with the intended function of the site and trail user needs.

LOCATIONS

- Community gateways and trailheads
- Select community access points, backcountry trailheads, and backcountry access points
- Rest areas where there is not adequate shade from trees

DESIGN GUIDANCE

- Consider the orientation of structures to provide maximum protection from elements.
- Shade structures may be placed in any setting (paved surface, crushed stone, natural earth). Footings are required per engineer or manufacturer specifications.
- Landscaping may be incorporated into design.
- Structures should not impede pedestrian, equestrian, or bicycle movement and should be located adjacent to the trail (not within the travel-way).
- Structures should not block viewsheds of historic, natural, or cultural elements.
- Structures should incorporate other amenities, especially benches and picnic tables.

ACCESSIBILITY CONSIDERATIONS

- When locating shade structures, consider ADA access under and around the structure.

Shade structures providing critical shade for trail users

Prefabricated wood shade structure (Streetlife)

NATIVE LANDSCAPE AND SHADE TREES

The Great Redwood Trail cuts across a broad cross section of northern California ecological regions, shown in Figure 72. The design of the trail should highlight and emphasize native ecology, and showcase exemplary trees and landscapes native to the region.

LOCATIONS

- Community gateways, trailheads
- Select community access points, backcountry trailheads, and backcountry access points
- Linear parks and day-use areas
- Select rest areas
- Highly visible sections of trail
- Ecological restoration including creek restoration projects

DESIGN GUIDANCE

- Identify opportunities to partner with local California Native American tribes for protection and enhancement of culturally significant native plant species.
- All plants should be native and locally sourced.
- Situate shade trees to maximize coverage of the trail and trail support facilities.
- Landscape design should reflect the local ecological region. Locations near the boundary of two different ecological regions may draw from landscape palettes of multiple regions.
- Plant arrangement should generally be organic and reflect natural clustering and distributions of species found in nature.
- At community gateways, trailheads, and linear parks, a geometric arrangement of shade trees may maximize coverage and align with the geometry of the space.
- Trees at trailheads or adjacent to trails should be limbed up to maintain sightlines and vertical clearance.

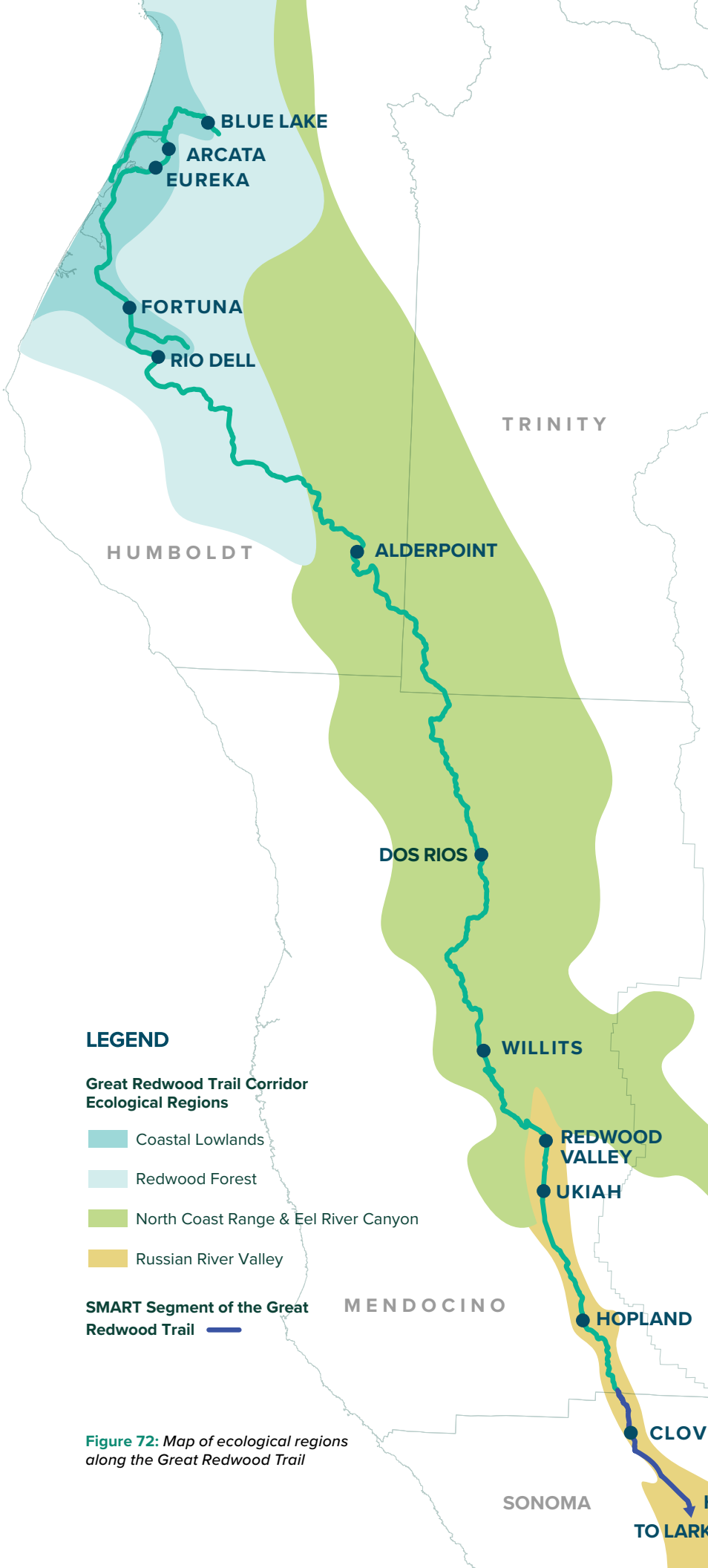


Figure 72: *Map of ecological regions along the Great Redwood Trail*

ECOLOGICAL REGIONS

The keystone species listed below are general recommendations and may not be applicable for all locations along the trail within the ecoregion. Each project location should have the proposed plant species reviewed by the local partners and California Native American tribes.

Coastal Lowlands

The Coastal Lowlands ecoregion contains beaches, dunes, and marine terraces below 400 feet in elevation. Wet forests, lakes, estuarine marshes, dunes, grasslands, and streams are characteristic features of the landscape.

- **Trees**: bishop pine, Sitka spruce
- **Additional Species**: California wax myrtle, coyote brush, dudleya, solidago, yarrow

Redwood Forest

The Redwood Forest ecoregion lies within the coastal fog zone. It features fog-dependent coast redwoods and Douglas-fir. Large stands of old-growth forest moderate the local climate.

- **Trees**: coast redwood, Douglas-fir, western redcedar, Port Orford cedar, grand fir, Sitka spruce
- **Additional Species**: currants, ferns, sorrel, yerba buena

North Coast Range & Eel River Canyon

The North Coast Range and Eel River Canyon occur in the central part of the northern California Coast Ranges. They are characterized by high rainfall and mixed evergreen and hardwood forests.

- **Trees**: Douglas-fir, tanoak, valley oak, white oak
- **Additional Species**: toyon, coffeeberry, huckleberry, coyote brush, ceanothus, yerba buena, native grasses

Russian River Valley

The Russian River Valley ecoregion is low, flat, populated, and heavily agricultural in character. Grape vineyards are extensive, as well as areas of orchards and specialty crops.

- **Trees**: blue oak, valley oak
- **Additional Species**: manzanita, ceanothus, native grasses

ERDALE

HEALDSBURG
KSPUR

GREEN INFRASTRUCTURE

Green infrastructure treats and slows stormwater runoff from impervious surface areas such as roadways, paved surfaces, compacted soil, and buildings. Sustainable stormwater strategies manage runoff, reducing the risks of pollution, erosion, or flooding of local waterways. Combined with native low-water shade trees, they reduce greenhouse gas emissions, aid in carbon sequestration, and increase habitat. These strategies also promote groundwater and ecosystem health by capturing, purifying, and infiltrating stormwater. Stormwater features could include flow through bio-swales, rain gardens, tree box filters, and bio-retention planters.

LOCATIONS

- Community gateways and trailheads
- Select community access points, backcountry trailheads, and backcountry access points
- Select campgrounds, rest areas, and linear parks

DESIGN GUIDANCE

- Install in urban and rural areas without conventional stormwater systems, remote locations, or areas along the trail that are prone to flooding to improve drainage and reduce costs compared to installing traditional drainage systems.
- Use green infrastructure to provide an ecological and aesthetic enhancement of standard landscape areas, including buffers along roadways or private property.
- Bio-swales and rain gardens may be appropriate at parking lots, curb extensions, trailheads, and select locations along the trail.
- Incorporate native water-tolerant trees into stormwater facilities at trailheads.
- Pervious surfaces such as pavers or crushed stone surfacing could be used for infiltration in trailhead plazas and parking lots.

Bio-swale along a trail

Pervious materials including pavers and pervious asphalt may be used for parking lots and driveways at trailheads

INTERPRETIVE ELEMENTS

Interpretive elements convey site and context information to visitors. Placed in strategic locations, they educate people about the place, its culture, natural environment, and history, offering site insight and connection for locals and visitors alike.

LOCATIONS

- Community gateways
- Select trailheads and access points
- Select rest areas and points-of-interest along the trail
- Linear parks and day-use areas

DESIGN GUIDANCE

- Interpretive elements should be designed at a human scale with attention to details and craftsmanship.
- Sign panels are the most common and traditional form of interpretive elements. Additional types to be considered for high profile locations may include inlays and ground markings, sculptural elements, or custom wood or metal signage.
- Align interpretive elements with trailheads and rest areas and consider co-locating with seating and shade. For interpretation of specific locations or visible landmarks, orient the interpretive element to the landmark.
- Avoid placing too many signs in any given location, as it could cause visual clutter and confusion.
- Use reflective coating to minimize glare on panels.

ACCESSIBILITY CONSIDERATIONS

- Interpretive elements should provide an equivalent experience for users regardless of ability, including for wheelchair users and individuals with visual impairments.
- In many locations, interpretive elements may be multi-lingual.

TRIBAL COLLABORATION

Interpretive elements could highlight California Native American tribal culture and history. In addition to conventional interpretive elements, the following were identified by tribes as key interpretive opportunities:

- Consider building an interpretive center and/or culturally important buildings. If built, ensure it is located in collaboration with local California Native American tribes to avoid trespassing, or identification of and possible damage to sensitive cultural resource areas.
- Consider creating a memorial to Murdered and Missing Indigenous People (MMIP).
- Tribal artwork along the trail.
- Interpretive elements can incorporate native languages, including use of indigenous place names.

Artistic interpretive panels such as perforated metal create engaging displays

Interpretive signs with relief maps and audio recordings increase accessibility to a wider number of users

PUBLIC ART

Public art provides a visually pleasing and satisfying experience for trail users. Public art could take a variety of forms and provide opportunities for people to interact, learn, and play. Public art may also serve as a focal point and destination for communities along the trail, highlighting local stories and artists. Popular public art installations could attract visitors and stimulate businesses nearby. Public art could include sculptures, murals, mosaics, metal work, and fountains, among many other medias.

Materials for creating public art include steel, bronze, stained glass, concrete, wood, ceramic tile, and stone, as well as other materials deemed suitable by local agencies.

LOCATIONS

- Community gateways
- Select trailheads and access points
- Linear parks and day-use areas

DESIGN GUIDANCE

- Public art materials should be durable against vandalism, theft, and weather and require low maintenance.
- The style of public art provides a sense of belonging, reflects the local character and the community's cultural values, and is compatible with the style of immediate and adjacent buildings and landscapes.
- It is encouraged that public art be created by California Native American tribal or local artists.
- At a large scale, public art could be used as a gateway element (in combination with or in place of a gateway monument), announcing the entrance onto the trail or into the community. Public art could also be combined with interpretive elements and trail branding, providing information and identity in an aesthetic way.

Murals on blank facades of adjacent buildings are low cost and high impact, and present an opportunity for public-private partnerships

Art installations may be placed to create a sculpture trail

GATEWAY MONUMENTS

Gateway monuments are typically large structures or archways that announce a primary point of arrival to the trail. They function as major art elements that reoccur at key locations along the trail. Gateway monuments could be the focal points of community gateways and trailheads, and combined with signage, seating, public art or other amenities.

LOCATIONS

- Community gateways and trailheads
- Linear parks

DESIGN GUIDANCE

- Gateway monuments should be designed with durable, high-quality, and anti-vandalism materials.
- Gateway monument design should reflect the character of the Great Redwood Trail and the community.
- Gateway monuments should be located adjacent to or span across the trail entry to avoid flow obstruction.
- Gateway monuments should not obstruct vehicle visibility at road crossings.
- Gateway monuments could be designed with illumination to increase safety and highlight the destination after dusk.

Gateway monuments may feature the trail and/or community name

Gateway monuments may be paired with lighting to increase visibility

Trail-Oriented Development

Trail-oriented development for the Great Redwood Trail includes a wide spectrum of private investments that may experience economic benefit from proximity to the trail, and in turn enhance the function, experience, safety, and use of the trail. Seed money and funding for trail and community beneficial businesses should be available, identified, and secured, as should considering a preference for local and/or tribal GRT partners.

This chapter identifies the range of opportunities for trail-oriented development, documents principles and design recommendations, and highlights the existing regulatory barriers to success.

TYPES OF DEVELOPMENT

- **Restaurants and retail**: Includes shops, restaurants, breweries, distilleries, coffee carts, food trucks, and more. These will inherently be concentrated around community gateways and trailheads in city and town centers. In backcountry areas, restaurants or food may be located at rural outposts or part of a farm stay.
- **Recreational services**: Includes rafting outfitters, backpacking tours, equestrian tours, bike tours, and walking tours, among others.
- **Rentals and recreational equipment**: Includes recreational equipment outfitters and bike shops and rentals.
- **Lodging and camping**: Includes hotels, motels, and vacation rentals. For backcountry areas, includes backcountry cabins, farm stays, and campgrounds.
- **Civic amenities:** Includes information centers and information kiosks.
- **Housing**: Includes multi-family or mixed-use developments in town centers, or new sub-developments in outlying areas.

LOCATIONS

Trail-Oriented Development may vary greatly between cities and backcountry areas, as outlined in Table 14.

Table 14: *Table of trail-oriented development types by context*

DEVELOPMENT TYPE	CITY OR TOWN CENTERS	SUBURBAN OR RURAL	BACK-COUNTRY
Business Districts	Likely	Not likely	Not likely
Restaurants	Likely	Somewhat likely	Not likely
Breweries and Wine Bars	Likely	Somewhat likely	Not likely
Markets or Fairs	Likely	Somewhat likely	Not likely
Rafting Trips and Outfitter	Somewhat likely	Somewhat likely	Somewhat likely
Equestrian Tours	Likely	Somewhat likely	Somewhat likely
Backpacking Tours	Likely	Somewhat likely	Somewhat likely
Walking and Biking Tours	Likely	Somewhat likely	Somewhat likely
Recreational Equipment	Likely	Somewhat likely	Not likely
Bike Rentals	Likely	Somewhat likely	Not likely
Hotels and Motels	Likely	Somewhat likely	Not likely
Vacation Rentals or B&Bs	Likely	Somewhat likely	Somewhat likely
Farm Stays	Not likely	Somewhat likely	Somewhat likely
Campgrounds	Not likely	Somewhat likely	Somewhat likely
Information Centers	Likely	Somewhat likely	Not likely
Transportation Services	Likely	Somewhat likely	Somewhat likely
Housing	Likely	Somewhat likely	Not likely

CASE STUDY: NAPA VALLEY VINE TRAIL AND BIKE TOURS

The Napa Valley Vine Trail connects cyclists and pedestrians with a collection of vineyards and small towns. The trail branding and signage, including the trail's AG RESPECT program, highlights key destinations along the route. The trail supports bike rentals and tours of vineyards, towns, and restaurants.

CASE STUDY: BURKE GILMAN BREWERY AND RETAIL CORRIDOR

The Burke Gilman Trail connects a series restaurants, bike shops, cafes, and breweries in Seattle. Businesses are encouraged to provide direct trail access, featuring patios and bike parking along the trail. The trail's success has resulted in formal and informal brewery tours.

CASE STUDY: ATLANTA BELTLINE COMMERCIAL DEVELOPMENT

The Atlanta Beltline is a 33-mile, multi-use rail-trail network that has created 2,000 acres of new and restored greenspace, public art, historic preservation, and affordable housing units, which has supported 30,000 permanent and 48,000 one-year construction jobs. These trail-oriented developments activate the trail, provide access and amenities, and expand park space.

CASE STUDY: HIPCAMP

Hipcamp is a California-based company that partners with landowners to create new places for outdoor recreation. Accommodations range from undeveloped to developed private campgrounds, farm stays, backcountry cabins, and yurts. In Mendocino County alone, over 11,000 visitors use Hipcamp annually. The average camp host earned $7,500 in supplemental income.

GRTA provided a small stipend to Ukiah Vecinos en Acción (UVA) to organize a series of Friday night festivals with food vendors and live music.

SCALES OF DEVELOPMENT

Trail-oriented developments range from short-term and low-cost improvements to long-term investments. Where existing experiences, services, or businesses exist, it is critical that trail users are aware of and able to access them. Depending on the proximity to the Great Redwood Trail, a number of solutions may be applicable.

LOW INVESTMENT

AMENITIES AND PROGRAMMING

- **Amenities**: While trailheads provide basic trail amenities, nearby or adjacent businesses may support with additional amenities such as bike parking, seating, drinking fountains, and shade to ensure availability for local users.
- **Wayfinding**: Signage at trailheads could indicate nearby businesses or business districts, as well as the distance to them if not directly adjacent.
- **Programming**: Community events, organized walks and tours, and public markets or fairs are examples of programming that engages both the trail and local businesses.

GRTA Role:

- GRTA should provide wayfinding sign designs to local agency partners to expand the wayfinding system and provide a uniform experience for trail users.
- GRTA should support and encourage community events that bring people to the Great Redwood Trail.

MEDIUM INVESTMENT

CONNECTIONS TO EXISTING DEVELOPMENT

- **Connectors**: Where infrastructure to business districts is lacking, sidewalks or sidepaths connecting to the business district will increase access by users.
- **Loops and tours**: For off-trail experiences such as viticulture or cannabis tours, safe routes or loops could be identified connecting the various destinations. Online and paper maps and guides should be developed to support the experience.
- **Direct access**: Trail-oriented development adjacent to the Great Redwood Trail may provide access directly to the trail. Outdoor patios or seating areas may face the trail to increase visibility to trail users.

GRTA Role:

- GRTA should partner with local government agencies, local businesses, and tourism agencies to plan, develop, and promote connections between businesses and the Great Redwood Trail.
- Note: The GRTA may be restricted to investments within the right-of-way under its jurisdiction.

MODIFYING EXISTING USES

Some existing land uses could be modified slightly to become trail-oriented developments. This is particularly relevant to lodging and camping.

- **Private land use and access**: In backcountry and rural areas, landowners with land adjacent to the trail may create private campgrounds. This could range from a fully developed campground with restrooms and river access to backcountry camping areas with more limited amenities. Campgrounds may be signed from the trail or advertised through services such as Hipcamp.
- **Vacation rentals**: For properties accessible from the trail, homeowners may rent out rooms or entire houses for use through existing services such as Airbnb and VRBO, among others. This may be applicable in cities and towns, as well as for farm stays in rural or backcountry locations.

GRTA Role:

- GRTA should partner with tourism agencies and interested landowners to promote private trail-oriented development projects.
- Zoning code requirements and other land conservation restrictions such as the Williamson Act may be a barrier to modifying existing uses. GRTA will need to work with local and state partners to help lower the barriers for trail-oriented development to the greatest extent possible. Reference Figure 73 for an overview of zoning along the corridor.

HIGH INVESTMENT

RETROFIT AND DEVELOPMENT

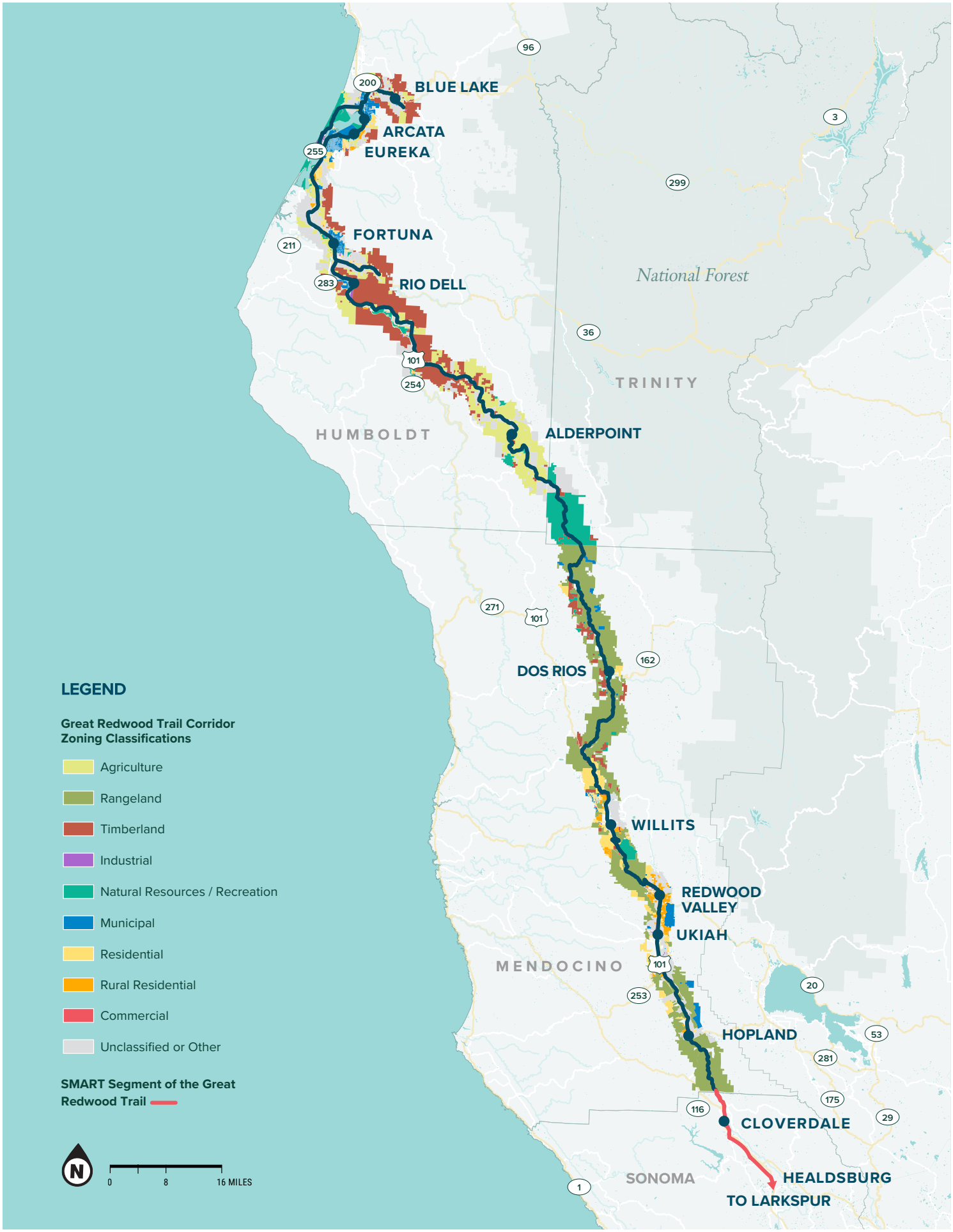
Creating new trail-oriented businesses or developments is inherently a longer-term and higher-investment option.

- **Adaptive reuse**: Renovating existing rail buildings or rural outposts into lodging, information centers, or event spaces offers a great way to preserve and give new life to underutilized buildings.
- **Retrofit**: Retrofitting includes modifying existing buildings or lots to have secondary access or amenities that face the trail, such as patios or plazas.
- **New construction**: Vacant land adjacent to the trail in cities and towns presents an opportunity for new trail-oriented development. New developments should be designed to provide access, programming, and orientation that aligns with the trail.

GRTA Role:

- GRTA should partner with economic development agencies and other funders to provide technical assistance and identify capital investment or low interest loans to support the development and expansion of local businesses.

Figure 73: *Land Use Zoning Adjacent to the GRT Corridor Within Two Miles*



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05

Trail Operations & Management

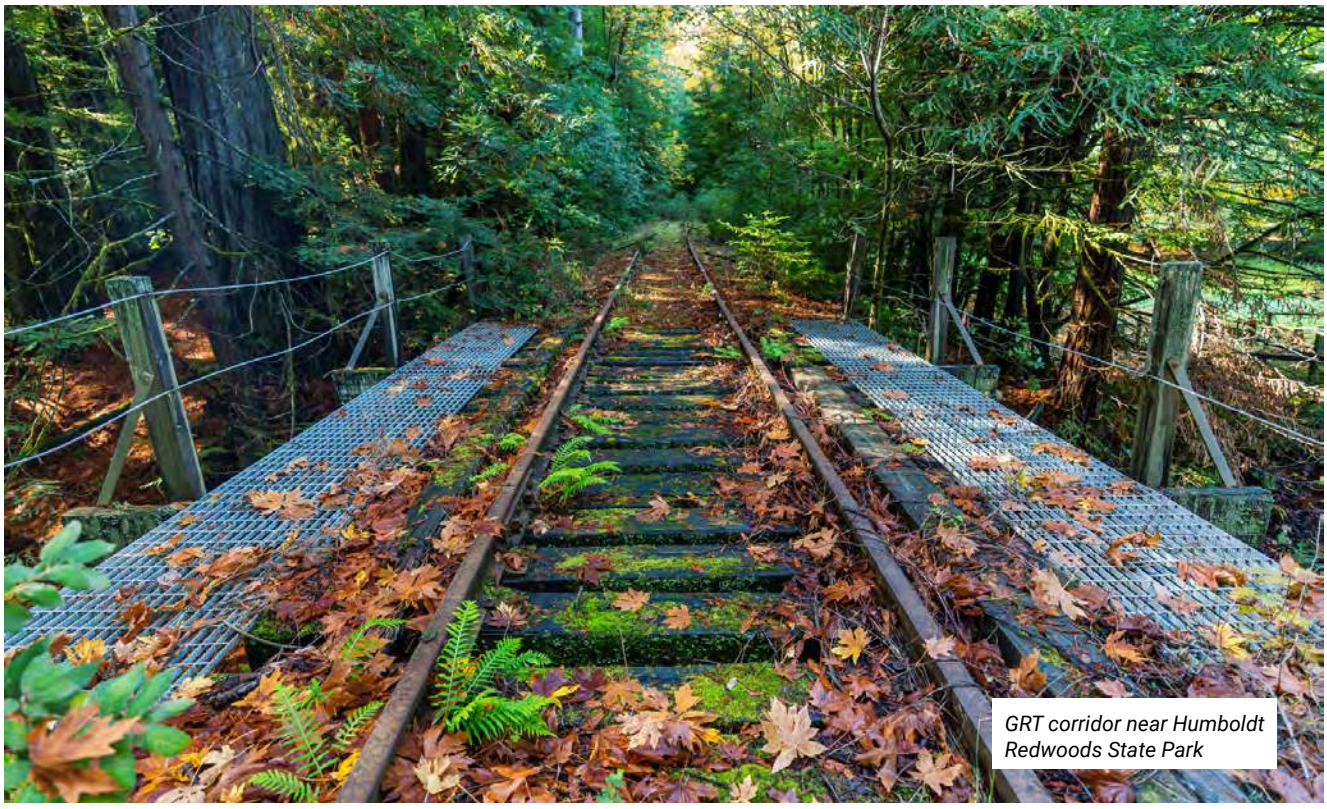
GRT corridor in Mendocino County

O&M PURPOSE AND GOALS

Purpose

The purpose of this Operations & Maintenance (O&M) chapter is to provide guidance to the Great Redwood Trail Agency (GRTA) and its partners regarding the **governance**, **operations**, and **maintenance** of the Great Redwood Trail (GRT) to ensure that the GRT segments are well-maintained and operated. GRT segments could travel through a variety of natural and built environments, from developed urban areas to rural agricultural and ranching lands, oak woodlands, temperate coniferous forests, and deep river canyons. This context, along with the high number of bridges, trestles, and tunnels inherited from the former Northwestern Pacific railroad, could influence the design of individual GRT segments. There could be Class I shared-use paths in many cities and towns, while other segments, in more remote backcountry locations, there could be unpaved single-track dirt trails.

This chapter identifies non-binding recommendations and best practices for the GRTA and local partner agencies (potentially including tribal, federal, state, county, city, and nonprofit entities) to consider when planning O&M activities for individual GRT segments. Local partners have already constructed several segments of the GRT, and they are likely to develop more of the GRT in or adjacent to their jurisdictions in the future. These local partners already have trail license agreements in place with the GRTA. Some of the recommendations and best practices identified in this Plan may be included in any new or renewed license agreements with local partners.



GRT corridor near Humboldt Redwoods State Park

Historic Fort Seward Station

Overview

This chapter includes recommendations relating to policies, strategies, planning, and staffing needs for the GRT.

Common management activities across trail systems such as the GRT could include:

- Identifying and securing long-term operational, maintenance, and enhancement funds
- Setting and implementing policies and procedures (including safety and emergency response)
- Hiring, training, and managing paid professional staff
- Overseeing maintenance activities
- Managing uses and user conflicts
- Planning for the trail in the future
- Engaging in outreach and public relations, including volunteer coordination

The following agencies and partners are or may be directly involved in developing, maintaining, and operating segments of the GRT:

- Great Redwood Trail Agency
- Bureau of Land Management
- National Park Service
- California State Parks
- Mendocino County
- Trinity County
- Humboldt County
- City of Ukiah
- City of Willits
- City of Rio Dell
- City of Fortuna
- City of Eureka
- City of Arcata
- City of Blue Lake
- Blue Lake Rancheria
- Mendocino Land Trust
- The Wildlands Conservancy
- California Native American tribal governments and/or organizations
- Other local groups to be determined in the future

GRT corridor in Redwood Valley

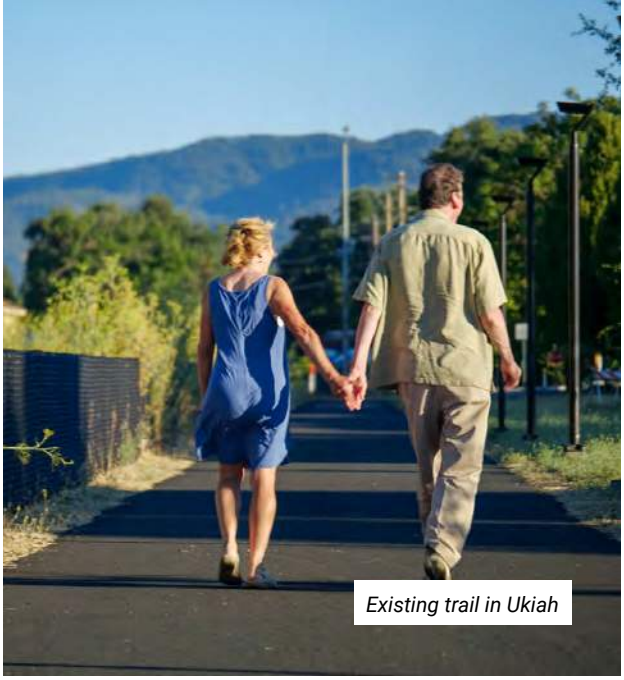
Corridor Planning and Design with O&M

The Design Guidelines and O&M recommendations are closely related since trail design affects O&M practices and costs. Therefore, this chapter serves only as guidance when evaluating trail design options. As segments are designed and built, new information and lessons learned could inform ongoing refinement of O&M practices and policies.

DESIGN CONSIDERATIONS RELATED TO O&M

Some of the key design features related to O&M costs could include:

- Structure Maintenance and Replacement
  - Tunnels
  - Bridges
  - Trestles
  - Culverts and Drainage
  - Swales
  - Livestock Crossings
- Staging Areas
  - Trailheads
  - Roadway Crossings
  - Parking
- Support Facilities
  - Parks
  - Campgrounds
  - Restrooms
  - Trail Amenities (e.g., trash cans, benches, and public art)
  - Signage and Wayfinding
- Trail Characteristics
  - Paved
  - Unpaved (crushed gravel, dirt)
  - Width
- Trail Connections
  - Connector Trails (e.g., to businesses, downtown areas, neighborhoods)



Existing trail in Ukiah

O&M policies could also be shaped by the following information as individual projects advance through the preliminary engineering and design phases:

- Geomorphic issues, such as landslides and other natural hazards
- Structural assessment, repair, or retrofit of existing infrastructure (e.g., bridges, trestles, and tunnels)
- Hydrology (e.g., addressing drainage issues, and building stable and sustainable crossings)
- Designs to improve sight distance for trail users and safety patrols
- Road crossings (e.g., signals, marked crosswalks, and signage)
- Feasibility (alternatives) analysis to determine which route or design treatment is most cost-effective
- Funding availability
- Phasing plans for trail development to understand how resources could be shared, with maintenance equipment and materials staged, to reduce costs and increase efficiency

ENVIRONMENTAL MITIGATION RELATED TO O&M

Environmental review completed for individual trail segments pursuant to the California Environmental Quality Act (CEQA) and/or National Environmental Policy Act (NEPA) may result in the adoption of mitigation measures, which could affect O&M costs. It is recommended that environmental review for individual trail segments be coordinated with project design so that environmental impacts can be reduced to the maximum extent feasible.

FINAL DESIGN AND CONSTRUCTION METHODS RELATED TO O&M

As individual trail segments progress through final design, the recommendations in this chapter could be tested, reviewed, and refined. For example, the type of drainage installed for a trail segment could impact future maintenance costs. In addition, field conditions, soil types, landslide remediation, types and quality of materials used, and/or extent of necessary tunnel/bridge remediation could impact ongoing O&M costs. Construction staging for trail repairs and access to the GRT right-of-way could also impact long-term O&M costs and should be considered during the design phase for each trail segment.

Railroad trestle near Loleta.

TRAIL GOVERNANCE

GRT trail segments could span many miles, connecting cities, towns, and other neighboring properties. This creates a need for a governance structure that is responsive to the needs and desires of all interested and affected parties. There are segments where GRT partners still need to be identified. The GRTA will provide leadership to identify partnerships and collaborations to plan, construct, operate, and manage GRT segments that currently do not have an identified trail partner. Establishing such a trail governance structure involves decisions related to staffing, public oversight, volunteer involvement, and liability.

Governance and Staffing

This section makes recommendations for staffing (paid and volunteer) to help conduct operations and maintenance activities. Specifically, this section discusses:

- GRTA staffing
- Volunteer management

GRTA BOARD OF DIRECTORS AND GRTA STAFFING

BACKGROUND

The GRTA has a geographically representative Board of Directors established by the Great Redwood Trail Agency Act (Government Code § 93000 et seq.) and composed as follows:

1. Two persons appointed by each of the boards of supervisors of the counties of Humboldt, Marin, Mendocino, and Sonoma.
2. A city representative, selected by the cities served by the rail line.
3. The Governor may appoint a nonvoting director from the Transportation Agency and a nonvoting director from the Natural Resources Agency.

Existing trail in Arcata

The GRTA staff includes a General Manager, Legal Counsel, and an Administrative Assistant. In addition, GRTA currently has access to two dedicated trail project managers who are employees of the State Coastal Conservancy.

As more of the GRT is built, the level of future GRTA staffing will depend upon the level of steady funding it receives and the extent of the GRT segments that it directly develops and manages, as well as other factors. It is anticipated that local agencies could develop segments of the GRT within and adjacent to their jurisdictions, leaving the more remote segments to potentially be developed by the GRTA.

★ G-1 RECOMMENDATIONS

A key management recommendation is to maintain continuity in the GRT program's staffing structure, to the extent feasible. This recommendation applies to the parts of the GRT system that are currently managed by GRTA. Retaining a knowledge base to support the management and operations of a functional trail system and other assets, while also supporting the trail user experience, could benefit from a dedicated and versatile GRTA staff.

Based on best practices of other O&M plans, it is recommended that, provided sufficient funding is secured, there could be several staff positions within the GRTA that are dedicated to managing and operating the GRT, including an Operations Manager and field staff. It is anticipated that the Operations Management team could work closely with trail partners to further the goals for the GRT system.

Based on conversations with California Native American tribal representatives, the GRTA could explore creating jobs for tribal members or having a tribal preference in the hiring process.

STAFF RECOMMENDATION	RESPONSIBILITIES
Operations Manager The Operations Manager could serve as the primary staff person for trail-related actions and decision-making. As the primary point person within GRTA for all trail-related actions.	▶ Developing and implementing policies and procedures regarding the trail system, including advocating for adjustments to existing policies or to address needs. ▶ Developing short- and long-range plans and tracking tasks and budgets for prioritization of maintenance, operations, and capital projects. ▶ Assisting General Manager with obtaining funding for GRTA Trails Program and managing grants. ▶ Tracking progress toward the GRTA Vision & Goals with regular reporting to GRTA Board and General Manager. ▶ Engaging and collaborating with municipalities, California Native American tribes, adjacent property owners, community members, trail users, businesses, law enforcement, emergency service providers, trail advocacy groups, and other stakeholders with regular trail patrols and in support of various projects, initiatives, or management actions. ▶ Coordination with local agencies to reach the public with status updates, service information, trail promotion, and opportunities for user feedback. ▶ Supervising and coordinating staff, volunteers, and Regional Stakeholder Group (local, county and state agency partners).
Field Staff The role of the Field Staff could focus on the maintenance and operational functions of the trail system, with additional oversight of projects that are within the trail system.	▶ Identifying maintenance projects based on condition assessments and working knowledge of the trail. ▶ Assisting with project prioritization and project development. ▶ Coordinating response to operational issues or remedial maintenance needs. ▶ Updating the Job Order Contracting list and procuring services seasonally or as needed. ▶ Establishing performance standards for the GRT and evaluating adherence to those standards. ▶ Coordinating with the Operations Manager on planning and budgeting. ▶ Engaging adjacent property owners, community members, stakeholders, trail users, law enforcement, emergency service providers, and other stakeholders with regular trail patrols in support of various projects, initiatives, or management actions. ▶ Volunteer coordination, training, and oversight.

STAFF RECOMMENDATION	RESPONSIBILITIES
 **Trail Rangers** Trail Rangers could perform a wide variety of duties. They could be a friendly, helpful presence that could also enforce trail rules and provide information and assistance to trail users.	▶ Responding to emergencies and coordinating with emergency service providers and fire departments ▶ Answering trail user questions ▶ Patrolling the trail, trailheads, and campgrounds ▶ Explaining and enforcing trail rules, to promote trail safety and reflect community values Rangers could be funded through the GRTA as sufficient funding is secured. Ranger coverage may also be provided through partnerships with local or state public safety enforcement agencies. Some Trail Ranger duties may be covered by Trail Ambassador and Trail Monitor positions.
 **Trail Ambassadors**	Once trailheads and other programming become established, volunteer trail ambassadors could be a way to further both trail stewardship and economic development objectives. Ambassadors could serve as a presence on the trail, both as a deterrent to unwanted behavior and an outreach opportunity to encourage desired behavior. Moreover, ambassadors could be effective at helping direct trail users toward amenities in towns, such as local businesses or attractions. They could also serve as naturalist-interpreters of trail features. Staging ambassadors at busier trailheads on weekends or other peak use times offers the potential to serve the greatest number of trail users.
 **Trail Monitors**	Volunteers can play a pivotal role as trained eyes on the trail. With training and equipped with checklists and GPS-enabled tools, volunteers can provide real-time feedback to trail managers, alerting the GRTA or local agency to issues requiring response. These volunteer activities could be coordinated through “adopt-a-segment” or trail condition assessment apps. Condition assessments could consist of general inspections of the trail on a regular basis, or more specialized assessments of trail features or areas needing repair.
 **California Conservation Corps (CCC)**	This organization hires corps members who receive job training and career exposure, including trail construction and maintenance. Since 2008, the Corps has worked with California State Parks on trail building. The CCC could be a valuable workforce training for the GRT if they chose to build and/or maintain segments of the GRT.
 **Volunteer Fire Departments**	Volunteer Fire Departments in rural areas provide essential emergency and fire response services. The GRTA could establish formal relationships with nearby volunteer fire departments along the trail’s length. Options for providing funding to volunteer fire departments that respond to fires and emergencies on the GRT within their jurisdiction could be explored.

NEW POLICIES AND PROCEDURES

BACKGROUND

This chapter provides a strategy framework, but is not intended to, nor can it, capture all future standard operating procedures and policy details. As new GRT segments are planned and constructed, new O&M issues may emerge that inform additional policies/procedures. For example, the GRTA may decide additional management is needed for certain trail uses not described in this Master Plan such as electric pedal-assisted bicycles (e-bikes).

★ G-2 RECOMMENDATION

In collaboration with GRT partners, the GRTA should develop and adopt new policies and procedures as needed to support the effective overall implementation and management of the GRT. GRTA staff should work collaboratively with the GRTA Board of Directors to review existing policies and amend and adopt new policies as needed.

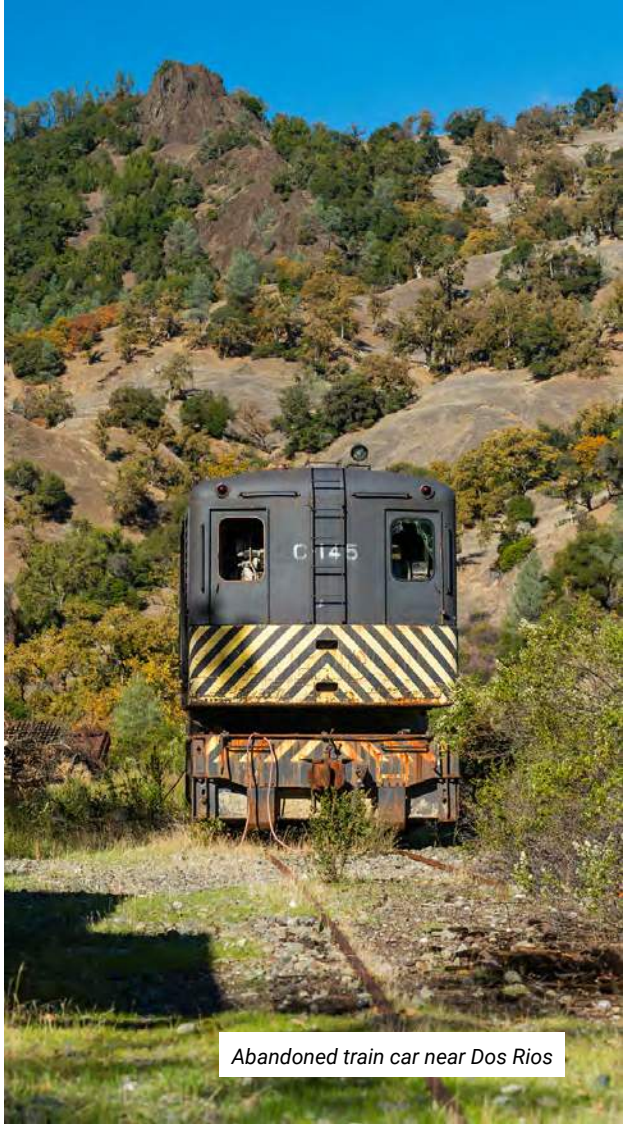
Eureka Waterfront Trail, a segment of the Great Redwood Trail

Right-of-Way Agreements

In the railbanked portion of the GRT line, GRTA has the right to establish a trail in the former railroad right-of-way. Trail planning, construction, operations and maintenance may include negotiating and obtaining access agreements from private landowners.

GRTA requires an encroachment permit for use of or activities in its right-of-way. This permit process sometimes results in a license or lease agreements with a neighbor or utility; these agreements are negotiated on a case-by-case basis. There are hundreds of existing leases and license agreements between GRTA and its partners, many of which date back to when this was an active railroad line.

Various types of legal arrangements, including license agreements, easements, and leases (discussed below), may be used by the GRTA and local agencies as they design and construct segments of the GRT. The GRTA and local partners will work closely with adjacent landowners to coordinate the public's use of GRT with existing private uses.



Abandoned train car near Dos Rios

LEGAL ARRANGEMENT	POTENTIAL BENEFITS
Licenses A license is generally a fixed-term agreement that provides limited rights to the licensee for use of the property. Licenses are generally revocable. Typically, licenses are used in situations when the property cannot be sold (e.g., a publicly owned, active corridor such as the GRTA right-of-way) or the owner wants to retain use of and everyday control over the property. For the GRT, a local trail management authority could obtain permission to build and operate a trail through a license agreement with GRTA.	▶ Provides an acceptable term length with an option to renew. ▶ Is revocable. ▶ Identifies all allowable activities, uses and parties. ▶ Provides guidance on maintenance responsibilities. ▶ Specifies limits on other uses of licensed property. ▶ Includes a trail management plan, including information on future improvements to the trail.
Leases A lease is an agreement between GRTA and a tenant.	▶ Gives the tenant an exclusive use of a fixed property.
Easements With easements, a landowner retains title to the land while granting permission to GRTA to use the property for one or more specified purposes. The easement is on the property's title, so the easement survives property transfer.	▶ Guarantee use or uses compatible with trail activities. ▶ Easements with neighboring public/private entities for access or maintenance, as well as temporary easements in some circumstances. ▶ Define the purpose of the easement and identify all allowable activities, uses, invitees, and vehicular types. ▶ State that all structures and fixtures installed as part of a trail are property of GRTA and trail partners.

Resource Protection

FEDERAL, STATE, TRIBAL, AND LOCAL GOVERNMENT AND OTHER PARTNERSHIPS

Round Valley Indian Tribes, Tribal Council Meeting. (Photo courtesy of Round Valley Indian Tribes. Note: Some Tribal Council members have changed positions since date of photo).

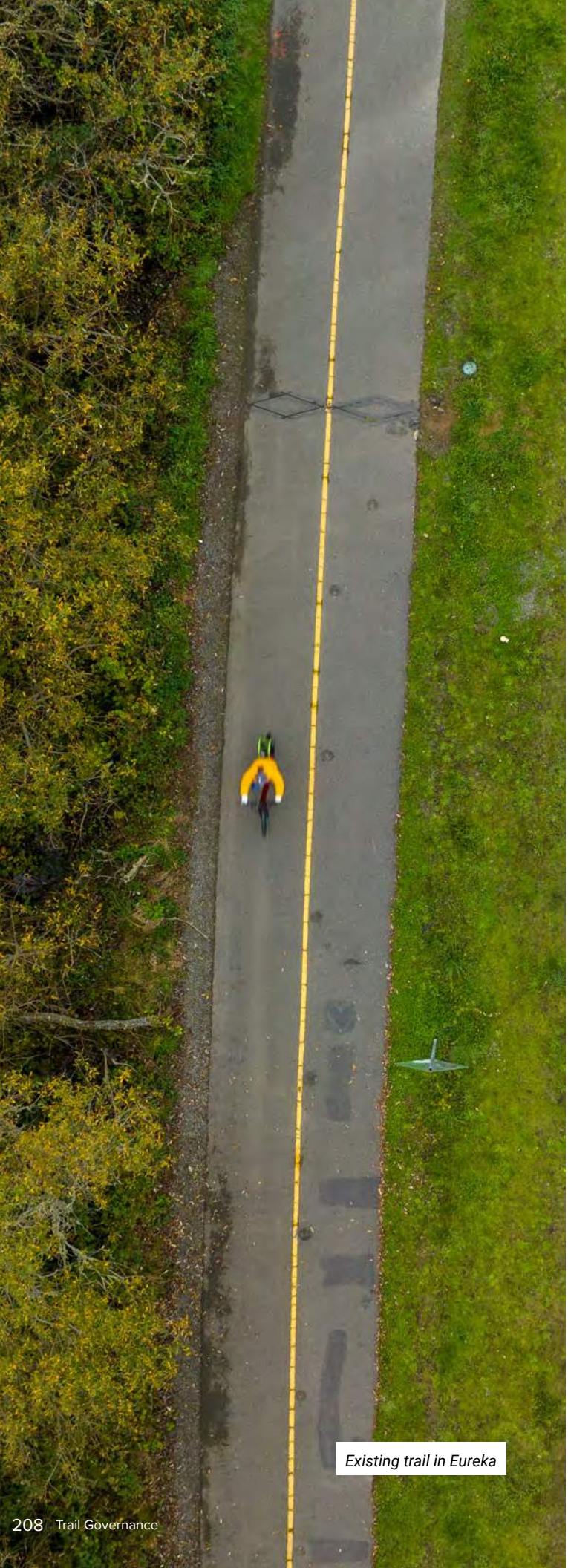
★ G-3 RECOMMENDATION

Work with California Native American tribes, federal, state, local agencies, and nonprofits to ensure trail development is coordinated with resource protection and restoration activities. Develop existing and future plans/programs to meet all applicable regulatory requirements. Agencies and organizations to consult could include, but are not limited to:

- California Native American tribal governments
- National Park Service
- Army Corps of Engineers
- National Oceanic and Atmospheric Administration (NOAA)
- Bureau of Land Management (BLM)
- US Fish and Wildlife Service (USFWS)
- US Forest Service
- Natural Resource Conservation Service (NRCS)
- Cities and Counties
- California Department of Fish & Wildlife (CDFW)
- CAL FIRE
- Regional Water Quality Control Board (RWQCB)
- Resource Conservation Districts (RCDs)
- CalTrout
- Trout Unlimited

Based on conversations with California Native American tribal representatives, the GRTA could take the following actions to partner with tribes more closely in the development and stewardship of the trail:

1. Respectfully consult early and often with tribes (beyond what is required by law) to build long-term relationships.
2. Form a Tribal Advisory Committee to provide input as the trail is developed.
3. Invite tribes to co-manage portions of the trail that cross ancestral tribal lands. This may involve helping to secure funding for tribal members to engage in paid stewardship activities such as operating tours or conducting trail maintenance.



Existing trail in Eureka

Connecting Trail Users to Local Communities

Marketing the GRT and maximizing its economic benefit to nearby communities is a key objective. The GRTA and local agencies could work together to promote the trail and gain trail-related benefits, such as visitor stays and purchases.

G-4 RECOMMENDATION

Consider developing a "Trail Town" program in partnership with local economic development organizations, business owners, and tourism agencies. Fostering economic development opportunities in trail-adjacent communities involves creating or improving connections to these communities, promoting existing services and amenities, supporting necessary improvements to services and amenities, and aligning with local and regional plans to support economic revitalization efforts already in process. Getting more users on the trail and connecting these users to towns and village centers, or other locations with services and amenities off-trail, offers a great opportunity for stimulating local economies.

Trailheads can be a gateway between trails and communities and can be vital in drawing users off the trail and into towns. The development of detailed information at trailheads, including wayfinding signs, can be found in the GRT Design Guidelines. Businesses are encouraged to incorporate the GRT into business planning and marketing, further increasing potential positive economic impacts of the GRT. Towns can encourage overnight stays by promoting activities off the trail. This can be achieved by highlighting local historic and cultural points of interest with interpretive signs, including wayfinding signs at trailheads, in town, and on the trail, that guide users to attractions and amenities within towns.

CASE STUDY: GREAT ALLEGENY PASSAGE

The Great Allegheny Passage (GAP) Trail, part of The Great American Rail Trail, has partnered with the Rails-to-Trails Conservancy and with the Trail Town Program to enhance their trail experience by integrating the trail into surrounding towns. The "Progress Fund" is a nonprofit community development financial institution that makes loans available to small and tourism-oriented businesses in Pennsylvania, West Virginia, and Maryland. The Trail Town Program, which is part of the Progress Fund, has published multiple guides for developing trail towns within this rail-trail corridor. The Trail Town Guide: Revitalizing Rural Communities with Bike Trail Tourism and Trail Tours: Capturing Trail-Based Tourism are useful examples of creating a guide for towns interested in developing the GRT. The Trail Town Guide identifies five keys to a successful trail town:

- **Partnerships**
- **Assessment/Research**
- **Connecting Town to Trail**
- **Development**
- **Marketing**

Photo Credit: The Great Allegheny Passage Conservancy

Rails-to-Trails has developed a set of toolboxes for managing and maintaining trails, in conjunction with recommended designs, planning, funding, acquisition, and organization steps. For successful trail towns, the Conservancy offers a few basic objectives: improving trail-to-town connectivity, improving services and amenities, and promoting a culture of hospitality, stewardship, and inclusivity. In planning trail towns, the Rails-to-Trails toolbox encourages regional planning (instead of town-based), assessment of visitor, community, and business needs, and continual tracking of progress on annual spending, jobs created, or new trail-serving businesses.

The GAP Trail passes through a dozen "Trail Towns," from Pittsburgh, Pennsylvania, to Cumberland, Maryland, where overnight accommodations include bed-and-breakfasts, guesthouses, hotels, and campgrounds. Local businesses—including restaurants, outfitters, tour operators, and shuttle services—are highly supportive of trail users as well as integrated into the trail experience.

After a mudslide caused an eight-day GAP Trail closure, trail traffic saw a significant decline for 40 days, as people thought the trail was closed and canceled their trips. This resulted in a negative economic impact to Trail Towns that rely on trail-related tourism. The GAP Conservancy and its partners updated their operations plan to avoid such an event in the future, establishing a detailed detour plan to avoid negative impacts of a trail closure, with an alternate route ready to deploy quickly.

Volunteers

Most major trails in the United States have a strong volunteer corps that assists with various aspects of trail maintenance and operations, through day-to-day activities like clean-ups, visitor service, stewardship/ trail maintenance, or project work, such as planning enhancements, trail programming, and administrative tasks. A good example of an effective volunteer group is the Dennis Wendt Memorial Trail in Fortuna. The River Life Foundation, led by the late Sean Swanson, started to host clean-ups of homeless encampment areas and served as a liaison with the City to bring more “eyes to the trail.”

Volunteers brought donated gravel to fill the space between the railroad tracks to make it into a walkable trail and help facilitate patrols. The City uses tax measure funds to pay for clean-ups and dumping abatement on this GRT segment.

G-5 RECOMMENDATION

Develop and implement training programs to engage volunteers and partner organizations (e.g., trail ambassadors, trail assessments and stewardship recommendations, adopt-a-trail segments, or various types of trailhead programming). Engaging with volunteers and partner organizations can assist with trail stewardship, which promotes a sense of community pride and ownership of/engagement with the trail system. Volunteer efforts could contribute to the GRT and may ultimately serve a vital role in the GRT’s success. It should be recognized that while volunteer programs can have some benefits, they also can require staff time to manage.

Channeling volunteer energy toward activities that serve the trail could be important to successfully managing this trail system. Providing training to onboard volunteers with clear guidance about their role could empower them to help ensure the GRT’s success. Much of this could happen at a local level through the GRTA, Friends of GRTA, GRTA Alliance, or local partner groups. Volunteer opportunities should be highlighted on the GRTA website and social media.

To consistently maintain the GRT and establish baseline maintenance protocols and performance standards, volunteers could focus their efforts on hand work. GRTA or local agency staff would manage and validate insurance coverage for maintenance activities conducted by volunteers, local agencies or contractors.

Volunteers could also assist with the maintenance of trailheads and trailside amenities. Volunteer maintenance support benefits from close coordination between the GRTA Board, staff, partner agencies, and/ or partner organizations. Training in trail maintenance could be coordinated and offered through the GRTA, to ensure consistency across the entire length of the GRT. Other volunteer organizations, such as Rotary Clubs, may be able to assist with beautification efforts and landscaping. Volunteers could support or organize "adopt-a-trailhead" programs or stewardship of a bench, picnic area, or other trail amenity. While volunteers could contribute to the GRT’s success, they do require staff time for training and oversight, which should be considered when budgeting for staff.

Risk Management Related to O&M

To responsibly manage potential risks relating to safe GRT use, the GRTA or a local partner agency could regularly monitor and inspect the trail. If they become aware of any unsafe condition that they are unable to address within a short timeframe, the trail segment could be closed with warning/closure signs at each entry point.

An important risk management recommendation is to adopt procedures for quickly reporting safety incidents and conditions on the GRT, and staffing and resources to address the incident or condition, including potential temporary trail closures. Cloud-based, crowdsourced systems (such as AllTrails, Trailforks, and OuterSpatial) have built in reporting systems that could someday be used for this purpose. Use of these kinds of reporting systems would need to take into consideration GRTA and partner staffing capacity.

To maximize user safety, the trail design should meet all required and recommended design standards. For Class I segments, this standard is dictated by the Caltrans Highway Design Manual, Americans with Disabilities Act (ADA), AASHTO Bicycle Design Guide, and other published standards. For the unpaved and gravel sections of trail, design standards used by agencies such as California State Parks and United States Forest Service should be used. There may be sections of the GRT where a trail professional determines that field conditions require a non-standard trail design.

G-6 RECOMMENDATION

One or more safety plans with procedures for reporting and addressing safety incidents and conditions on the GRT should be put in place as trail segments are implemented to maximize safety for trail users.

Existing Annie & Mary Trail in Blue Lake

Table 15: *Governance Recommendations Summary*

ID	ISSUE	RECOMMENDATION
G-1	GRTA staffing will be related to the level of funding it receives and the extent of the GRT that it directly develops and manages.	As sufficient funding is secured, GRTA could establish new staff positions as the trail is designed and constructed, including an Operations Manager and field staff. GRTA might also consider funding rangers as the trail is developed, to be responsible for patrolling the trail and enforcing regulations. Additional staff could be added as the trail is developed. These positions should be marketed to local residents, and a hiring preference for Native people should be explored.
G-2	New policies and procedures for GRTA may be necessary as issues arise in the future.	GRTA could develop and adopt new policies and procedures as needed to effectively implement and manage the GRT.
G-3	With many partners and stakeholders, the GRTA and/or local partners will need to coordinate administrative and operational tasks and provide oversight for trail management.	Work with California Native American tribes, federal, state, local agencies, and nonprofits to ensure trail development is coordinated with resource protection and restoration activities. Develop existing and future plans/programs to meet all applicable regulatory requirements. Form a Tribal Advisory Committee to provide input as the trail is developed. Invite tribes to co-manage portions of the trail that cross ancestral tribal lands. This may involve helping to secure funding for tribal members to engage in paid stewardship activities such as operating tours or conducting trail maintenance. Respectfully consult early and often with tribes (beyond what is required by law) to build long-term relationships.
G-4	Marketing the GRT and maximizing communities' economic benefit from the trail is a key objective.	The GRTA could develop a "Trail Town" program in partnership with local economic development organizations, business owners, and tourism agencies. GRTA could assist with efforts to foster economic development opportunities in trail-adjacent communities, aligning with local and regional plans, to support economic revitalization efforts already in motion.
G-5	Volunteers could be critical to help expand staff capacity and carry out various operations and maintenance activities.	GRTA could establish a volunteer program with a focus on trail stewardship activities (Trail Ambassadors, Monitors, or Stewards).
G-6	Providing a safe and enjoyable experience is a key priority.	One or more safety plans with procedures for reporting and addressing safety incidents and conditions on the GRT could be put in place, as trail segments are implemented, to maximize safety for trail users.

OPERATIONS

Introduction

Many aspects of operations could proactively address safety issues and develop an efficient process for emergency response. Recommendations related to GRT safety and security can provide practical security features and enhance safety efforts.

FUNDING

As discussed in the Implementation Chapter, funding for design, construction, and O&M activities for individual trail segments could come from of a variety of sources, including federal, state, local, and private funding sources. As it can be more challenging to fund O&M costs than planning and capital funds for new facilities, the GRT segments should be designed and constructed to minimize operations/maintenance costs.

Outlet Creek along Hwy 162

OP-1 RECOMMENDATION

Pursue all options for operations and maintenance funding and design and construct GRT segments to minimize operations and maintenance costs. See Chapter 7: Implementation Strategy for specific funding opportunities.

The Eel River near Dos Rios

Emergency Response

The goal of emergency response and trail safety is to design practical trail safety features and enhance these in the future as necessary. Recommendations for GRT partners and the GRTA are offered for consideration below.

Emergency response coordination between various agencies is important, especially for remote backcountry segments of the GRT. Emergency procedure guidelines relating to GRT access, location referencing systems, and aerial support should be established to ensure effective and efficient response in the event of a trail emergency.

Photo Credit: Jesse Pluim, BLM

CASE STUDY: LOST COAST TRAIL

The Humboldt County Sheriff's Office emergency response protocols for the BLM section of the Lost Coast Trail are relevant to the GRT. Emergency calls and alerts on the Lost Coast Trail are dispatched to the Humboldt County Sheriff's Department. Humboldt County Sheriff's Office, the US Coast Guard, and BLM have an MOU in place to share resources and responsibility for responding to emergencies on the Lost Coast trail. If the location is close to the road or an access point, Humboldt County Sheriff's Office is the first responder. If it is easier to access from the water or by helicopter, the US Coast Guard responds first. Humboldt County and BLM also have an ATV that can be used to respond to incidents on remote parts of this trail.

★ OP-2 RECOMMENDATION

Emergency access for safety, security, rescue, and maintenance should be based on established protocols and cooperative agreements between local fire departments, CAL FIRE, sheriff and police departments, GRTA, GRT partner agencies/organizations, Coast Guard, and local landowners. Maps showing which partner agencies are responsible for individual trail segments as well as showing access points and keys/combinations to gates can be provided to emergency personnel and first responders.

In the event of an emergency, the initial responding party should notify other departments according to emergency response protocols and agreements. The local agency could take primary responsibility for responding to incidents on the trail in their jurisdiction and contact GRTA as soon as possible regarding the incident. Class I segments of the GRT could be designed to accommodate the width, length, and weight of emergency vehicles without damaging the edge of the trail. CAL FIRE identifies 10 feet as the minimum width of a road or paved trail for fire and emergency medical technician (EMT) equipment access (Public Resources Code Section 4290) with all-weather turnarounds required.

The GRTA has provided a consent-to-enforce letter to all law enforcement agencies. This letter needs to be re-submitted annually. In addition, a memorandum of understanding (MOU) could be developed, between law enforcement agencies in Mendocino, Trinity, and Humboldt counties and the GRTA. This MOU could delineate which jurisdiction or agency could respond to emergencies in particular areas, which is critical where there are overlapping areas of responsibility.

The Humboldt, Trinity, and Mendocino County Sheriffs' Offices could develop an MOU with the GRTA to implement a ranger program.

The MOU could document:

1. Responsibilities of GRT Rangers in GRT jurisdiction.
2. Responsible parties or agencies for medical emergencies.
3. Search and Rescue roles and responsibilities.
4. Sheriff's office roles and responsibilities.

911 Emergency calls related to fires are dispatched to the appropriate responsible agency. Federal, state, and local agencies operate under a mutual aid system, with each agency having an identified priority point of contact. While GRTA is not expected to have its own firefighting capabilities, firefighting and emergency response training for GRTA staff with CAL FIRE and local agencies could be considered.

Mile Markers/Emergency Response Signage

Development of a regionally coordinated mile marker/emergency response system could aid first responders in locating trail users during emergencies. Mile marker locations could be geolocated and known to 911 dispatch centers and responders. The historic railroad mileage system offers a good basis for such a mile marker system; however, adjustments could be needed to account for detours and deviations from the historic railroad grade, where they exist. Solar powered call boxes could be considered for remote segments of the GRT.

Access

Access is a significant concern for police departments whose responsibility area includes the GRT. GRT access for medical, fire, and police agencies should be identified, along with sufficient turn around areas for vehicles, where feasible. Where feasible, a four (4)-foot-wide trail surface should be provided in remote unpaved portions of the GRT, where ATVs may be the only vehicle appropriate for emergency response.

Helicopter Access in Backcountry Areas

Identification, development, and maintenance of helicopter landing pads at identified well-spaced locations within the Eel River Canyon could decrease emergency response times. The Eel River's gravel bars may provide seasonal landing areas for helicopters, but GRT access from the river may be steep. GRTA should coordinate with local fire departments and CAL FIRE to determine optimal locations for emergency helicopter landing pads. Suitable truck turnaround locations, where feasible, could benefit access for fire engine equipment. On the GRT, turnarounds could be in wider sections of the right-of-way.

GRT corridor along Outlet Creek near Longvale

Wildfire

The GRT is in northern California, which has high potential for seasonal wildfires. Wildfire response is the responsibility of CAL FIRE, local tribal governments and organizations, county and local fire departments, BLM, and the US Forest Service. The GRTA and trail partners could consider firefighting access in GRT trail design in remote areas like the Eel River Canyon, but the trail may not be wide enough in many areas of this rugged canyon for standard firefighting vehicles and equipment. ATV access, however, could be possible in some backcountry sections. The GRTA could collaborate with these fire response agencies to develop policies regarding campfires in the GRT/Eel River Canyon backcountry.

★ OP-3 RECOMMENDATION

The GRTA should coordinate with firefighting agencies along the GRT corridor, participating in agency coordination and wildfire training as appropriate.

Trail Closures

PROACTIVE MANAGEMENT THROUGH TRAIL CLOSURES

Undeveloped sections of the GRT corridor are currently closed to public use. Once developed, sections of the GRT may be closed during periodic maintenance or when natural disasters or environmental conditions pose a significant risk to trail users. Trail users should be managed during these closures. Flooding, red flag fire danger, high wind conditions, and winter weather may warrant periodic closures of the GRT to mitigate the need for rescue operations while keeping trail users safe.

★ OP-4 RECOMMENDATION

GRTA should coordinate with CAL FIRE and local fire departments to identify specific conditions under which the trail should be closed (e.g., nearby active fires). Notification of trail closures could be coordinated with a user permit system. Closures should be posted on applicable websites and social media channels as well as at trailheads. Procedures that could be followed before a trail closure to the public are listed below:

1. The GRTA or local agency partner could post signs at all trail entrances to be closed, indicating the duration of and reason for the closure. The GRTA or local agency could keep the public informed and make every effort to keep the closure as short as possible. In emergencies, a typical 48-hour closure notice period could be waived.

2. The GRTA or local agency partner could physically block the closed section of trail with barriers and “Trail Closed” signs.

3. If appropriate, the GRTA or local agency partner could provide “Detour” signs describing any alternate routes. GRTA could elect to close the trail until it has been inspected, to ensure that the trail is in safe, usable condition. Where obstructions remain, GRTA could provide warning signs for trail users to slow down or dismount as needed. Cloud-based, crowd sourced systems (such as AllTrails, Trailforks, and OuterSpatial) could be used to report trail hazards. Another example is the National Park Service, which has updated trail information for users on its website and mobile app. The GRTA could explore creating its own mobile app.

Damaged trestle bridge

Infrastructure Inspections and Monitoring

Regular inspection of the GRT and its amenities are important to ensure trail safety for users. Regular visual inspections should be conducted by the GRTA and/or local agency partners, to help identify and correct problems before they become more serious. For example, a fallen tree limb could be readily removed or blocked off to divert trail users away from the hazard until maintenance crews can address the problem. The GRTA could also consider establishing a webpage detailing any closed trail locations.

★ OP-5 RECOMMENDATION

GRTA or its local agency partner should maintain a written record of all trail inspections and create a database for this information. Local agencies could forward information to GRTA to include in their log or enter it into an online database. These records might reveal trends and use patterns that could assist GRTA and local agencies with prioritization for maintenance activities. Records could also document regular maintenance practices. A typical inspection record could include:

- Documentation of hazards found along the trail, along with remedial action taken. Basic items such as debris on the trail or other trail issues or maintenance needs could be noted.
- Regular inspection reports documenting the condition of the entire trail or trail segment, noting current or potential hazards on the trail (e.g., cracks, erosion, encroaching vegetation). Corrective actions could be integrated into the next workday(s).
- Regular visual and operational inspection reports for all GRT amenities such as benches, lighting, signage, drinking fountains, bike racks, rest rooms, and signals. Recommended corrective actions could be integrated into a maintenance work plan.

Privacy/Fencing

Fencing is not proposed throughout the entire corridor for a variety of reasons, from cost to environmental and visual impact. Locations where fencing may be advised include short sections to protect residential privacy and as needed to provide a buffer between trail users and livestock. Fencing as it relates to adjacent uses including ranches and farms is covered in Community and Neighbor Relations (OP-14).

OP-6 RECOMMENDATION

While not recommended for the entire corridor, fencing could also be appropriate to help delineate between public and private lands and/or increase privacy. Additional strategies include planting trees/bushes along the trail, installing "Private Property - No Trespassing" signs, and placing the trail away from private buildings.

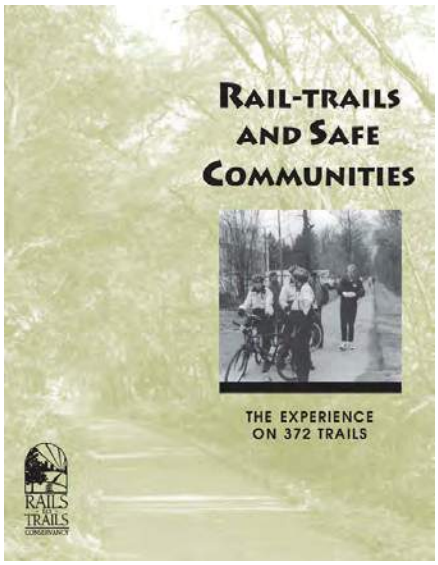
Existing trail in Blue Lake

People Experiencing Homelessness

Trails are not the root cause of the lack of affordable housing, addiction, and mental health issues that can lead to people being unhoused, although many trails experience impacts from these societal issues. Addressing these societal problems could require partnerships across the public and private sectors. The GRTA and its local partners should anticipate that some unhoused people may establish temporary encampments near the GRT, especially where it is close to goods, services, and employment.

TOOLS AND STRATEGIES FOR ADDRESSING HOUSELESS ENCAMPMENTS ALONG THE GREAT REDWOOD TRAIL

During the Great Redwood Trail Master Planning process, the community raised concerns about how to prevent or minimize camping in unauthorized locations along the current and future trail. While reasons for houselessness are varied, some individuals who lack stable housing are also dealing with substance abuse and mental health issues, which can potentially lead to conflicts with trail users. Keeping the trail safe and welcoming for all requires thoughtful outreach and trail design, active use of the trail by a broad range of community members, interagency collaboration, and an understanding of legal issues regarding houselessness.



An emergency non-congregate housing site in Chico on Sept. 6, 2023. Photo Credit: Fred Greaves for CalMatters

PREVENTING CAMPING IN UNAUTHORIZED AREAS

Promoting active use of trails by a broad range of community members can be key to preventing camping in unauthorized areas and minimizing encampments of people experiencing houselessness. Working with parks departments and community-based organizations to offer trail events, such as family fun-runs, yoga, birding walks, community fairs, and other engaging activities can be a way to get more eyes and ears on the ground and give all trail users a sense of ownership and safety. Engaging unhoused community members in these activities can also help foster a sense of responsibility for public areas and trails. When people from all walks of life come together and enjoy natural spaces with each other in these ways, it can increase community resilience. Well-designed and high-use trails can deter crime in more remote areas. Research conducted by the Rails-to-Trails Conservancy (RTC) suggests that converting an abandoned rail corridor to a trail reduces crime by enhancing the landscape and attracting people to use the trail for recreation and transportation.

Read more at:
https://www.americantrails.org/resources/rail-trails-and-safe-communities-1

LEGAL CONSIDERATIONS

The 2018 9th Circuit ruling in *Martin v. City of Boise* determined that sleeping is a human right, and a person cannot be cited for sleeping in a public park if there are no adequate alternatives available. The question is, what defines adequate shelter? Just providing enough shelter beds is not enough. For example, a shelter with a top bunkbed may not be appropriate for an elder or a disabled person. Local and state agencies are calling upon the 9th Circuit court to provide more guidance. While local agencies can still enforce safety and health issues, the *Martin v. City of Boise* ruling calls upon local jurisdictions to work collaboratively with community groups, social service agencies, and collaborative partnerships to ensure that unhoused individuals have adequate access to shelter.

For more details on legal consideration see: https://calmatters.org/housing/homelessness/2023/09/california-homeless-camps/

BUILDING RELATIONSHIPS WITH THE UNHOUSED COMMUNITY

A recurrent theme in interviews with local houseless advocates and in case studies from other areas is the importance of building trusting relationships and establishing open communication. Eureka Mayor Kim Bergel finds that in her work with the houseless community, “Simply saying hello and treating them like valued human beings often leads to reciprocal behavior towards the city.” When Eureka was developing their Waterfront Trail in 2016, they conducted outreach to houseless individuals in a well-established encampment where the future trail was planned. Weekly community service fairs held near encampments proved to be a successful strategy to connect people to services and help ensure they had adequate help with relocation.

The North Coast Environmental Center (NEC) conducts compassionate cleanups, working together with unhoused neighbors to protect the environment. “Putting in the effort to build trust can result in a mutually beneficial situation in which you get to collaborate with your unhoused neighbors to steward this place that we all call home, and maybe make new friends,” according to Executive Director Caroline Griffith. Building trust takes time and can be fragile. Caroline went on to say; “While law enforcement acknowledges that homelessness is not a crime, many people have had the experience of being treated like criminals and therefore have had very negative experiences with the police. So, in my opinion, involving law enforcement with outreach to unhoused communities should be an absolute last resort. People are so much more willing to engage if they don’t worry that there will be criminal repercussions.” She suggests developing a core of outreach ambassadors with training in working with unhoused neighbors. Involving the houseless community as part of the process can be part of the solution, helping to make sure all trail users feel safe. Along the trail, locating potable water sources, trash cans, and signs with information about how to access services can provide expanded support for unhoused communities.

Noah Coleman, of Betty Kwan Chinn Homeless Foundation, emphasized the importance of allowing plenty of time, at least 72 hours, but in many cases it may take weeks, for relocating the houseless prior to trail development. “When unhoused neighbors need

Photo Credit: 8 80 Cities

to relocate to make way for a trail it is important to give enough time for adequate outreach and connection to services.” He recommends that prior to projects being implemented, the houseless community needs a clear timeline as to when changes will take place and set expectations for upcoming changes. Conducting outreach in partnership with other service agencies about relocation options is key.

8 80 Cities (a nonprofit dedicated to creating sustainable cities for all), partnering with AARP, has developed an inclusive practices guide that provides concrete approaches and promising case studies that center people in the process of addressing homelessness in parks with the goal of creating places for all.

For more details, see: Homelessness in Parks: An Inclusive Practices Guide.

★ OP-7 RECOMMENDATION

Managing people experiencing homelessness so they do not impact trail users should be done on a case-by-case basis and in conjunction with public health experts, social service providers, and local law enforcement when needed and where appropriate. Trail segments could be designed to minimize places where people might congregate and camp. Increasing the number of legitimate trail activities, conducting regular clean-ups, events, patrols, and building relationships with the unhoused community are immediate actions that could be taken to reduce the number of people potentially camping on the GRT right-of-way. The GRTA should consider providing staff and volunteer training that includes procedures for engaging with people experiencing homelessness on the trail so that appropriate referrals to services are provided.

CASE STUDY: CITY OF EUREKA'S INTEGRATED APPROACH TO HOUSELESSNESS

The Eureka Police Department's Community Safety Engagement Team (CSET) works collaboratively with the city's Crisis Alternative Response Eureka (CARE) mental health professionals and Uplift Eureka's community service network to address issues of homelessness, mental illness, and substance use disorder. The CSET program includes Parks/ Waterfront Ranger and Mobile Intervention & Services Team (MIST) Officer positions. These teams also support and collaborate with county, state, and federal government, and non-government partners to fill existing service gaps.

Photo Credit: City of Eureka

CSET's philosophies include:

- Homelessness is not a crime, but criminal behavior frequently associated with the homeless community is.
- Balance accountability with compassion and outreach while trying to address the underlying causes of criminal behavior.
- A one-size-fits-all approach is not effective. Each person who is houseless is unique and an individualized approach is necessary.

CSET operates using the following strategies:

- High visibility, proactivity, and presence
- Identifying locations and individuals responsible for high emergency call volumes, and developing long-term solutions towards reducing their needs through a judicious balance of outreach and accountability
- Building relationships and working in partnership with those within the houseless community, government and private social service providers, businesses, and other community stakeholders

For more details about the city of Eureka's approach to addressing issues of homelessness in public spaces visit: https://www.eurekaca.gov/375/Community-Safety-Engagement-Team-CSET

CASE STUDY: JOE RODOTA TRAIL, SONOMA COUNTY- DEVELOPING LONG-TERM SOLUTIONS

In 2023 Sonoma County Board of Supervisors adopted a comprehensive plan to expand interim housing and support services to houseless people along 8½-mile Joe Rodota Trail linking Santa Rosa and Sebastopol. "The endless cycle of closing the Joe Rodota Trail to clear away hazardous encampments is not good for people who use the trail for its intended purpose, and it is not good for the unsheltered people who go there looking for a place to camp. It is expensive and ineffective. It is more efficient and humane to invest that money in solutions that will provide the wrap-around services needed to help move unhoused people toward safe and stable living situations." Supervisor Chris Coursey, Sonoma County Board of Supervisors.

Photo Credit: Sonoma County Regional Parks

https://sonomacounty.ca.gov/board-of-supervisors-approves-comprehensive-plan-to-clear-joe-rodota-trail-and-create-up-to-two-safe-sleeping-areas-for-homeless

CASE STUDY: THE JORDAN RIVER PARKWAY- A PERSON FIRST APPROACH

To better understand the complexity of homelessness within municipal public parks and people's concerns, challenges, successes and hopes from a wide array of perspectives, Milo Neild, M.S., and Jeff Rose Ph.D. conducted a series of in-depth, interviews with park managers, maintenance crews, people experiencing homelessness, police departments, health departments and social service providers. The study took place in Salt Lake City, Utah, and yielded these key themes:

- All members of the community are welcome to use public parks and open spaces.
- Everybody is welcome to use parks for recreation, relaxation, rest, and leisure.
- Those experiencing homelessness are part of our community.
- Each person experiencing homelessness is unique.

Photo Credit: Milo Neild, M.S.

Read more at: The National Recreation and Park Association, *Parks & Recreation* magazine

CASE STUDY: CITY OF MODESTO-DEVELOPING A PATHWAY TO HOUSING

By working with faith-based organizations, homelessness advocates, and other community organizations, the City of Modesto developed partnerships to help the city meet the basic human needs of the homeless population and address the conflicts arising from encampments along trail. Their first step was to designate a county park, which was near shelters and other services as a designated place where houseless individuals could sleep, taking off pressure on other parks. This gave the city the chance to develop the Modesto Outdoor Emergency Shelter (MOES), a tent city that provided safe shelter and services while indoor housing was developed. At MOES, there were expanded opportunities to help connect individuals with needed services. MOES was closed after indoor shelter bed space was expanded. These steps were part of developing a pathway to help eliminate houselessness and transition unhoused individuals to affordable housing.

Photo Credit: Martin Vorel, Libreshot

Read more at: https://www.americantrails.org/resources/solutions-to-homelessness-on-trails

Encroachment and Misuse of Corridor

Adjacent property owners have encroached onto the GRT corridor at several locations, including entities with and without any written agreements in place. In addition, entities with licenses or leases may not be abiding by these agreements' restrictions. An inventory of corridor encroachments and potentially unauthorized uses should be developed with potential or recommended actions, as appropriate.

★ OP-8 RECOMMENDATION

The GRTA should develop a responsive property management system that tracks licenses and leases, and allows for input from trail partners to identify unauthorized encroachments and prioritize areas needing attention, action and/or cleanup.

Trail and Camping Permits

BACKGROUND

Management of trail users in remote and backcountry settings can create specific pressures with regards to resource protection, safety, emergency response, and availability of campgrounds and restrooms. Due to difficult access to services in remote areas, special management strategies are recommended to reduce damage to natural and cultural resources and risks to trail users and emergency responders.

The longest backcountry stretch (42.6 miles) of the GRT is between Dos Rios (Mile Post (MP) 166.5) and Alderpoint (MP 209.1). The second longest stretch (20.7 miles) is between Fort Seward (MP 216.6) and South Fork (MP 237.3). Trail users making multi-day trips in the Eel River Canyon would benefit from overnight camping facilities. Services and trail amenities provided in backcountry areas, while challenging from an O&M perspective, encourage appropriate use and should be included during the trail design process.

★ OP-9 RECOMMENDATION

Given the isolation of the Eel River Canyon and the variety of potential hazards (e.g., landslides, heat, lack of water, and rattlesnakes). A reservation/permit system is recommended, to help manage the trail user experience, address safety and emergency response concerns, and protect natural and cultural resources.

Trail and Camping Reservation/ Permit System

It is recommended that a permit system be adopted immediately before the Eel River Canyon section is open to the public.

The permit might not be required for day use but could be required for overnight or multi-day use. A ranger could periodically patrol the GRT and check permits. The GRTA could manage the reservation system, and trail permits could be coordinated with camping reservations, to ensure overnight trail users have access to an approved campsite. Collaboration with California Native American tribes could result in education materials authored by California Native Americans that would accompany the permit. These materials could describe the history of the corridor and instruct trail users on how to respect sensitive tribal cultural resources if inadvertently encountered. There may be certain times of the year when sacred ceremonies are taking place, which may mean restricting permits, temporarily closing the trail, and/or increased monitoring of trail use during those times.

Fires should not be allowed during the fire season and could be prohibited altogether. Potable water may not be provided, but campers could treat river or creek water. A porta potty or composting pit toilet could be provided if it can be serviced regularly.

Rules & Regulations

The GRTA will need to consider rules and regulations to keep trail users safe and limit impacts on neighboring property owners and the general community.

Though most trail experiences are enjoyable, conflicts between trail users may occur that can have safety consequences. This is especially true on the Class I shared-use path segments, where diversity of users and usage levels are expected to be higher. These potential challenges usually are related to a trail user's mode of travel, level of experience, trip focus, expectations, attitudes toward and perceptions of the environment, and level of tolerance for other activities.

The GRT users are expected to follow trail rules, but to ensure this, support from trail rangers and local law enforcement may occasionally be necessary to ensure safety.

★ **OP-10 RECOMMENDATION**

To manage potential conflicts between multiple user groups, GRTA and local agency partners should address user conflicts as they arise, paying attention to patterns of use and types/locations of incidents. GRTA and local agency partners should review complaints and accident reports on an ongoing basis to identify patterns in user conflicts. These may include excessive speed, failure to yield, littering, or other behaviors deemed inappropriate by GRTA and partners. Each conflict may have a different resolution, and some suggested responses could include:

Community Involvement with Trail Safety
Creating a safe trail environment should involve the entire community. The most effective deterrent to illegal activity on the GRT is an actively used trail facility, inclusive of a variety of community members. Having significant numbers of people using the GRT will be a deterrent to undesirable activity on the trail. Educating the community about appropriate trail uses through signs, maps, brochures, websites, social and broadcast media campaigns, and events is a great way to actively promote responsible behavior on the GRT.

In addition, aligning GRT access points to be close to trail-oriented businesses can help promote a safe, vibrant trail environment. Wherever feasible, public access points to the trail should be provided at regular intervals. Access points should be inviting, with signs welcoming the public onto the trail.

Friendly Staff Presence on the rail
A "staff presence" on the GRT could consist of rangers, maintenance staff, or GRTA/partner agency volunteers. It is recommended that for the first six months after opening a new segment, the GRTA or local agency, possibly with volunteer assistance, patrol the trail frequently. After the first six months, the GRTA or local agency could patrol on a more intermittent basis. Note that patrols of the backcountry trail in the Eel River Canyon will likely be influenced by the location of access points. Where feasible, the unpaved trail could be accessible to all terrain vehicles (ATVs) to facilitate emergency access.

Regulations and Friendly Enforcement
Friendly ranger staff should have the authority to enforce GRT rules and regulations, as well as general laws, with trail rules posted prominently at trailheads and other appropriate locations.

Existing trail in Arcata

HOURS OF USE

Various types of GRT users may want to use the trail at different times. For example, thru hikers on a set schedule may want to start early in the morning to reach their desired destination. Meanwhile, local users may want to use the trail for transportation in the early morning or evening hours. Trail users' needs related to hours of use may also be complicated by emergency response, concerns from adjacent property owners, and enforcement parameters.

To accommodate varying user needs, it is recommended that, if possible, the GRT be open for use at any time. Thru hikers may desire to use the trail in non-daylight hours to reach their planned lodging/camping location or to stay on a particular schedule. In addition, enforcing hours of operation could likely be challenging, given the length and remoteness of some segments of the GRT. The ultimate hours of operation might also depend on the needs of commuters (students and employees) who typically travel between 7 a.m. and 7 p.m.

However, local agencies operating segments of the GRT may have their own needs. For example, the City of Ukiah operates its segment of the GRT from 8 a.m. - 9 p.m. If there are safety considerations in determining appropriate hours of GRT use, it is important for the GRTA to work with partners to accommodate each unique circumstance.

ACCEPTABLE/PROHIBITED USES

The following is a list of potentially prohibited uses along the trail:

- Motor vehicles, other than power-assisted wheelchairs
- Hiking or recreating off-trail or off GRTA property
- Smoking
- Loitering
- Vandalism
- Dumping and littering, including improper disposal of pet waste
- Consumption of alcoholic beverages
- Off-leash pets; pets should always be on short leashes (6 ft. maximum)
- Campfires (except in designated locations and subject to additional regulation)
- Camping (except in designated campgrounds)

ADDITIONAL SUGGESTED GUIDANCE:

- Keep to the right except when passing
- Yield to oncoming traffic when passing
- Bicyclists should always yield to pedestrians
- Bicyclists and pedestrians should always yield to equestrians
- Give a vocal or audible warning when passing
- Travel no more than two abreast
- Bicyclists, pedestrians, and equestrians yield to maintenance/emergency vehicles

SAFETY EDUCATION AND SIGNAGE

USER SAFETY EDUCATION

Uncertainty about trail regulations and appropriate etiquette can create user conflicts or lead people to misuse facilities or resources. For example, in areas surrounding the Eel River, it could be important to identify when summer water hazards are unsafe (particularly for drinking) with blue-green algae blooms. Many users will likely be unaware of such hazards. On-trail communication through signs is an important and essential way to encourage safety on the GRT.

Informational sign at Founder's Grove

A regulatory sign along the existing trail in Ukiah

★ OP-11 RECOMMENDATION

Design the GRT to minimize user conflicts. These designs could include adequate trail width to accommodate multiple users, unpaved shoulders (along Class I segments) to accommodate walkers or joggers, clear and consistent signage, and establishment of multiple access points, as outlined in the GRT Trail Design Guide section.

User safety education should be broadly supported by signage, maps and brochures, and online information. Trail users should be able to readily find safety and directional wayfinding information while planning a trip and while on the trail itself. Signage can help convey trail safety information and interpretive information on the environment and local history of the corridor.

Safety Signage

Signs help define appropriate trail use and enhance the user experience. Signs generally fall within four categories: warning, directional, informational/regulatory, and interpretive.

- **Warning signs** alert trail users of obstructions or potential changes in trail condition (e.g., an upcoming roadway intersection, tunnel, or reduced sight lines). Crossing features for roadways and railroad tracks include warning signs for both vehicles and trail users. The type, location, height, size, and color, as well as other criteria, are in the California Manual on Uniform Traffic Control Devices (CAMUTCD). Signage should be highly visible, catching the attention of users accustomed to roadway signs. Crossing signs for trail users should include a standard stop sign and pavement marking, sometimes combined with other features such as rumble strips, or a change in trail geometry. At roadway crossings, a sign reading “Bicycle Trail Xing” along with an emblem or logo specific to the trail helps warn trail users and motorists.

Trail managers should ensure that signs informing users to stay on the authorized trail are prominently displayed and regularly maintained.

- **Directional signs** at trail junctions and crossings help people stay on the trail and access destinations. Directional signs should include GRT branding, so trail users know they are on the GRT, as well as information to help them reach their destination. Directional signs are useful for both trail users and motorists.
- **Informational/Regulatory signs** alert trail users to a variety of information, such as permitted uses, trail hours of use, names and distances to different points of interest, rules, regulations, and appropriate trail etiquette.
- **Interpretive signs** can help educate trail users about nearby natural, cultural, and historical resources, as well as provide safety information. Interpretive signage related to sensitive cultural resources should be authored and placed in collaboration with local California Native American tribes to avoid identification and possible disturbance of sites.

Safety Brochures

The GRTA, in coordination with local agency partners, should develop brochures with safety and trail etiquette information and maps of existing trails, walkways, bikeways, and other facilities important to the GRT, aimed at encouraging more local trips by foot or bicycle. Brochures could be available at trailheads, public buildings, tourism bureaus, outdoor stores, and local bicycle shops.

Existing Annie & Mary Trail in Blue Lake

DOG USE MANAGEMENT

Dog handlers and their pets enjoy trails for several reasons – mobility assistance, personal security for handlers, and dogs' enjoyment and fitness. However, dogs can frighten or chase people, horses, livestock and wildlife, and adding dogs to people walking, horseback riding, and biking can create conflicts.

Existing signage at Founder's Grove

★ OP-12 RECOMMENDATION

Limiting negative impacts on the environment and ensuring a good experience for all visitors requires effective dog management. GRTA and local agency partners' management of dog use on the trail could include the following elements (as determined by the GRTA and/or local agency trail manager):

- Installing signs at GRT trailheads and along the GRT, applying specifically to dog handlers, stating the importance of compliance with regulations including:
  - Stay on the trail.
  - Employ a "greet-before-you-meet" etiquette for interactions with people and other dogs.
  - Keep pets on a short (six feet or shorter) leash.
- Providing a dispenser with disposable plastic bags for waste pickup and trash receptacles at trail entrances and as appropriate along the trail.
- Providing watering areas on the trail, wherever possible, reminding handlers that water is vital and dog handlers should carry a supply.
- Providing an education program that includes "dog patrollers," as part of an overall user education program.
- Incorporating tiered enforcement to include verbal warnings, fines, and prohibition of handlers who are routinely noncompliant with rules.
- Consider establishing off leash "dog parks" along the trail or collaborating with municipalities to ensure off leash areas are available. Legal off leash areas may decrease the incidence of dogs illegally off leash on the trail.

GRT Corridor in Redwood Valley

HUNTING

Potential impacts of hunters using the GRTA right-of-way or adjacent properties are unknown, and it is assumed that hunters would abide by established regulations. It is assumed that the GRT corridor is used for access to active hunting areas on private ranchlands during hunting seasons, and this was mentioned as a potential trail user safety hazard by both the Humboldt and Mendocino County Sheriffs' offices.

OP-13 RECOMMENDATION

The GRTA/trail partners could work with adjacent land owners, hunters and CDFW to provide trail access for hunters traveling to appropriate designated hunting areas on public or private land adjacent to the trail, while prohibiting hunting within the trail corridor. The GRTA could collaborate with regulatory agencies and hunting groups on the development and placement of appropriate regulatory and wayfinding signage.

Community and Neighbor Relations

ADJACENT PROPERTY OWNERS

Adjacent property owners and businesses along the trail may have concerns related to liability, fire risk, protection of cultural and natural resources, protection of livestock and infrastructure, trespassing, and crime. The GRT is adjacent to extensive cattle ranches, especially in the Eel River Canyon and Trinity/southern Humboldt counties. The GRT is also adjacent to industrial uses, including several active lumber yards and mills. Vineyards are next to the GRT for many miles in southern Mendocino County. Mendocino, Trinity, and Humboldt counties are well known for cannabis cultivation, both permitted and unpermitted. An estimated 5,000 cannabis grow sites exist in the hills and mountains above the GRT in the Eel River Canyon.[1] All these adjacent uses should be considered in developing the GRT.

1 Michael Kraft, "Best and Worst of Times in Humboldt County's Cannabis World," Times-Standard, June 25, 2023, https://www.times-standard.com/2023/06/25/business-sense-best-and-worst-of-times-in-humboldt-countys-cannabis-world/.

Existing private driveway

Livestock and Ranches
Fencing needs and livestock crossings may be identified during the GRT planning and design process, particularly in areas with active ranching, which could create safety issues for trail users. The breeds used for commercial cattle operations (Angus and Hereford) are generally docile and not a safety concern unless provoked or disturbed, similar to wildlife. Ranchers have raised a concern regarding the safety of the livestock if dogs are on the trail. Livestock and wildlife will need crossings designed to fit their typical patterns of movement to reach water and grazing areas. Ranchers will also need access to check and move cattle, fix fences and monitor land.

Cannabis Cultivation
While only a few unpermitted cannabis operations have been identified on the GRT corridor itself, there is evidence that growers use ATVs on the GRTA right-of-way. GRTA should work with partners and neighbors to address this unauthorized use. In areas of cannabis cultivation, for safety reasons, it could be important to warn trail users to stay on the trail. Environmental restoration on GRTA property may also help address cannabis cultivation impacts, including unauthorized water use.

Vineyards
Trails and vineyard operations can be complimentary, especially if vineyards include wineries with tasting rooms. Challenges could include agricultural spraying operations that may impact trail users, unauthorized use of the GRT right-of-way by agricultural equipment, and trail users trespassing into adjacent vineyards. These issues have been successfully addressed by the Napa Valley Vine Trail, through a public education campaign about the agriculture/trail interface issues. As the Napa Valley Vine Trail is located on private property via easements, local legislation has addressed vineyard owners' liability. Fencing can be used to delineate between private and public land and could also be considered during GRT planning and design.

Industry
Special GRT design consideration is necessary for safely crossing industrial sites adjacent to the GRTA right-of-way. These should be considered on a case-by-case basis, and re-routing may be an option in some cases.

OP-14 RECOMMENDATION

Maintain ongoing relationships with adjacent landowners. Recommendations related to managing the interface between public trails and private lands could include:

- Provide an efficient system for landowners and trail users to easily report issues along the trail that allows GRTA and trail partners to respond quickly to immediate issues while tracking repeated/recurring issues so they can be addressed in a more comprehensive manner.
- Sign the edge of the trail property with 'No Trespassing.'
- Monitor trespassing issues with law enforcement and landowners.
- In areas with recurring trespassing issues, work with landowner to address.
- Provide wayfinding signs to the closest public restrooms.
- Install porta potties or composting pit toilets at trailheads.
- As funds are available, hire rangers and ambassadors to regularly patrol GRT.
- Assist with identifying funding sources for volunteer fire departments that respond to emergencies and fires on the GRT.
- Help ensure funding for good operations and maintenance practices.

Table 16: *Operations Recommendations Summary*

ID	ISSUE	RECOMMENDATION
OP-1	Funding sources should be identified to pay for the operation and maintenance costs identified in the O&M Plan.	Pursue all options for operations and maintenance funding and design and construct GRT segments to minimize operations and maintenance costs.
OP-2	Emergency response presents challenges, especially on remote parts of the GRT.	The GRTA/trail partners should develop Emergency Response Plans that follow established protocols with first responders and establish clear policies and procedures for effective response to emergencies on the trail.
OP-3	The GRT crosses areas in Northern California that have a high level for potential wildfires.	The GRTA should coordinate with CAL FIRE and local fire departments to provide access for firefighting efforts in the event of a wildfire on/near the GRT. The GRTA could also work with CAL FIRE to issue a proclamation that prohibits campfires during peak fire season.
OP-4	The trail, or sections of the trail, may be closed from time to time during periodic maintenance of the facility or when natural disasters or environmental conditions pose a significant risk to trail users.	The GRTA could establish guidelines and processes for GRTA staff and local agency partners to proactively close the trail, to ensure safety and a quality user experience.
OP-5	Regular upkeep of the trail and associated amenities is essential for trail safety and user enjoyment.	The GRTA could establish a regular inspection program to effectively monitor, document, and remedy trail issues.
OP-6	Adjacent property owners and businesses along the trail may have concerns pertaining to privacy, trespassing or crime.	While not recommended for the entire corridor, fencing could also be appropriate to help delineate between public and private lands and/or increase privacy. Additional strategies include planting trees/bushes along the trail, installing "Private Property - No Trespassing" signs, and placing the trail away from private buildings.
OP-7	Occasionally, the GRT could need to address issues related to people experiencing homelessness on the trail.	The GRTA and local agency partners could design the trail to minimize places where houseless people may camp and take steps to connect homeless people with resources.
OP-8	Some of the GRTA property is currently being misused or encroached upon by private parties.	The GRTA should develop a responsive property management system that tracks licenses and leases, and allows for input from trail partners to identify unauthorized encroachments and prioritize areas needing attention, action and/or cleanup.
OP-9	Management of trail users in remote and backcountry settings can create specific pressures with regards to resource protection, safety, emergency response, and availability of trail-related services.	Given the isolated nature of the Eel River Canyon and the variety of potential hazards, a reservation/permit system could be employed to better manage the trail user experience and address safety, emergency response, and resource protection concerns.
OP-10	Though most trail experiences are enjoyable, the GRTA will need to consider rules and regulations to keep trail users safe and limit impacts on neighboring property owners and the general community.	Where design techniques intended to minimize potential conflicts are not effective, the GRTA/trail partners could establish rules and enforcement mechanisms including community involvement, regular maintenance, trained personnel, and enforcement of regulations.
OP-11	Uncertainty about trail regulations and appropriate etiquette can create user conflicts or lead people to misuse facilities or resources.	User safety education should be supported by a broad range of outreach materials, from signage to brochures to online information.
OP-12	Dogs can frighten or chase people, livestock and wildlife, and including dogs with multiple user groups can create conflicts.	The GRTA/trail partners could establish clear policies and procedures for dog use on the trail including signage, waste removal, education programs, and tiered enforcement.
OP-13	Hunting activities may impact the safety of GRT users.	The GRTA/trail partners should support current hunting regulations and work with adjacent landowners, hunters and CDFW to avoid hunting near the GRT during hunting season.
OP-14	Potential impacts to community and neighbor relations including vineyards, farms, industrial uses, and ranch operations should be considered.	The GRTA/trail partners could develop relationships with adjacent landowners to better understand how their operations may be impacted by the GRT, and vice-versa, and find potential design/operational solutions.

Existing trail in Ukiah

MAINTENANCE

Introduction

Effective regular maintenance is critical to the overall success and safety of the GRT. To provide a consistent trail user experience, GRTA should work with partner cities, counties, and land managers to develop a coordinated maintenance strategy.

The benefits of a good maintenance program are far-reaching and could include:

- A high standard of maintenance is an effective advertisement to promote the trail as a beneficial local and regional transportation and recreation resource.
- A maintenance program can maximize the useful life of the public investment in the GRT.
- Good maintenance can be an effective deterrent to vandalism, litter, misuse, and property encroachments.
- A regular maintenance routine can preserve positive public relations between adjacent landowners and the GRTA.
- A proactive maintenance policy can help improve safety and promote a positive user experience on the GRT.
- When it's clear who to contact when trail maintenance is needed, and quality maintenance is performed in a timely and efficient manner, this benefits trail users, neighbors, GRTA, partner agencies, and the public.

Although none of the recommendations contained in this Master Plan are binding on any agency, local jurisdictions may choose to adopt some or all these maintenance recommendations and/or may have additional maintenance standards that go above and beyond, as local operations and funding allow. California Native American Tribes interested in assisting with maintenance and stewardship of the GRT are welcome and encouraged to participate. Periodic updates to O&M practices and policies should be coordinated and managed by GRTA. Maintenance activities for the GRT could vary depending on land use context and user demand, and generally fall within three categories: inspections, routine maintenance, and remedial maintenance.

Existing culvert failure

Inspections are important for monitoring the GRT's maintenance needs. Routine inspections such as monitoring trail surface conditions, signs, and lighting can be carried out by maintenance staff. Other inspections (such as bridge, trestle, or tunnel inspections) should be conducted by certified professionals. A reporting system via the GRT website or mobile app could also be a way for the public/users to report on trail conditions and identify potential repair needs.

Remedial maintenance refers to repairing, replacing, or restoring major components that have been damaged, deteriorated, or destroyed by nature or normal "wear and tear." Some items ("minor repairs") may occur on a five- to ten-year cycle, such as repainting or replacing signage. Major reconstruction items may occur over a longer life cycle or after a catastrophic event such as a flood, fire, landslide, or earthquake.

Routine maintenance refers to the day-to-day chores of litter pick-up, trash, and debris removal, weed and dust control, path cleaning, vegetation trimming, graffiti removal, and other regular maintenance activities. Some "routine" maintenance may also be conducted on a more seasonal basis.

Deferred Maintenance refers to Routine and Remedial maintenance that has been delayed until the repair requires significantly more resources than would have originally been necessary. Unfortunately, the GRTA inherited deferred maintenance. The inspection process should include the identification of deferred maintenance tasks followed by a plan to perform the tasks with a goal of eliminating all deferred maintenance needs. For railbanked areas, this may include removal of rails and ties with associated native landscaping restoration.

Maintenance Responsibilities

Assuming sufficient funding is secured, it is possible that the GRTA could manage sections of the GRT not developed/managed by local agencies. It is also possible that specific maintenance standards and requirements could be included in existing, revised, or future license agreements between the GRTA and local agency partners. The GRTA could develop its own maintenance staff and/or develop contracts with individuals or companies to address maintenance of the trail, including occasional "big ticket" items beyond everyday trail maintenance. Volunteers could also be used for "lighter" maintenance activities. The GRTA will also collaborate with interested California Native American Tribes to develop maintenance plans that incorporate traditional ecological knowledge and identify tribal stewardship opportunities.

Established management policies, procedures, and practices could apply to the proposed trail.

The following lists maintenance-related responsibilities of GRTA and partner trail agencies for their GRT segment, assuming adequate funding is secured:

- Develop and implement a maintenance plan and ensure its adequate funding.
- Monitor safety/security of the trail through routine inspections.
- Anticipate and oversee major maintenance and rehabilitation efforts.
- Manage neighbor issues using fencing, signage, vegetative screening, and other methods as necessary.
- Act as the trail manager point of contact for the public and respond to issues/ concerns raised by trail users.
- Preserve the linear integrity of the corridor and set policy for non-trail uses of the corridor.

CASE STUDY: HUMBOLDT COUNTY TRAILS

Volunteer Trail Stewards (VTS) are a group of volunteers that maintain many Humboldt County trails. These include the Humboldt Bay Trail, Waterfront Trail, Hikshari Trail, McKay Forest Trails, and Freshwater Farm Reserve (managed by North Coast Regional Land Trust). Each volunteer steward group has a dedicated leader, most of whom have been around for at least five years. Volunteers typically meet once a month for two- to three-hour workdays, and some groups meet more frequently. Volunteer group size varies from 6 to 30 people, and each group is responsible for one trail section. VTS leaders believe that monthly workdays address trail maintenance needs, except for during the spring when there can be rapid vegetation growth. Some groups have a dedicated volunteer that operates a flail mower.

VTS groups, with the help of the Humboldt Trails Council (HTC), have MOUs in place with each trail jurisdiction and receive a modest amount of funding for their volunteer efforts. One part-time staff person, who manages these volunteer groups, is funded through the Humboldt Bay Trail Fund. Insurance is secured through HTC, who also develops MOU agreements with the jurisdictions.

Volunteers doing maintenance on the Freshwater Farms Reserve Nature Trail

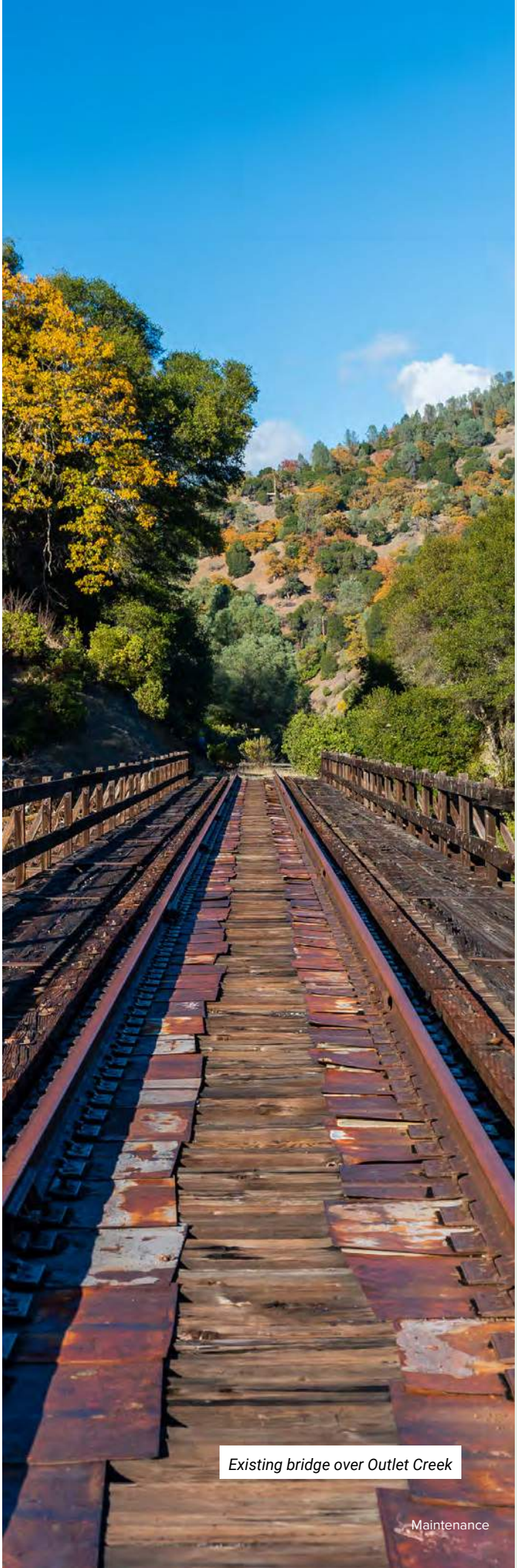
Inspections and Structure Management

Strategic management of trail structures is essential to a trail system's longevity, as is budgeting for replacement or repair of structures for safety reasons. Preventative maintenance activities can prolong the life of trail infrastructure, saving the trail manager both time and money and delaying the expense of larger rehabilitation or replacement projects.

Moreover, preventative maintenance demonstrates an effort to extend the life of initial capital improvements, which originated from a significant investment in the railroad. A preventative approach emphasizes the importance of making well-timed smaller investments and strategic maintenance activities that can delay the need for more expensive structural reconstruction or replacement.

To select the appropriate maintenance agreement, the trail manager/GRTA should conduct a structure inspection and assessment.

Existing trestle in Loleta



Existing bridge over Outlet Creek

STRUCTURE MANAGEMENT DATABASE

Records from decades of operation as a historic rail corridor and the subsequent GRT design, permitting, and construction activities could be used to establish an inventory of existing structures. The major categories of structures associated with the former rail corridor include bridges, tunnels, underpasses, culverts, ditches, embankments, surface treatments, road crossings, switches, and signs.

Existing tunnel

★ MA-1 RECOMMENDATION

Preventative maintenance activities are fundamental to managing trail structures. Regular inventory of the trail system structures documents conditions through inspection and assessment.

A structure inventory database for the trail can be found in the GRT Feasibility, Governance, and Railbanking Report, as well as in GRT planning and permitting activities. The location of bridges along the GRT corridor has already been included in a database managed by GRTA. Other assets could be added to this system and updated on a regular basis. Having a single database for GRT structure information could support the GRT team in their planning efforts. The database could also integrate with user generated maintenance requests provided via a website or mobile app.

In addition to inventorying trail structures, maintenance information could also be stored within the structure management database. This GIS database could list maintenance schedules for various trail structures, recently performed maintenance activities, and include photos of maintenance issues and structure condition. Routine field inspections could identify structure condition to inform prioritization of repair, rehabilitation, and replacement needs. The responsibility for inspection and condition reporting could rest with different entities, with GRTA overseeing this task. Some structures are already included in formal inspection processes, such as tunnels and underpasses that provide grade-separated road crossings. Inspection and condition assessment processes for other assets could be formalized. This could range from formal inspection processes by licensed professionals to providing data forms or a mobile app to trained volunteers. Documentation of structure condition and steps taken to address issues or minimize hazards is also important for prioritization of maintenance activities, projects, and funding.

GRTA staff and partners should be able to access and update the maintenance status for trail structures, so that a comprehensive assessment of trail condition can be easily summarized. The list below gives an example of information that could be part of the structure management database:

- Structure type
- Location
- Managing entity
- Condition
- Maintenance schedule/frequency
- Last-performed maintenance activity
- Cost of last maintenance activity
- Links to maintenance instructions/manual for specific asset type
- Links to asset-specific reports or evaluations (e.g., structural reports or geotechnical evaluations)
- Date of last assessment
- Notes
- Photos

Paved and Crushed Stone Multi-Use Trail Maintenance

PAVED AND CRUSHED STONE TRAIL TREAD MAINTENANCE

Paved and crushed aggregate GRT segments could require maintenance to maintain a smooth and stable surface over their lifespan. Routine maintenance activities could help prolong the useful life of the trail while providing a better experience for trail users. Remedial maintenance activities may be necessary to repair the trail tread or reconstruct segments damaged by flooding or landslides.

Existing trail in Arcata

★ MA-2 RECOMMENDATION

Development of consistent standards for both routine and remedial/capital maintenance activities could promote a consistent, high-quality trail experience while extending the lifespan of the trail.

ROUTINE MAINTENANCE

Sweeping/Clearing
Paved trails could be swept/cleared regularly to keep the paved surface free of debris, especially glass, other sharp objects, sand, grit, and loose gravel, leaves, and branches. Sweeping could be scheduled based on location and need; for example, pathway segments in wooded areas could tend to accumulate plant litter and should be swept more frequently to maintain safe conditions. At a minimum, there could be two annual sweeps of paved trail segments: one in the spring and one in the fall.

Patching and Sealing
Periodically, potholes on paved trail sections could need manual filling and patching, or cracks could need sealing. As an asphalt surface deteriorates, fog seal, sealcoating, slurry seal or micro surfacing could be applied to extend the life of the paved surface. The cost of crack repair and slurry sealing are relatively small compared with reconstruction or overlay. Slurry sealing is estimated at $5,000 to $10,000 per mile and could be conducted every five to ten years, based on local conditions.

Crushed Aggregate Trail Tread Maintenance
Minor grading should be done once a year to eliminate low spots, address ponding or erosion problems, or to correct other trail surface issues. This could include regrading rutted areas, filling potholes or depressions, or proactively addressing erosion issues. Every three to six years or as needed, new aggregate could be added to maintain the trail surface and quality.

REMEDIAL/CAPITAL MAINTENANCE

Asphalt Overlays and Reconstructions
Based on observations and analysis of similar asphalt pathways, trail pavement could be overlaid every 20 to 25 years on average, according to local engineering firm GHD. The need for repaving depends upon use, loads, and climate. Extensive asphalt replacement/renovation are anticipated every 50 years. However, replacement could be reduced with preventative maintenance measures, such as sealcoating every 5 to 7 years to prevent surface raveling. Sealcoating should include restriping where applicable. Sealcoating should include restriping where applicable.

DRAINAGE INFRASTRUCTURE MAINTENANCE

Insufficient or improper drainage can compromise any trail. The historic railroad grade crosses over numerous creeks, tributaries, drainages, and depressions. Regular maintenance of culverts or other types of drainage crossings, such as bridges, is important to proper drainage of any trail system.

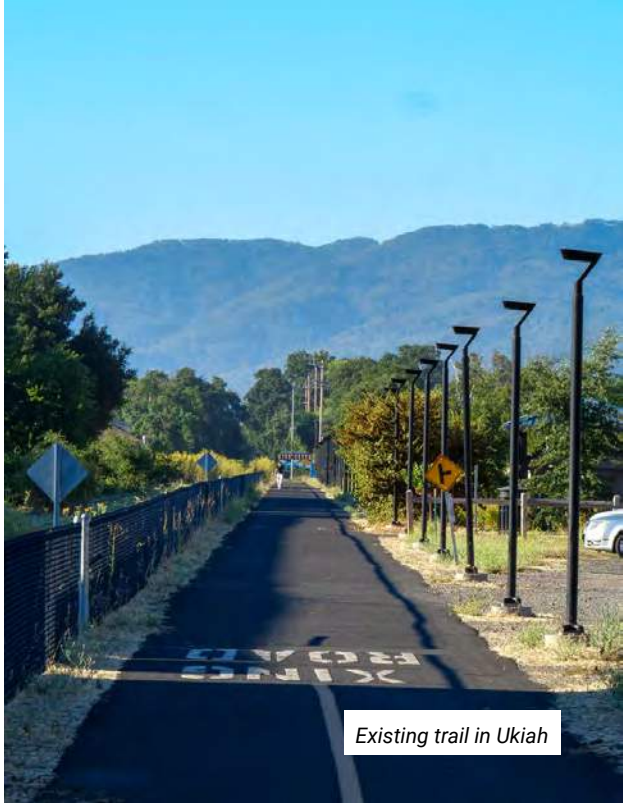
★ MA-3 RECOMMENDATION

Ditches and trail drainage structures could be kept clear of debris to prevent trail washouts and maintain proper drainage. Trail managers could conduct monthly inspections of trail drainage during the rainy season and immediately after any major storm events or flooding.

Existing culvert

VEGETATION MAINTENANCE

On the Class I segments of the GRT, it is recommended that trail managers maintain sufficient clearance, to prevent fire, promote safety, and maintain an aesthetic appearance.



Existing trail in Ukiah

★ MA-4 RECOMMENDATION

Brush Removal
All brush and trees could be removed from the trail berm, unless the tree is a legacy tree of 1.5- feet or more in diameter at breast height, in which case it could be retained where feasible. Brush could also be removed adjacent to road and driveway crossings to provide visibility for trail and roadway users. In some cases, brush clearing to facilitate visibility could extend beyond 12 feet from trail center line.

Class I Shared-Use Path Right-of-Way
In areas where vegetative growth impedes water flow in the trail prism, the mowed width could be increased to include a nearby ditch, provided it is not a wetland area. Road and driveway crossings of the GRT could be mowed to facilitate visibility for both trail and road traffic.

Class I Shared-Use Path Trail Surface
Within the trail tread, weeds could be mowed, sprayed, or otherwise controlled to prevent growth through the trail surface. A Class I trail is generally a 10- to 12-foot trail width with 1-foot-wide shoulders on both sides.

Noxious Weeds
Comply with applicable laws or local ordinances when completing all mowing, spraying, or other methods.

Trailheads
Mowing frequency and timing should comply with local ordinances. Weeds could be controlled at the base of all structures (e.g., signs, buildings, and kiosks), through the parking surface of unpaved/dirt parking areas, and around parking lot wheel stops.

Road Crossings
Providing safe intersections is important to trail user safety. Vegetation could be cleared at intersections as needed to ensure good visibility for both trail users and motorists, using string/brush trimmers, hedge trimmers, or mowers. Local agencies could use a street sweeper on paved segments of the GRT.

Trash and recycling receptacles at Founder's Grove

REMOVAL OF LITTER AND DUMPED MATERIALS

Litter and illegal dumping can detract from any trail experience and potentially damage natural environments and harm wildlife.

★ MA-5 RECOMMENDATION

GRTA, trail partners, or volunteers could regularly remove litter along open GRT segments. Litter receptacles could be placed at primary access points, such as trailheads. Illegal dumping could be controlled by vehicle barriers, regulatory signage, and enforcement. When illegal dumping occurs, it is a good idea to remove the trash as soon as possible, to prevent additional occurrences. More intensive efforts could focus on the more problematic areas and could include signs, vehicular barriers, educational campaigns, and/or enforcement. Neighborhood volunteers, community service crews, or inmate crews could assist with GRT maintenance.

Backcountry Trail Maintenance

TREAD MAINTENANCE

The GRT in the backcountry will be different from paved and crushed stone trail conditions in more "frontcountry" sections, as there can be access challenges due to active landslides, the remoteness of the area, and varying conditions along the former railroad grade.

★ MA-6 RECOMMENDATION

Develop standards for routine backcountry trail maintenance to promote a consistent, high-quality trail experience.

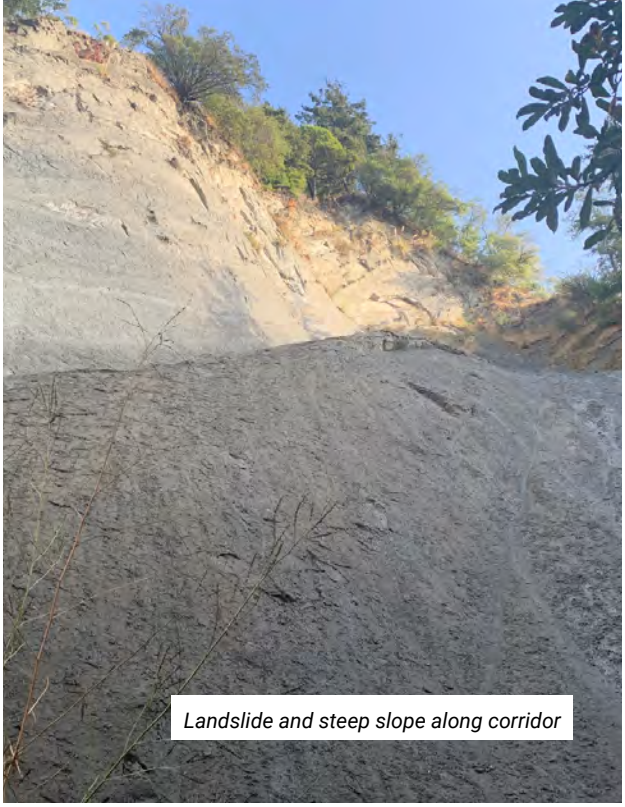
Routine Tread Maintenance

Routine maintenance of the trail tread in backcountry portions of the GRT could focus on creating and maintaining a crowned trail or outsloped trail, depending on what tread construction techniques are used. For more information, see Chapter 4: Trail Use and Design. Where the trail departs from the historic rail line, an outsloped trail should be constructed. Over time and with trail use, compaction of the trail surface can occur, allowing water to run down the trail, which could lead to erosion and rutting. By "knocking out" the downslope edge or outside berm with hand tools, water can flow off instead of down the trail. In addition, thoughtful trail design and sound construction can help limit the amount of maintenance required in backcountry areas. These include thoroughly compacting the trail (doing a good job on the "finish work") with an eye on shaping the trail to facilitate good drainage. The trail should be constructed/maintained to be "hydrologically disconnected" from watercourses to prevent sediment transportation into streams.

GRT corridor near Alderpoint

RECONSTRUCTION OF HAZARD-PRONE TRAIL SEGMENTS

The GRT corridor has more than 100 major and minor landslides in Mendocino, Trinity, and Humboldt counties. Some of these landslides are still moving. The width and extent of landslides along the GRT are difficult to estimate, but some are over 200 feet wide. The GRT's alignment across several landslide-prone areas makes trail washouts likely in some areas, particularly between Dos Rios and Alderpoint.



Landslide and steep slope along corridor

★ MA-7 RECOMMENDATION

Any permanent structural solution for trail construction across landslide areas could be costly and might wash out soon after its installation. The design team will search for the most appropriate solution, which may involve a trail bobcat (if access is possible) or a trail crew with hand tools. The backcountry portion of the GRT could be inspected after major storms and closed if landslides have created unsafe use conditions. If feasible, trails could be reconstructed to standards specified by the GRT Design Guidelines.

Maintenance Staging Strategies

Maintaining the GRT in remote areas could be facilitated by having strategically located maintenance sheds along the GRT. These could consist of a locked maintenance shed or trailer/storage unit, which could store trail tools, emergency response supplies, and rescue equipment. Maintenance outposts could be located based upon the following considerations:

- Access to landslide or hazard-prone trail segments
- Ability to transport supplies and materials to the maintenance shed and jobsite
- Property availability, which may consist of fee simple property, easements, or license agreements with adjacent property owners
- Utility service available, or solar panel potential
- Ability to monitor and secure the premises
- Maintenance outposts could be developed in conjunction with campgrounds or emergency response stations along the GRT, on property owned by GRTA or partners, or on adjacent willing landowner properties.

Structural Solutions

In some cases, landslide damage could necessitate a larger scale response and repair. In these cases, the GRTA could assess the cost-benefit of frequent trail reconstruction against building a more permanent structural solution.

DRAINAGE INFRASTRUCTURE MAINTENANCE

Improper drainage can contribute to backcountry trail maintenance issues. The historic railroad grade crosses numerous creeks, tributaries, drainages, and swales. Culverts under the railroad grade drain some of these areas, and maintaining these culverts is essential to protecting the trail. When culverts become plugged with debris, water can overrun the trail. The Eel River Canyon section of the GRT has many failed culverts with related drainage issues, which could need to be addressed when the GRT is built.

★ MA-8 RECOMMENDATION

Drainage structures could be kept clear of debris to prevent trail washouts and maintain drainage flow to protect the GRT. In areas where drainage flows across the trail, hardening the trail with rock where these crossings exist could be helpful. Culverts and other drainage structures could be thoroughly incorporated into the structure management database and inspected regularly during the wet season and after major rain events.

VEGETATION MAINTENANCE

Pruning vegetation and trees is an important trail maintenance activity. Where feasible, backcountry trails could be cleared four feet on each side of the tread and overhead (recommended height depends on user group). Trees and shrubs should be cut as close to the ground as possible. At road crossings, additional clearing may be necessary to ensure adequate sight distance for motorists and trail users.

Existing wooden culvert

Structure Maintenance

SIGNAGE

Proper maintenance and replacement, when necessary, of signs facilitates a positive user experience, helps prevent unauthorized social trails, and promotes adherence to rules and regulations. Sign maintenance refers to safety signs, mile markers, interpretive signs, and directional signs on the GRT or at trailheads.

MA-9 RECOMMENDATION

Signs could be checked for fading or vandalism as part of regular maintenance activities and visual inspections performed by GRTA staff and/or trail partners.

Signage in Loleta Downtown Park

TRAIL BRIDGES AND TRESTLES

The GRT has 10 major trestles (wood pile structures over 300 feet) and 31 steel bridges between Willits and Arcata. There are also many trestles on the Annie & Mary Trail between Arcata and Blue Lake. The maintenance goal is to maintain functionality of bridges, prevent safety hazards, and promote ADA compliance.

Existing trestle in Loleta

★ MA-10 RECOMMENDATION

In general, to retain bridge design specifications, a qualified civil/structural engineer could, as appropriate, perform and document an annual inspection. Any structural damage could be reported to the GRTA and local agency partner. Structural engineering assessments could be done by a qualified engineer with experience with railroad trestles, bridges, and tunnels. Additional GRT design guidelines for trestles and bridges include:

Handrails and Pickets
Handrails and pickets, vertical elements in the handrail/barrier design, may be recommended for safety on trestles and bridge structures.

Decking (bridges)
Trail decking generally provides a smooth and even surface (with less than ½" gaps between planks) to prevent safety hazards and meet ADA requirements. Bolts, screws, and nails should be flush with the decking surface.

Approaches
Bridge approaches provide a smooth transition from the trail surface to the bridge decking, preventing safety hazards and meeting ADA requirements. Where the trail surface is eroding near bridge approaches, retaining walls could be constructed to contain tread surface material and provide a smooth transition to the bridge.

Abutments
Abutments could be included in routine visual inspections to identify erosion issues or other stability concerns and could benefit from consultation with engineering staff or contractors.

Super- or Substructure
Super- or substructures could be included in routine visual inspections to identify stability concerns. Damage or failure of super- or substructure could be reported to GRTA and local partner agency's engineers/construction crews.

Debris
All debris that piles up against a bridge could be removed, to ensure free flow of water.

Collapsed tunnel along corridor

TUNNELS

Some of the 30 tunnels on the GRT corridor between Willits and Arcata are partially or fully collapsed. Inside the tunnels, some timber framing and sheathing have been removed, or there are drainage and rock fall issues. Several tunnels are long enough to require special treatment.

MA-11 RECOMMENDATION

Interim Route of the GRT

Where a tunnel has collapsed completely or partially, it may be more practical to re-route the GRT around the tunnel temporarily while funds are being obtained for tunnel repairs. This could necessitate obtaining easements from or agreements with adjacent property owners.

Lighting

The longer tunnels on the GRT may require user activated lighting. Bats are common in some of the GRT tunnels, and potential impacts to bats/users should be considered. The historic 2.25-mile-long Donner Pass Railroad Tunnels and Snowsheds near Truckee are open to the public and have similar conditions to the GRT's Island Mountain tunnel and appear to operate safely. However, the bat guano in the Island Mountain Tunnel may be a safety hazard for trail users, and an alternative GRT route may need to be identified.

TRAIL AMENITIES

Trail amenities include benches, trash receptacles, bicycle repair stations, fencing, and gates, all of which help contribute to a positive trail experience. Trail amenities require maintenance and upkeep to stay in good working order.

MA-12 RECOMMENDATION

Trail amenities could be inspected regularly and resupplied where appropriate.

RESTROOMS

Typically, restrooms are not included on most Class I shared-use paths because the paths are located near existing facilities in towns and cities. However, usage volumes and remoteness may result in the need for composting pit toilets or porta-potties. These could be located away from residential uses and accessible by maintenance vehicles. The GRTA and local partner agencies should inspect, clean, and empty these facilities regularly. GRTA could evaluate suitable locations for composting pit toilets and porta-potties on backcountry GRT segments. On segments of trail without bathroom access, Leave No Trace etiquette could be promoted to prevent public health risks or water contamination. Furthermore, backcountry permit holders could be required to carry human waste trash bags similar to requirements in Zion National Park or encouraged/required to have a shovel to dig a hole where appropriate. Those specific regulations could be developed as part of a "leave no trace" program along the GRT.

Existing restrooms at Humboldt Redwoods State Park

Table 17: *Maintenance Recommendations Summary*

ID	ISSUE	RECOMMENDATION
MA-1	Decades of operation as a rail corridor has created an inventory of structures within the right-of-way.	The GRTA could inventory existing structures in order to plan and implement preventative maintenance activities to effectively manage structure safety and promote longevity.
MA-2	Paved and crushed aggregate segments of the GRT could require regular maintenance to maintain a smooth and stable surface over their lifespan.	Development of consistent standards for both routine and remedial/capital maintenance activities could promote a consistent, high-quality trail experience while extending the lifespan of the trail.
MA-3	Insufficient drainage can quickly compromise paved and crushed stone sections of the GRT. It is important to maintain existing drainage systems and repair or replace failed drainage systems associated with the former railroad.	Ditches and trail drainage structures could be kept clear of debris to prevent trail washouts and maintain proper drainage. Trail managers could conduct monthly inspections of trail drainage during the rainy season and immediately after any major storm events or flooding.
MA-4	Unmaintained vegetation is not only a fire hazard, but it can also be a danger to trail users especially at intersections, where it interferes with sight distance.	The GRTA could develop consistent standards for brush removal and weed control. The GRTA could help ensure vegetation is regularly removed near intersections to maintain good visibility for trail users and approaching motorists.
MA-5	Litter and illegal dumping can detract from trail experience and potentially damage natural environments and wildlife.	The GRTA and local agency partners could remove litter on all GRT segments. The GRTA could place litter receptacles at primary access points and help control dumping by placing vehicle barriers, regulatory signage, and enforcement of fines as much as possible. Illegal dumping could be removed as quickly as possible.
MA-6	The GRT in the backcountry will be different from Class 1 and more "frontcountry" sections, as there can be access challenges, active landslides, remoteness challenges, and varying conditions along the former railroad grade.	Develop standards for routine backcountry trail maintenance to promote a consistent, high-quality trail experience.
MA-7	The GRT corridor has more than 100 major and minor landslides in Mendocino, Trinity, and Humboldt counties. Significant stretches of the GRT lie within geomorphically hazard-prone areas that also have challenging access constraints.	The trail could be inspected after major storms and closed if landslides have created unsafe conditions. Trails could be reconstructed to standards as specified within the GRT Design Guidelines.
MA-8	Improper drainage can contribute to backcountry trail maintenance issues. The historic railroad grade crosses numerous creeks, tributaries, drainages, and swales. Culverts under the railroad grade drain some of these areas, and maintaining these culverts is essential to protecting the trail.	Drainage structures could be kept clear of debris to prevent trail washouts and maintain drainage flow to protect the GRT. In areas where drainage flows across the trail, hardening the trail with rock where these crossings exist could be helpful. Culverts and other drainage structures could be thoroughly incorporated into the structure management database and inspected regularly during the wet season and after major rain events.
MA-9	Proper maintenance and replacement of signs helps provide a good user experience, prevents unauthorized social trails, and can promote adherence to rules and regulations.	Signs could be checked for fading or vandalism as part of regular maintenance activities and visual inspections. Replace or repair damaged signs as soon as possible.
MA-10	The GRT has 10 major trestles (wood pile structures over 300 feet) and 31 steel bridges between Willits and Arcata. The maintenance goal is to maintain functionality of bridges, prevent safety hazards, and promote ADA compliance.	In general, to retain bridge design specifications, a qualified civil/structural engineer could, as appropriate, perform and document an annual inspection. Any structural damage could be reported to the GRTA and local agency partner. Structural engineering assessments could be done by a qualified engineer with experience with railroad trestles, bridges, and tunnels.
MA-11	Some of the 30 tunnels on the GRT corridor between Willits and Arcata are partially or fully collapsed. Inside the tunnels, some timber framing and sheathing have been removed, or there are drainage and rock fall issues. Several tunnels are long enough to require special treatment.	Where a tunnel has partially or fully collapsed, it may be practical to consider re-routing the GRT around the location. This may require obtaining easements from adjacent property owners. The longer tunnels on the GRT, including the Island Mountain Tunnel, may require lighting that is user-activated. The presence of bats inside tunnels could need to be considered.
MA-12	Trail amenities include benches, trash receptacles, bicycle repair stations, fencing, and gates, all of which help contribute to a positive trail experience.	Trail amenities could be inspected regularly and resupplied where appropriate.

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06

Project Prioritization

GRT corridor along Hwy 162

PRIORITIZATION PROCESS

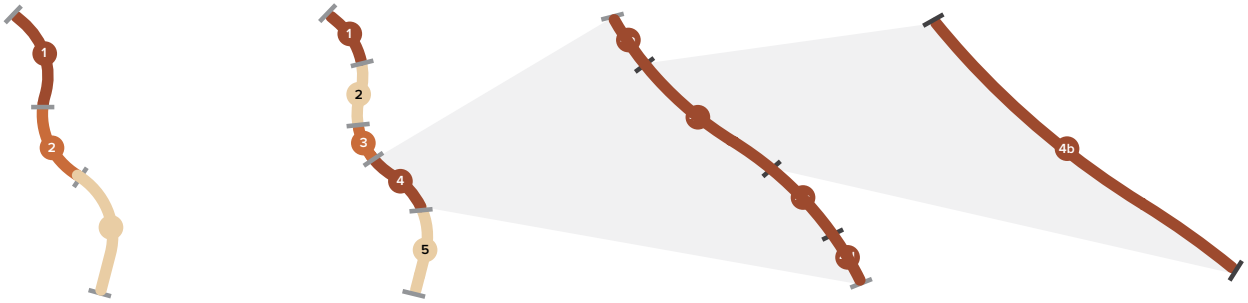
Prioritization provides an organized framework for building out the Great Redwood Trail (GRT), by identifying high-value and low-constraint trail segments that could be built in the shorter term, as well as more challenging segments that could be built over a longer timeframe. Trail segments that were fully constructed or under construction as of 2023 were not included in the prioritization.

The prioritization in the Master Plan builds upon previous efforts in the 2019 Feasibility Report. Master Plan segments provide a blueprint for potential future implementation projects, but may be further broken down in future planning and design phases, as shown in Figure 74.

Prioritization Process

- **Segment Delineation**: The GRT was delineated into segments for the purposes of prioritization based on trail extents that connect communities, start and end at a natural terminus or access point, share similar trail types and conditions, and could be constructed by a single local agency partner.
- **Prioritization Criteria**: Criteria were established to prioritize segments that provide the greatest benefits for trail users, adjacent communities, and local agency partners. These criteria help identify the segments that provide immediate impact to communities and the GRT, and are relatively feasible to implement.
- **Criteria Evaluation & Refinement**: The prioritization was a two-stage process. In stage one, segments were evaluated based on the established criteria. In stage two, additional refinement of prioritization results by the GRT team and local agency partners was undertaken to best reflect real world conditions.

Figure 74: *Prioritization flowchart from feasibility report to design and construction of individual projects. The segments referenced in this graphic are for illustrative purposes only and do not align with actual segment or project delineations.*



Feasibility Report (Previous Delineation)

Feasibility report segments were based on even spacing and independent utility of jurisdictions. The prioritization was largely informed by corridor conditions and constructability in relationto failed bridges, tunnels, and landslides.

Master Plan (Current Delineation)

Master Plan segments are informed by the feasibility report and refined based on access points, connecting towns, context, and ongoing planned projects. Prioritization expands upon the feasibility report to consider access, trip demand, railbanking, continuity, and ecological restoration.

Planning (Future Delineation)

Master plan segments could be used to develop projects for advanced planning, environmental clearances (including CEQA), and design study. Projects might be comprised of the entire segment length, multiple segments, or portions of segments depending on a variety of factors related to permitting, funding, and additional engineering analysis.

Design & Construction (Future Delineation)

Projects that advance to final design and construction will vary in length based on local factors. Planned projects may be constructed in their entirety or phased as a series of smaller projects.

Criteria

Prioritization criteria were organized by the key factors that drive trail development: Impact and Feasibility.

Key criteria were given a higher weight in the prioritization process, as indicated with a checkmark (✔) in Table 18. These weighted criteria were selected because they provide the most accurate indicators of future trail use (Access and Demand), the greatest barriers to construction (Feasibility - Structures and Feasibility - Natural Features), and highlight significant existing momentum for trail construction (Planning Status).

FUTURE REFINEMENT AND CRITERIA

The prioritization reflects the data and information available during the master planning process. Future refinements to prioritization are encouraged as additional input and information becomes available, including tribal cultural resources, tribal support, community support, and economic opportunities, among others.

Dyerville Train Truss Bridge

Table 18: *Overview of Prioritization Criteria*

CATEGORY	CRITERIA
Benefits Will the segment provide immediate positive impact to trail users and the environment?	Access
	Demand
	Continuity
	Ecological Restoration Opportunities
Feasibility Is the segment readily constructible with few major barriers?	Feasibility - Structures
	Feasibility - Natural Features
	Planning Status
	Railbanking Status
Project Readiness Is there community support and willing trail partners?	Community Support
	Willing Trail Partners
	Strategic Value

Category:

Benefit

Will the segment provide immediate positive impact to trail users and the environment?

	HIGH SCORE	MEDIUM SCORE	LOW SCORE
1 ACCESS **Does the segment have access opportunities using public roads?** **Data Source:** County Roads GIS Layers (accessed 2023)	**3+** public roads	**1 - 2** public roads	**No access** to public roads
2 DEMAND **Does the segment have high trip demand?** **Data Source:** Trip Demand from Economic Benefit Assessment (2023)	**150+** trips per day	**100+** trips per day	**50+** trips per day
3 CONTINUITY **Does the segment build upon existing or planned sections?** **Data Source:** Trail Status GIS Layers (2023)	**Adjacent** to planned or existing segment	**1** segment away from planned or existing segment	**2+** segments away from planned or existing segment
4 ECOLOGICAL RESTORATION OPPORTUNITIES **Does the segment align with ecological restoration opportunity sites?** **Data Source:** Restoration Opportunities Analysis (2023)	**2+** Ecological restoration opportunities	**1** Ecological Restoration opportunity	**No documented** restoration opportunities

Category:

Feasibility

Is the segment readily constructible with few major barriers?

GRT corridor near Scotia Fireman's Park

1 FEASIBILITY: STRUCTURES

Are there major structural barriers to trail construction?

Data Source: Field assessment data (2018)

HIGH SCORE	MEDIUM SCORE	LOW SCORE
All bridges and tunnels in structural condition	**1+ partially collapsed** bridges or tunnels	**1+ fully collapsed** bridges or tunnels

2 FEASIBILITY: NATURAL FEATURES

Are there major natural feature barriers to trail construction?

Data Source: Field assessment (2018)[1]

HIGH SCORE	MEDIUM-HIGH SCORE	MEDIUM-LOW SCORE	LOW SCORE
No landslides mid- or major-scale	**1+ mid-scale** landslides	**1 large-scale** landslides	**2+ large-scale** landslides

3 PLANNING STATUS

What is the current status of the segment?

Data Source: Trail Status GIS Layers (2023)

HIGH SCORE	MEDIUM SCORE	LOW SCORE
Fully planned segment (study completed or in progress)	**Partially planned** Segment	**No planning** to date

4 RAILBANKING STATUS

Is the segment impacted by ongoing railbanking process?

Data Source: Railbanking Status (2023)

Fully railbanked	Railbanking **in-progress**	**Not** railbanked

1 For the purposes of prioritization, major-scale landslides include translational slides, rotational slides, and slip-outs. Mid-scale landslides include soil creep, steep bench failures, and retaining wall failures. These categories were documented in the 2018 field assessment data.

Results

SEGMENTS AND REACHES

For purposes of prioritization, 43 segments along the GRT were identified (Table 19). Three segments between Eureka and Arcata were fully constructed or under construction as of 2023, and were not included in the prioritization. The remaining 40 segments were sorted into four reaches (South, Eel River Canyon, North, Spurs) and evaluated based on the criteria.

SOUTH REACH

From the Sonoma County border to Dos Rios (Mendocino County). Includes segments of the trail along the Russian River, Outlet Creek, and the mainstem Eel River to Middle Fork. Segments feature population centers in Mendocino County including Hopland, Ukiah, Redwood Valley, and Willits.

EEL RIVER CANYON REACH

From Dos Rios (Mendocino County) to Humboldt Redwoods State Park (Humboldt County). Includes the wild and scenic Eel River Canyon and extends from Middle Fork to South Fork Eel River. Segments feature remote wilderness and adjacent conservation and state park lands. Alderpoint is the largest population center along this reach.

NORTH REACH

From Humboldt Redwoods State Park to Arcata (Humboldt County). Includes segments of the trail along the Eel River and Humboldt Bay. Segments feature population centers in Humboldt County including Rio Dell, Fortuna, Loleta, Eureka, and Arcata.

SPUR TRAILS

Includes all spur trail segments, including the Annie & Mary (Korblex), Samoa, and Carlotta lines, all located in Humboldt County. The Annie & Mary line extends along the Mad River from Arcata to Blue Lake. The Samoa line extends from Arcata around Humboldt Bay through Manila and Samoa. The Carlotta Line begins in Alton and extends east along the Van Duzen River towards Carlotta.

TIER 1 SEGMENTS

Based on the prioritization, the following were identified as Tier 1 segments:

SOUTH REACH

- **Hopland**: Hwy 101 south of Hopland to Nelson Ranch Road
- **South Ukiah:** Nelson Ranch Road to Plant Rd
- **Ukiah:** Plant Rd to Brush St, includes existing trail
- **North Ukiah:** Brush St to Moore St
- **Redwood Valley:** Moore St to Laughlin Way
- **South Willits:** Hwy 101 near CAL FIRE Station to Hill Rd
- **Willits:** East Hill Rd to Commercial St, planned segment

EEL RIVER CANYON REACH

- **Eel River Canyon Preserve:** Island Mountain Rd to Cain Rock Railroad Bridge
- **Alderpoint:** Cain Rock Railroad Bridge to Steelhead Creek
- **Steelhead to Fort Seward:** Steelhead Creek to Fort Seward Railroad Station
- **McCann to Founders Grove:** McCann Rd bridge to Founders Grove

NORTH REACH

- **Rio Dell / Scotia Bluffs** Wildwood Ave Bridge to Metropolitan Heights Rd
- **Alton:** Metropolitan Heights Dr to Riverwalk Dr
- **Fortuna:** Riverwalk Dr to SR 211
- **Loleta:** SR 211 to Tompkins Hill Rd
- **College of the Redwoods to Eureka:** Tompkins Hill Rd to Tooby Rd, planned segment

SPUR TRAILS

- **North Arcata:** Sunset Ave to Humboldt Bay MWD Park 1
- **Blue Lake:** Glendale Dr to Mad River Levee

Figure 75: *Map of Segment Prioritization*

EVALUATION AND REFINEMENT

The prioritization was a two-stage process. This two-stage process establishes that the prioritization both identified the top tier projects and reflects the goals and priorities of local agency partners.

STAGE 1: CRITERIA EVALUATION

First, segments were evaluated and scored based on the established criteria in Table 18. The segments were then compared to each other within each reach to ensure that geographic equity along the entire corridor was taken into consideration, and guarantee Tier 1 segments from all three reaches along the GRT mainline. The scores for impact and feasibility are reflected in the "Stage 1" columns in Table 19.

★★★ indicates the segment scored in the top third of its reach for this criteria
★★ indicates the middle third of its reach
★ indicates the bottom third of its reach

STAGE 2: PROJECT READINESS

Second, additional refinement of prioritization results was undertaken to best reflect real world strategic value of segments. The project team and local agency partners identified key segments that reflected their community interests, willing partners, and understanding of the logical sequence to develop the trail. The strategic value scores are reflected in the "Stage 2" column in Table 19.

★★★ indicates a critical segment
★★ indicates a strategic segment

RESULTS: COMBINING STAGE 1 & 2 TO IDENTIFY PRIORITY

- Any segment with seven or more total stars across all three stage one and stage two columns was identified as a **Tier 1 segment**. This rule applies to all mainline trail reaches and select spur trail reaches with existing or planned segments.
- Any segment with six or more total stars across all three stage one and stage two columns was identified as a **Tier 2 segment**.
- Any one or two segments directly between high-priority or medium-priority segments were identified as a **Tier 2 segment**. This rule minimizes short gaps between priority segments.
- All remaining segments were identified as a **Tier 3 segment.**

GRT corridor along Outlet Creek

DEFINING SEGMENT TIERS

Prioritization tiers reflect a snapshot in time, but are intended to be flexible over time. As Tier 2 or 3 segments develop local agency partner momentum, funding, tribal support, or community support, they could become Tier 1.

Segments within each reach were compared against each other to ensure geographic equity and a holistic approach, resulting in Tier 1, 2, and 3 segments within each reach.

- **Tier 1** segments are generally high-impact and high-feasibility. These segments have existing momentum and provide strategic value to local agency partners.
- **Tier 2** segments are typically high-impact or high-feasibility, but often not both. They tend to be located on the periphery of population centers or between Tier 1 segments.
- **Tier 3** segments are generally lower-impact and lower-feasibility.

Table 19: *Summary of GRT prioritization results by segment, as of 2023*

REACH		SEGMENT	START	TERMINUS	STATUS*	MILES	TIER	IMPACT	FEASIBILITY	PROJECT READINESS
South Somona County border to Dos Rios	1	Russian River Wilds	Hwy 101, South of Echo Station Rd	Hwy 101, South of Hopland	Proposed	9.7	3	★	★	★★
	2	Hopland	Hwy 101, South of Hopland	Nelson Ranch Rd	Proposed	8.0	1	★★	★★★	★★★
	3	South Ukiah	Nelson Ranch Rd	Plant Rd, Ukiah	Proposed	4.6	1	★★	★★★	★★★
	4	Ukiah	Plant Rd, Ukiah	Brush St, Ukiah	Planned & Partially Existing	3.3	1	★★★	★★★	★★★
	5	North Ukiah	Brush St, Ukiah	Moore St, Calpella	Proposed	5.2	1	★★★	★★★	★★★
	6	Redwood Valley	Moore St, Calpella	Laughlin Way, Redwood Valley	Proposed	4.1	1	★★	★★★	★★★
	7	Laughlin Grade	Laughlin Way, Redwood Valley	Hwy 101, CAL FIRE Howard Station	Proposed	9.2	2	★★	★	★★
	8	South Willits	Hwy 101, CAL FIRE Howard Station	East Hill Rd, Willits	Proposed	4.7	1	★★★	★★★	★★
	9	Willits	East Hill Rd, Willits	Commercial St, Willits	Planned	1.6	1	★★★	★★★	★★★
	10	North Willits	Commercial St, Willits	Hwy 101, Outlet Creek Split	Proposed	3.7	2	★★	★★	★★
	11	Outlet Creek Canyon	Hwy 101, Outlet Creek Split	SR 162, Longvale	Proposed	9.0	3	★	★★	★
	12	Longvale to Farley	SR 162, Longvale	Farley Station	Proposed	6.1	3	★	★	★
	13	Farley to Dos Rios	Farley Station	Laytonville Dos Rios Rd, Dos Rios	Proposed	8.3	3	★	★	★
Eel River Canyon Dos Rios to Humboldt Redwoods State Park	14	Indian Springs	Laytonville Dos Rios Rd, Dos Rios	Woodman Creek Rd	Proposed	4.7	3	★★	★	★
	15	Woodman to Shellrock Creek	Woodman Creek Rd	Shell Rock Creek	Proposed	7.1	3	★★	★	★
	16	Spyrock	Shell Rock Creek	Blue Rock Creek	Proposed	4.6	3	★	★★★	★
	17	Blue Rock Creek to Island Mountain	Blue Rock Creek	Island Mountain Rd	Proposed	11.7	3	★	★★	★
	18	Eel River Canyon Preserve / Emerald Waters Reserve	Island Mountain Rd	Cain Rock Railroad Bridge, Alderpoint	Proposed	12.1	1	★★	★★	★★★
	19	Alderpoint	Cain Rock Railroad Bridge, Alderpoint	Steelhead Creek	Proposed	5.0	1	★★★	★★★	★★★
	20	Steelhead to Fort Seward	Steelhead Creek	Fort Seward Railroad Station	Proposed	4.8	1	★★★	★★★	★
	21	Fort Seward to Brock Creek	Fort Seward Railroad Station	Brock Creek	Proposed	5.2	2	★★	★★	★
	22	Brock Creek to Eel Rock	Brock Creek	Eel Rock Rd	Proposed	3.3	2	★★★	★★	★
	23	Eel Rock to McCann	Eel Rock Rd	Dyerville Loop Rd, McCann	Proposed	7.2	2	★★★	★★	★
	24	McCann to Founders Grove	Dyerville Loop Rd, McCann	Dyerville Loop Rd, Founders Grove	Proposed	5.2	1	★★★	★★★	★★★
North Humboldt Redwoods State Park to Arcata	25	Founders Grove to Pepperwood	Dyerville Loop Rd, Founders Grove	Larabee Ranch Rd	Proposed	5.0	3	★★	★★	★
	26	Pepperwood to Stafford	Larabee Ranch Rd	Hwy 101, Shively Rd	Proposed	10.0	3	★	★	★
	27	Stafford to Scotia	Hwy 101, Shively Rd	Fireman's Park, Scotia	Proposed	2.6	3	★	★★★	★
	28	Scotia Fireman's Park	Fireman's Park, Scotia	Wildwood Ave Bridge, Scotia	Proposed	1.1	2	★★	★★★	★
	29	Rio Dell / Scotia Bluffs Trail	Wildwood Ave Bridge, Scotia	Metropolitan Heights Rd, North of Rio Dell	Proposed	3.5	1	★★	★★	★★★
	30	Alton	Metropolitan Heights Rd, North of Rio Dell	Riverwalk Dr, Fortuna	Proposed	5.0	1	★★	★★	★★★
	31	Fortuna to Fernbridge	Riverwalk Dr, Fortuna	SR 211, Fernbridge	Proposed	4.2	1	★★★	★★★	★★★
	32	Loleta	SR 211, Fernbridge	Tompkins Hill Rd, College of the Redwoods	Proposed	7.7	1	★★★	★	★★★
	33	College of the Redwoods to Eureka	Tompkins Hill Rd, College of the Redwoods	Tooby Rd, South of Eureka	Planned	3.2	1	★★★	★★★	★★★
	34	Humboldt Bay Trail Eureka	Tooby Rd, South of Eureka	Y St Eureka	Existing	6.3	Exists with some parallel routes; City developing plans for trail improvements.			
	35	Arcata to Eureka Gap Closure	Y St Eureka	Hwy 101, Bayside	Under construction	4.3	Entire segment is under construction, as of April 2024			
	36	Humboldt Bay Trail Arcata	Hwy 101, Bayside	Sunset Ave, Arcata	Existing	4.0	Entire segment exists			
Spurs Includes Annie & Mary (Korblex), Samoa, and Carlotta Lines	37	North Arcata	Sunset Ave, Arcata	Humboldt Bay Municipal Water District Park 1	Planned	3.3	1	★★	★★★	★★★
	38	Glendale	Humboldt Bay Municipal Water District Park 1	Glendale Dr, Glendale	Proposed	1.7	2	★★	★	★★
	39	Blue Lake	Glendale Dr, Glendale	Mad River Levee, Blue Lake	Planned & Partially Existing	3.5	1	★★★	★	★★★
	40	Carlotta Phase I	SR 36, Alton	SR 36, Carlotta	Proposed	5.0	3	★	★★★	★
	41	Carlotta Phase II	SR 36, Carlotta	End of the Line, Carlotta	Proposed	2.2	3	★	★★★	★
	42	Manila	Alliance Rd, Arcata	Pocket Park, Manila	Proposed	5.4	2	★★★	★★★	★
	43	Samoa and Fairhaven	Pocket Park, Manila	Bendixon St, Fairhaven	Proposed	4.5	2	★★	★★★	★

Legend: Tier 1 Segment | Tier 2 Segment | Tier 3 Segment | Existing Segment

*Planned segments have begun or completed a formal project planning or design process prior to construction. Proposed segments have not been formally studied beyond this Master Plan. Existing, planned, and proposed trails may all be present within a segment.

Existing bridge over Outlet Creek

KEY TAKEAWAYS FROM RESULTS

- **Prioritize continuity and connect to existing trails and populated Areas**: Tier 1 segments build off of existing or planned trails, and generally radiate out from population centers such as Ukiah, Willits, and Eureka. This encourages the trail to build longer upon itself as opposed to shorter and isolated trails.
- **Connect to access points**: In general, priority was given to segments that have access points for both construction and future trail users.
- **Build upon existing momentum:** Segments that have already been planned or have an interested partner are among the most likely segments to be constructed first.
- **Alderpoint is the logical starting point for the Eel River Canyon**: Starting at Alderpoint, the trail can expand south towards Emerald Waters Reserve, Eel River Canyon Preserve, and Island Mountain. From Alderpoint the trail can also expand north to create a continuous trail to Humboldt Redwoods State Park.
- **Connect short gaps between communities**: Tier 2 segments close smaller gaps between high-priority communities. While building these segments is not the top priority, these segments enable the creation of long regional trails within each reach.
- **Prioritize the mainline**: Building out the mainline trail is a primary objective. As a result, the only spur trails that were selected as Tier 1 are existing or planned.
- **There are segments where GRT partners still need to be identified** The GRTA will provide leadership to identify partnerships and collaborations to plan, construct, operate, and manage GRT segments that currently do not have an identified trail partner.
- **Prioritization requires ongoing refinement**: Prioritization in this memo serves as a starting point. Ongoing refinement can and should happen to reflect community and tribal support, as well as support from local agency partners who may represent those communities' needs.

RUSSIAN RIVER WILDS

Segment 1

SEGMENT EXTENTS

Hwy 101, South of Echo Station Rd to Hwy 101, South of Hopland

COUNTY

Mendocino County

LENGTH

9.7 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE

Crushed Stone Multi-use Trail

PRIORITIZATION

Tier 3

The Master Plan trail segments are delineated for prioritization and high-level planning purposes only. They may be used to develop individual projects for advanced planning, environmental review (including CEQA), and design study in the future. However, individual projects might be comprised of an entire Master Plan segment, multiple segments, or portions of segments depending on a variety of factors including partner agencies (i.e., project proponents), funding, permitting, and additional engineering analysis.

SEGMENT DETAILS

- Segment Breakpoint
- Design Concept
- GRT Milepost

TRAIL TYPES

- Paved Trail
- Crushed Stone Trail

TRAIL AMENITIES*

Existing amenities

- Campground

Trailheads

- Community Trailhead

Potential Opportunity Sites

- Trail-Oriented Development
- Campground
- River Access
- Parks / Rest Areas

INFRASTRUCTURE

Roadway Crossings**

- Crossing, Minor Public
- Crossing, Private
- Underpass

Infrastructure Conditions***

- Geomorphic, Major
- Geomorphic, Minor
- Bridge
- Bridge, Damaged
- Tunnel
- Tunnel, Damaged

BOUNDARIES

- City/Town/Place
- Parks & Public Lands

OWNERSHIP

- GRTA
- Local
- State

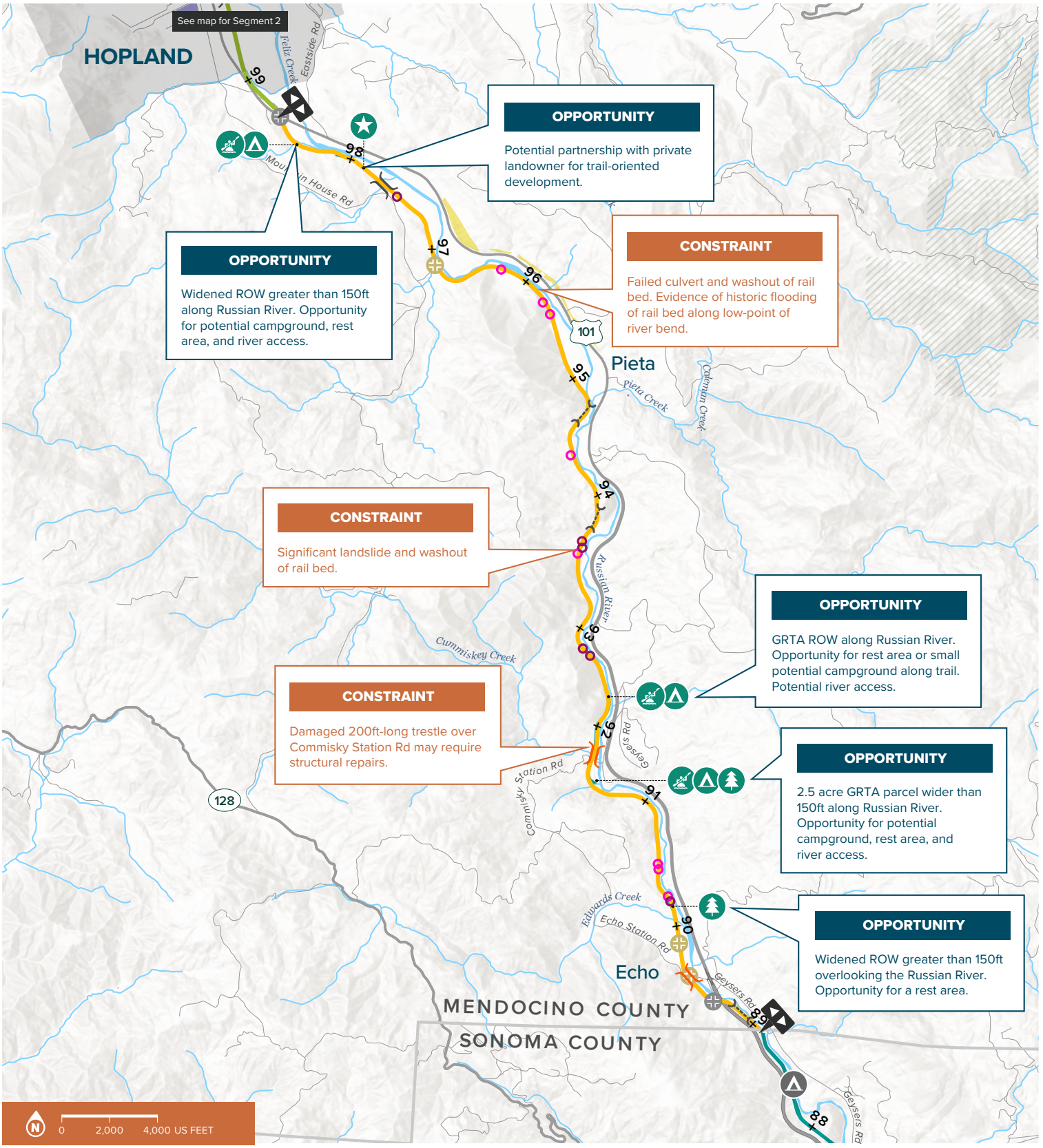
ENVIRONMENTAL

- Water

*All amenities are potential opportunities for planning purposes only.

**Private crossings may or may not be licensed.

***Conditions reflect best available data as of 2023. It is understood that conditions are rapidly changing based on 2020 report data. Select points have been updated based on new information.



The location of culturally significant resources is confidential and therefore, they are not shown on these maps. Before constructing any portion of the trail, an inventory and evaluation of cultural resources will be conducted in collaboration with California Native American tribes. Cultural resources are protected under state and federal law, and include Native American archaeological sites, historic archaeological sites and buildings, and natural areas with traditional cultural significance.

HOPLAND

Segment 2

SEGMENT EXTENTS

Hwy 101, South of Hopland to Nelson Ranch Rd

COUNTY

Mendocino County

LENGTH

8.0 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE

Paved Multi-use Trail

PRIORITIZATION

Tier 1

The Master Plan trail segments are delineated for prioritization and high-level planning purposes only. They may be used to develop individual projects for advanced planning, environmental review (including CEQA), and design study in the future. However, individual projects might be comprised of an entire Master Plan segment, multiple segments, or portions of segments depending on a variety of factors including partner agencies (i.e., project proponents), funding, permitting, and additional engineering analysis.

SEGMENT DETAILS

- Segment Breakpoint
- Design Concept
- \+ GRT Milepost

TRAIL TYPES

- Paved Trail
- Crushed Stone Trail
- Connector
- Loop, non-GRT

TRAIL AMENITIES*

Trailheads

- Community Gateway
- Community Trailhead
- Community Access Point

Potential Opportunity Sites

- Trail-Oriented Development
- Campground
- Parks / Rest Areas

INFRASTRUCTURE

Roadway Crossings**

- Crossing, Highway
- Crossing, Minor Public
- Crossing, Private
- Underpass

Infrastructure Conditions***

- Geomorphic, Major
- Bridge

BOUNDARIES

- City/Town/Place
- Parks & Public Lands

OWNERSHIP

- GRTA
- State
- Tribal
- Local

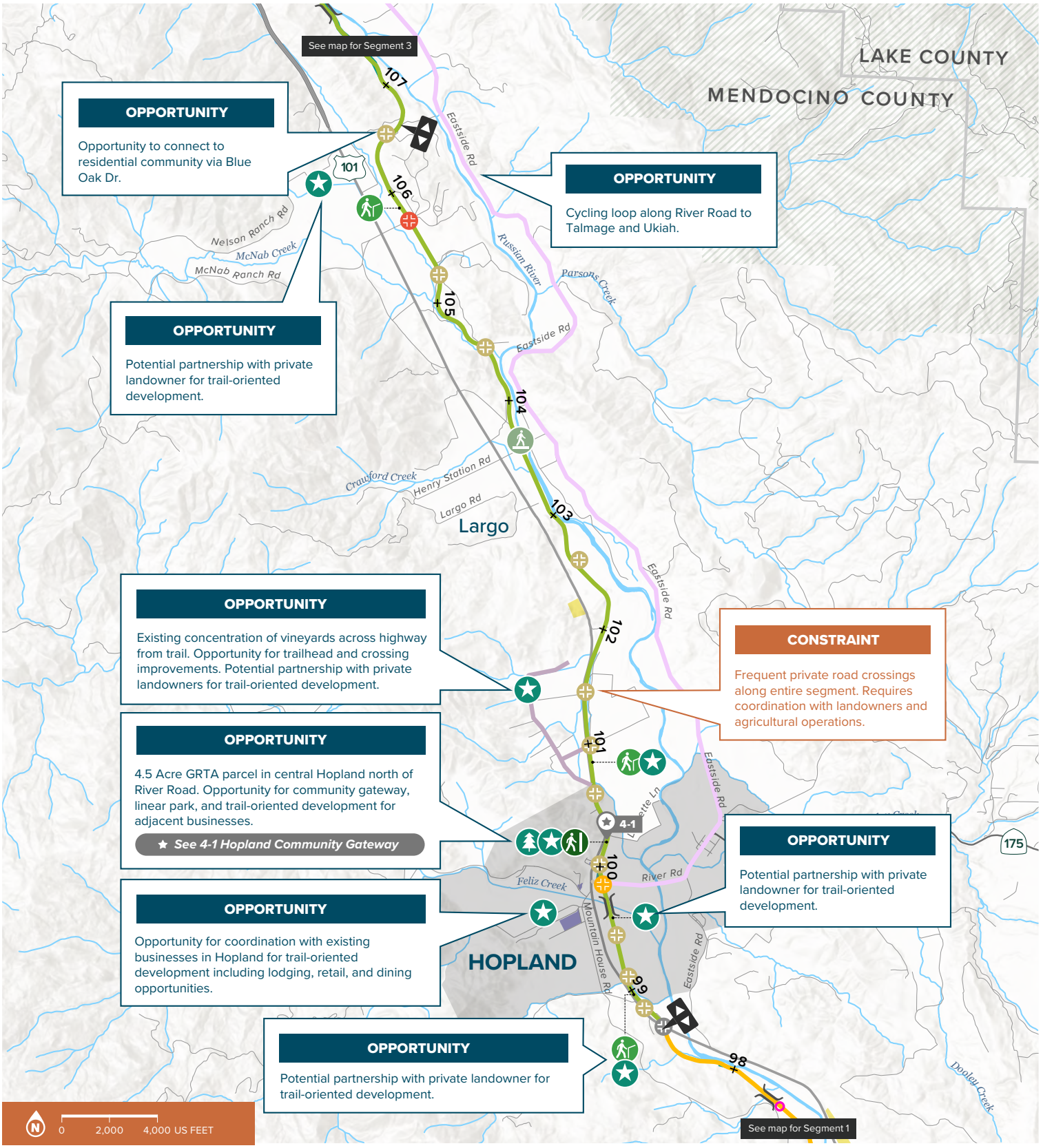
ENVIRONMENTAL

- Water

**All amenities are potential opportunities for planning purposes only.*

***Private crossings may or may not be licensed.*

****Conditions reflect best available data as of 2023. It is understood that conditions are rapidly changing based on 2020 report data. Select points have been updated based on new information.*



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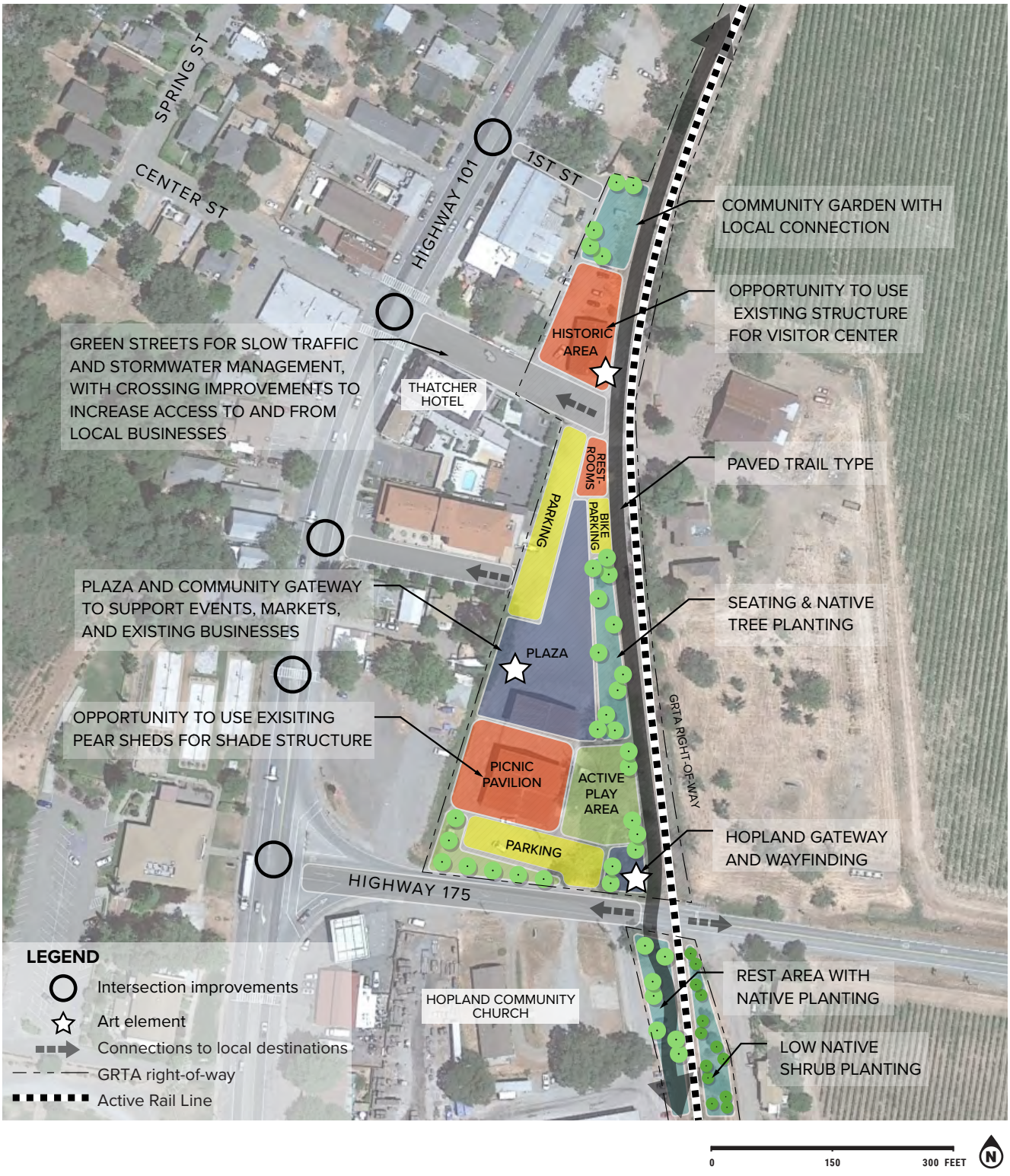
4-1 Hopland Community Gateway



Existing Conditions

Artistic rendering of a reimagined Hopland Depot and plaza

SOUTH UKIAH

Segment 3

SEGMENT EXTENTS

Nelson Ranch Rd to Plant Rd, Ukiah

COUNTY

Mendocino County

LENGTH

4.6 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE

Paved Multi-use Trail

PRIORITIZATION

Tier 1

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SEGMENT DETAILS

- Segment Breakpoint
- Design Concept
- GRT Milepost

TRAIL TYPES

- Paved Trail
- Connector
- Loop, non-GRT

TRAIL AMENITIES*

Trailheads

- Community Trailhead
- Community Access Point

Potential Opportunity Sites

- Trail-Oriented Development
- Campground
- River Access
- Park / Rest Area

INFRASTRUCTURE

Roadway Crossings**

- Crossing, Private

Infrastructure Conditions***

- Geomorphic, Minor
- Bridge
- Hazardous Materials

BOUNDARIES

- City/Town/Place

OWNERSHIP

- GRTA
- Federal
- Local

ENVIRONMENTAL

- Water

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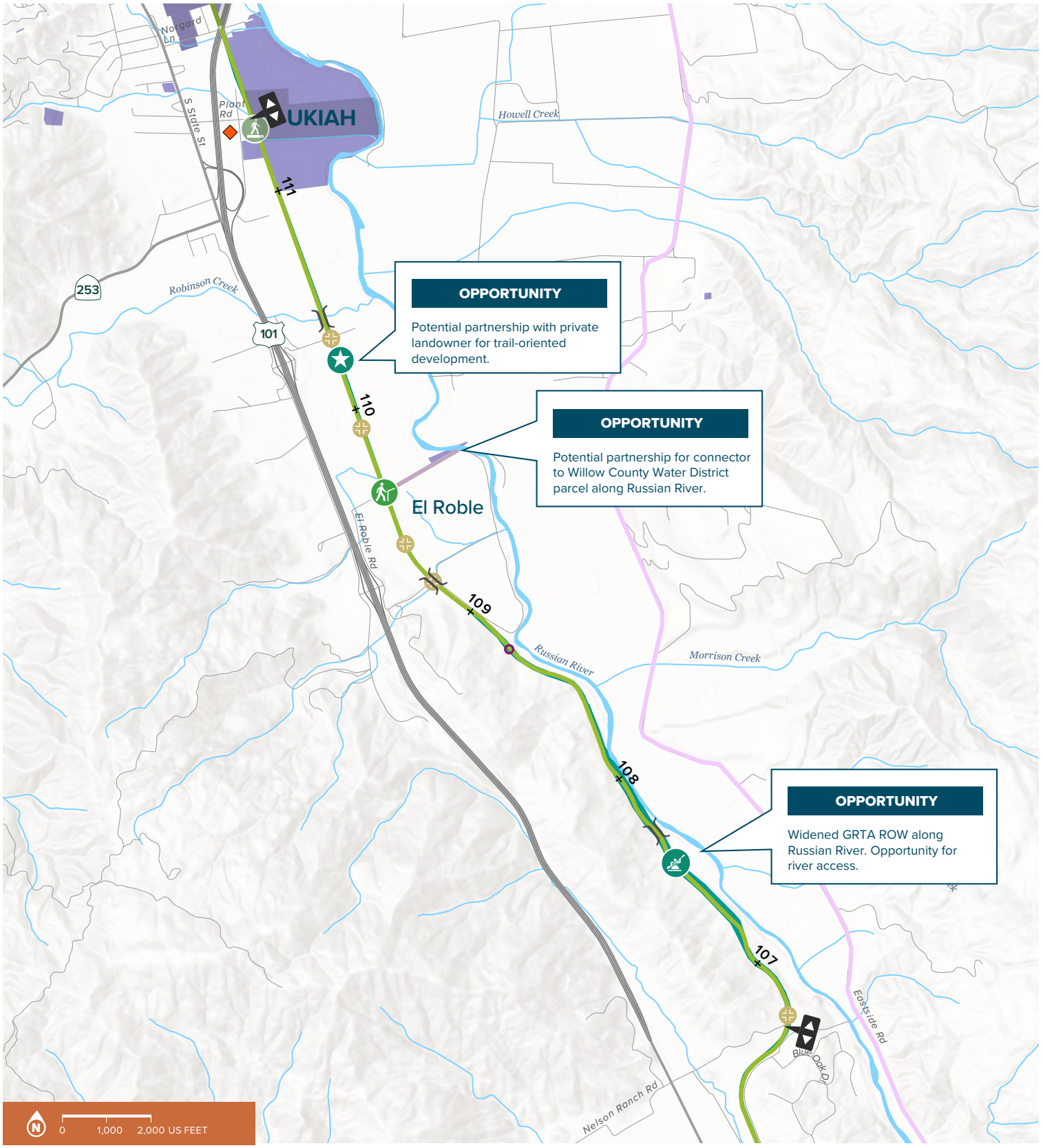

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UKIAH

Segment 4

SEGMENT EXTENTS

Plant Rd, Ukiah to Brush St, Ukiah

COUNTY

Mendocino County

LENGTH

3.3 Miles
Planned: 0.8 Miles
Existing: 1.8 Miles

TRAIL TYPE

Paved Multi-use Trail

PRIORITIZATION

Tier 1

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SEGMENT DETAILS

- Segment Breakpoint
- Design Concept
- GRT Milepost

TRAIL TYPES

- Paved Trail
- Connector
- Loop, non-GRT

TRAIL STATUS

- Existing
- Planned

TRAIL AMENITIES*

Existing amenities

- Trailhead

Trailheads

- Community Trailhead
- Community Access Point

Potential Opportunity Sites

- Trail-Oriented Development
- River Access
- Parks / Rest Areas

INFRASTRUCTURE

Roadway Crossings**

- Crossing, Major Public
- Crossing, Minor Public
- Underpass

Infrastructure Conditions***

- Hazardous Materials

BOUNDARIES

- City/Town/Place
- Tribal
- Parks & Public Lands

OWNERSHIP

- GRTA
- State
- Nonprofit
- Tribal
- Local

ENVIRONMENTAL

- Water

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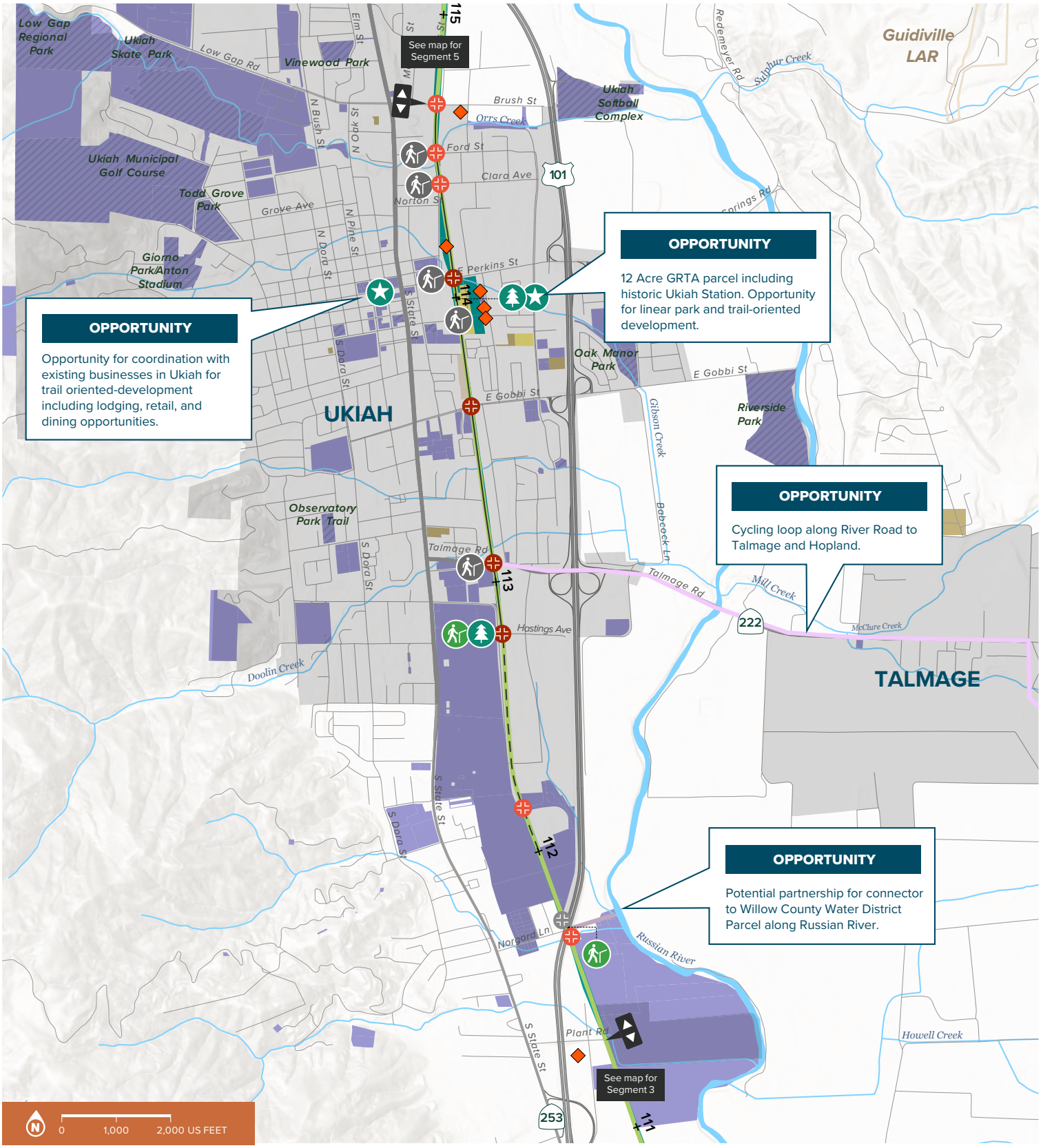

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NORTH UKIAH

Segment 5

SEGMENT EXTENTS
Brush St, Ukiah to Moore St, Calpella

COUNTY
Mendocino County

LENGTH
5.2 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE
Paved Multi-use Trail

PRIORITIZATION
Tier 1

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SEGMENT DETAILS
- Segment Breakpoint
- Design Concept
- \+ GRT Milepost

TRAIL TYPES
- Paved Trail
- Connector

TRAIL STATUS
- Existing

TRAIL AMENITIES*
Existing amenities
- Campground

Trailheads
- Community Gateway
- Community Trailhead
- Community Access Point

Potential Opportunity Sites
- Trail-Oriented Development
- Campground
- Parks / Rest Areas

INFRASTRUCTURE
Roadway Crossings**
- Crossing, Major Public
- Crossing, Minor Public
- Crossing, Private
- Underpass

Infrastructure Conditions***
- Bridge
- Hazardous Materials

BOUNDARIES
- City/Town/Place
- Tribal
- Parks & Public Lands

OWNERSHIP
- GRTA
- State
- Federal
- Nonprofit
- Tribal
- Local

ENVIRONMENTAL
- Water

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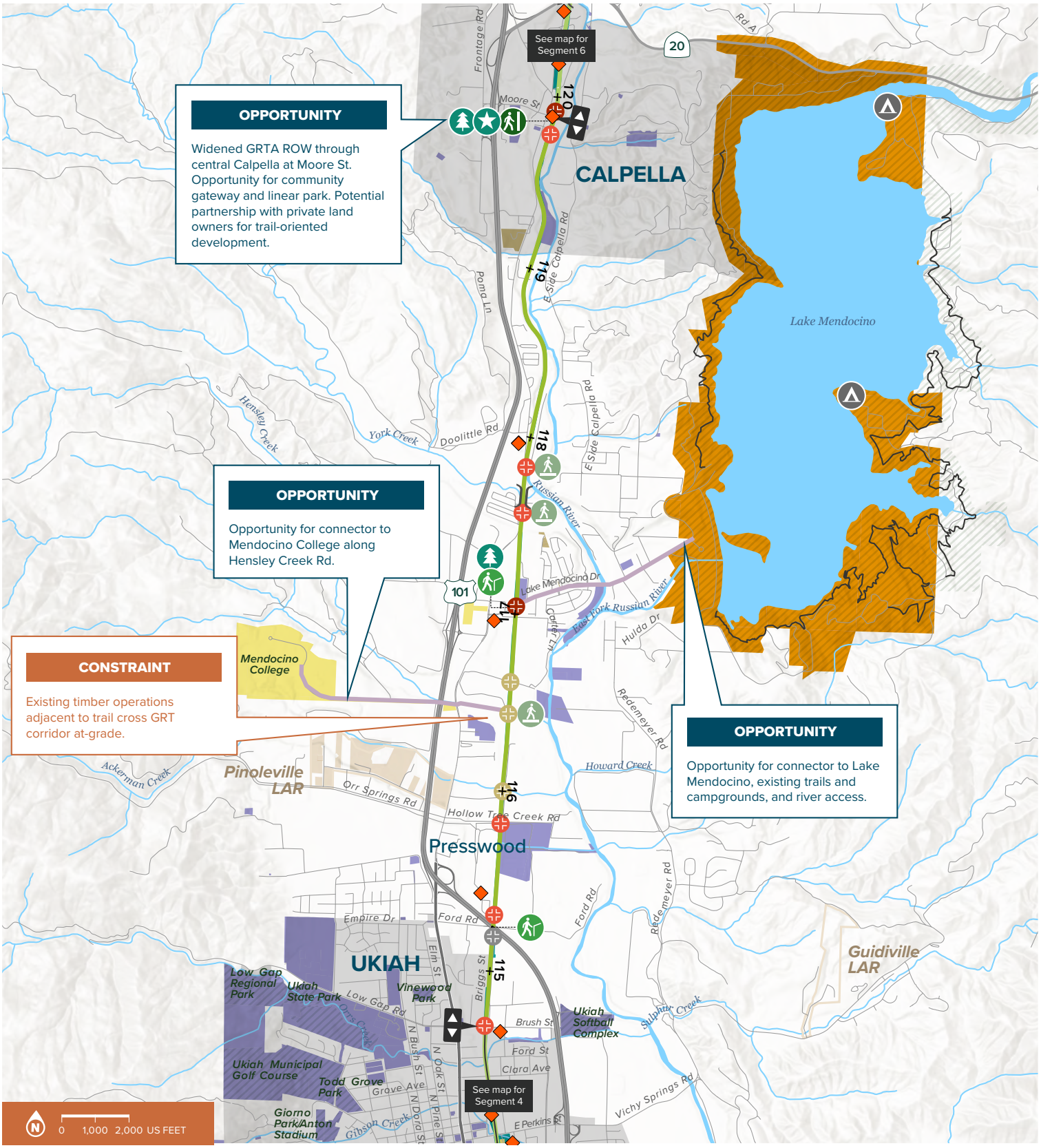

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REDWOOD VALLEY

Segment 6

SEGMENT EXTENTS

Moore St, Calpella to Laughlin Way, Redwood Valley

COUNTY

Mendocino County

LENGTH

4.1 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE

Paved Multi-use Trail

PRIORITIZATION

Tier 1

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SEGMENT DETAILS

- Segment Breakpoint
- Design Concept
- GRT Milepost

TRAIL TYPES

- Paved Trail
- Crushed Stone Trail

TRAIL STATUS

- Existing

TRAIL AMENITIES*

Trailheads

- Community Gateway
- Community Trailhead
- Community Access Point

Potential Opportunity Sites

- Trail-Oriented Development
- Creek Restoration
- Parks / Rest Areas

INFRASTRUCTURE

Roadway Crossings**

- Crossing, Major Public
- Crossing, Minor Public
- Crossing, Private
- Underpass

Infrastructure Conditions***

- Bridge
- Bridge, Damaged
- Hazardous Materials

BOUNDARIES

- City/Town/Place
- Tribal
- Parks & Public Lands

OWNERSHIP

- GRTA
- State
- Federal
- Nonprofit
- Tribal
- Local

ENVIRONMENTAL

- Water

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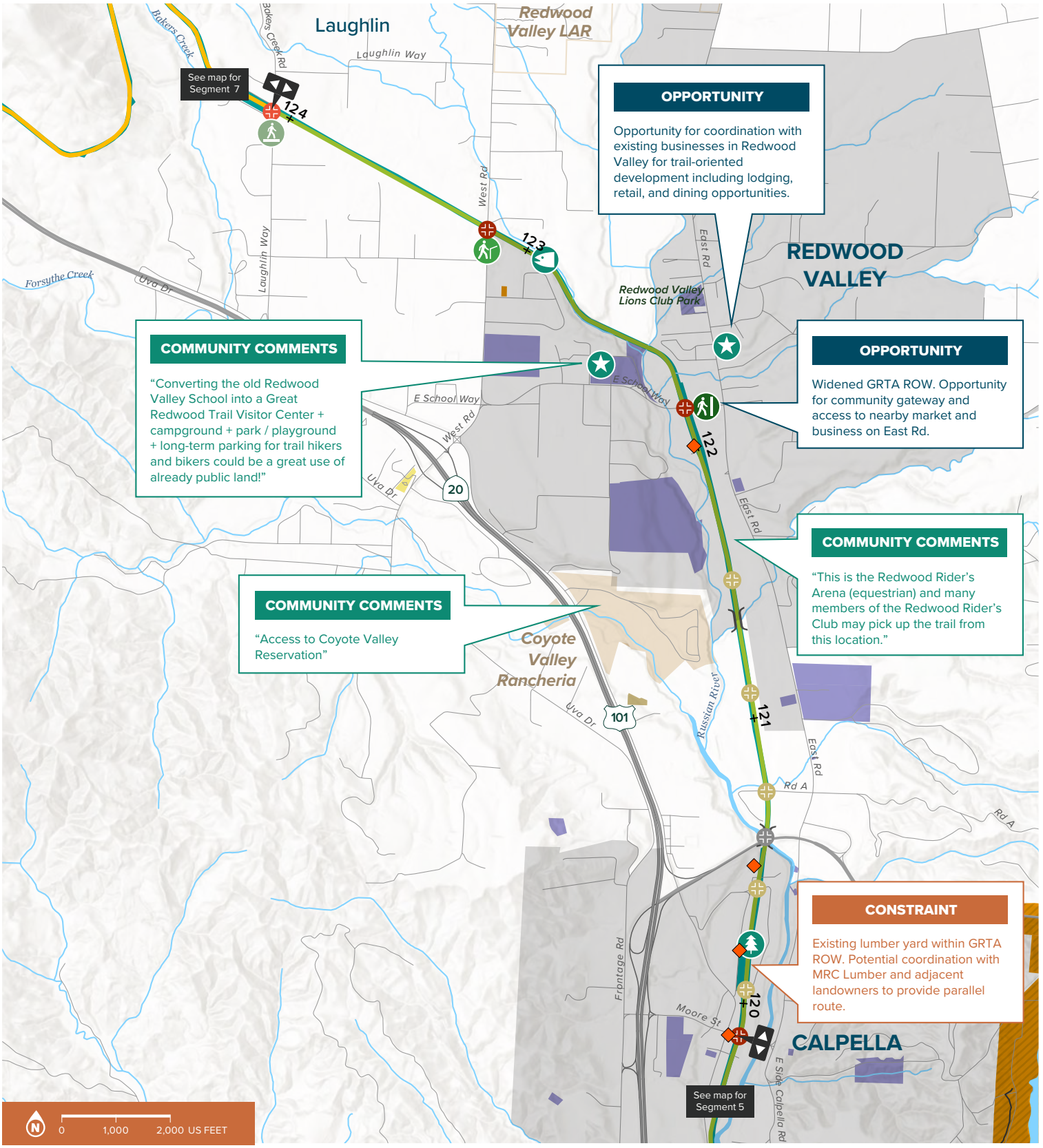

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LAUGHLIN GRADE

Segment 7

SEGMENT EXTENTS

Laughlin Way, Redwood Valley to Hwy 101, CAL FIRE Howard Station

COUNTY

Mendocino County

LENGTH

9.2 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE

Crushed Stone Multi-use Trail

PRIORITIZATION

Tier 2

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SEGMENT DETAILS

- Segment Breakpoint
- Design Concept
- GRT Milepost

TRAIL TYPES

- Paved Trail
- Crushed Stone Trail
- Connector

TRAIL AMENITIES*

Trailheads

- Community Gateway
- Community Trailhead
- Community Access Point

Opportunity Sites

- Campground
- Creek Restoration
- Parks / Rest Areas

INFRASTRUCTURE

Roadway Crossings**

- Crossing, Minor Public
- Crossing, Private
- Underpass

Infrastructure Conditions***

- Bridge, Damaged
- Geomorphic, Major
- Geomorphic, Minor

BOUNDARIES

- City/Town/Place
- Tribal
- Parks & Public Lands

OWNERSHIP

- GRTA
- State
- Federal
- Tribal
- Local

ENVIRONMENTAL

- Water

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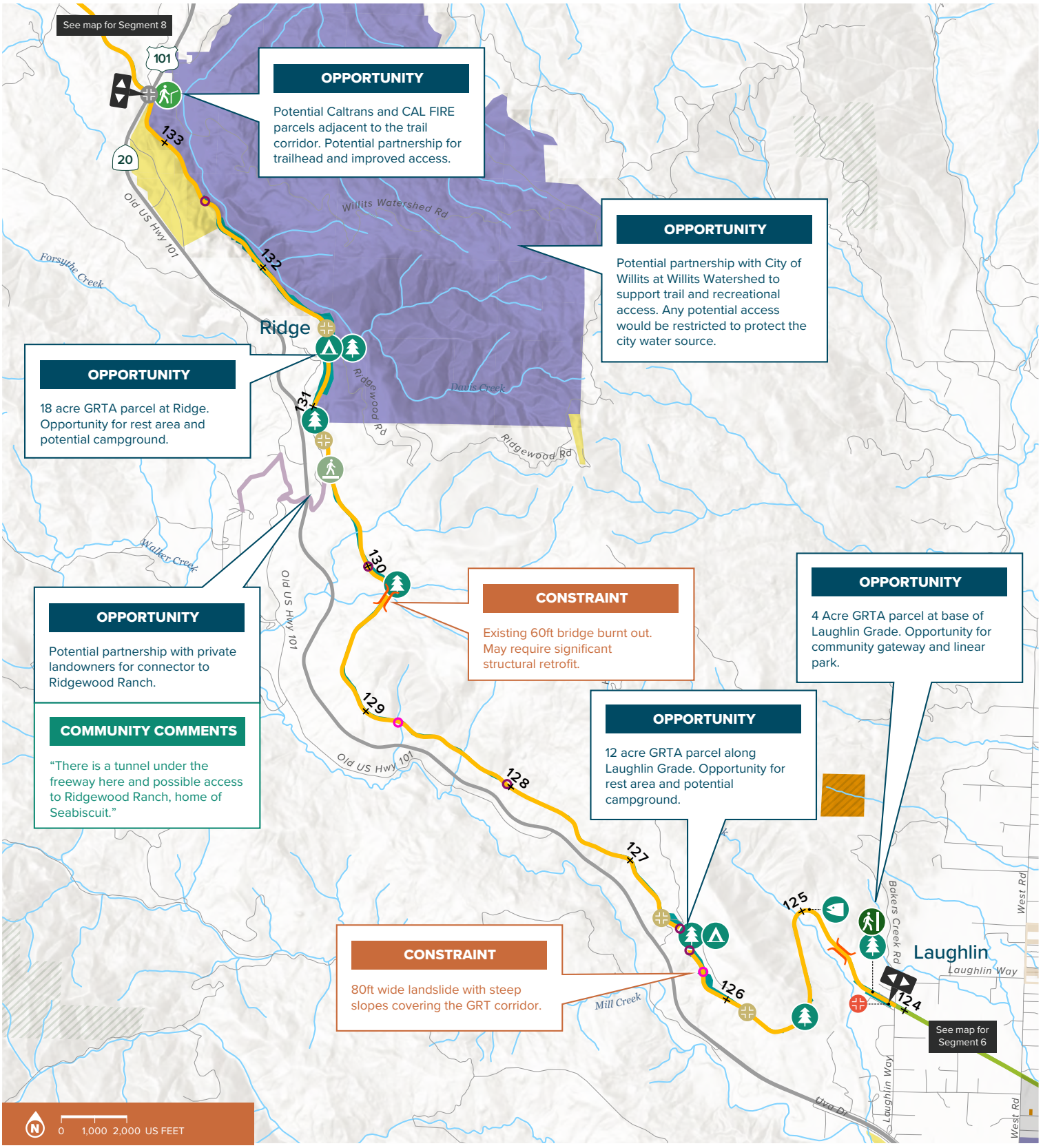

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SOUTH WILLITS

Segment 8

SEGMENT EXTENTS

Hwy 101, CAL FIRE Howard Station to East Hill Rd, Willits

COUNTY

Mendocino County

LENGTH

4.7 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE

Crushed Stone Multi-use Trail

PRIORITIZATION

Tier 1

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SEGMENT DETAILS

- Segment Breakpoint
- Design Concept
- GRT Milepost

TRAIL TYPES

- Paved Trail
- Crushed Stone Trail
- Connector

TRAIL STATUS

- Existing
- Planned

TRAIL AMENITIES*

Trailheads

- Community Trailhead
- Community Access Point

Potential Opportunity Sites

- Trail-Oriented Development
- Creek Restoration
- Parks / Rest Areas

INFRASTRUCTURE

Roadway Crossings**

- Crossing, Major Public
- Crossing, Private
- Underpass

Infrastructure Conditions***

- Bridge

BOUNDARIES

- City/Town/Place
- Parks & Public Lands

OWNERSHIP

- GRTA
- State
- Federal
- Local

ENVIRONMENTAL

- Water

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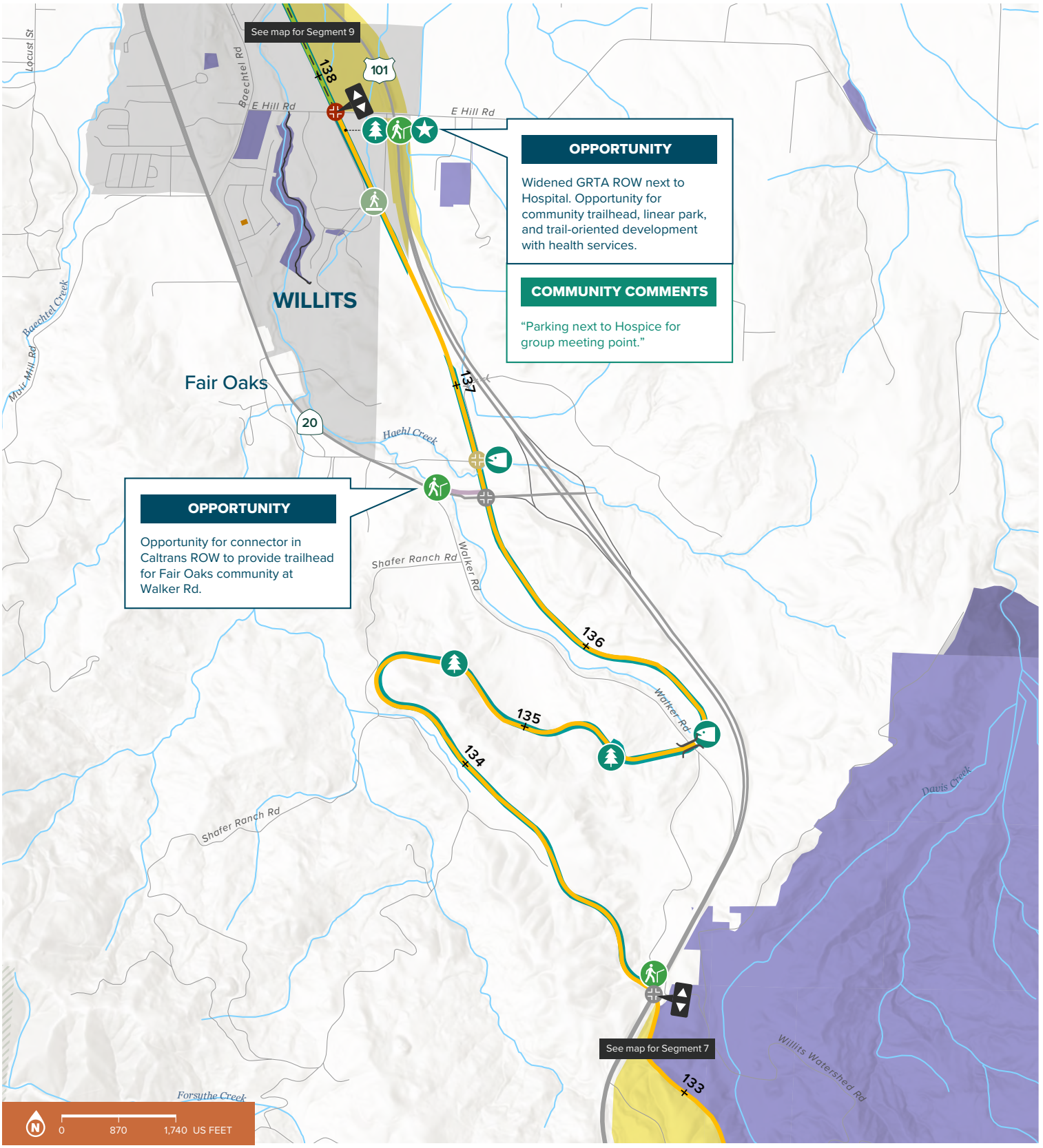

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WILLITS

Segment 9

SEGMENT EXTENTS

East Hill Rd, Willits to Commercial St, Willits

COUNTY

Mendocino County

LENGTH

1.6 Miles
Planned: 1.6 Miles
Existing: 0.0 Miles

TRAIL TYPE

Paved Multi-use Trail

PRIORITIZATION

Tier 1

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SEGMENT DETAILS

- Segment Breakpoint
- Design Concept
- GRT Milepost

TRAIL TYPES

- Paved Trail
- Crushed Stone Trail
- Connector

TRAIL STATUS

- Existing
- Planned

TRAIL AMENITIES*

Trailheads

- Community Gateway
- Community Access Point

Potential Opportunity Sites

- Trail-Oriented Development
- Creek Restoration

INFRASTRUCTURE

Roadway Crossings**

- Crossing, Major Public
- Crossing, Minor Public
- Crossing, Private

Infrastructure Conditions***

- Rail Debris
- Hazardous Materials

BOUNDARIES

- City/Town/Place
- Tribal
- Parks & Public Lands

OWNERSHIP

- GRTA
- State
- Tribal
- Local

ENVIRONMENTAL

- Water

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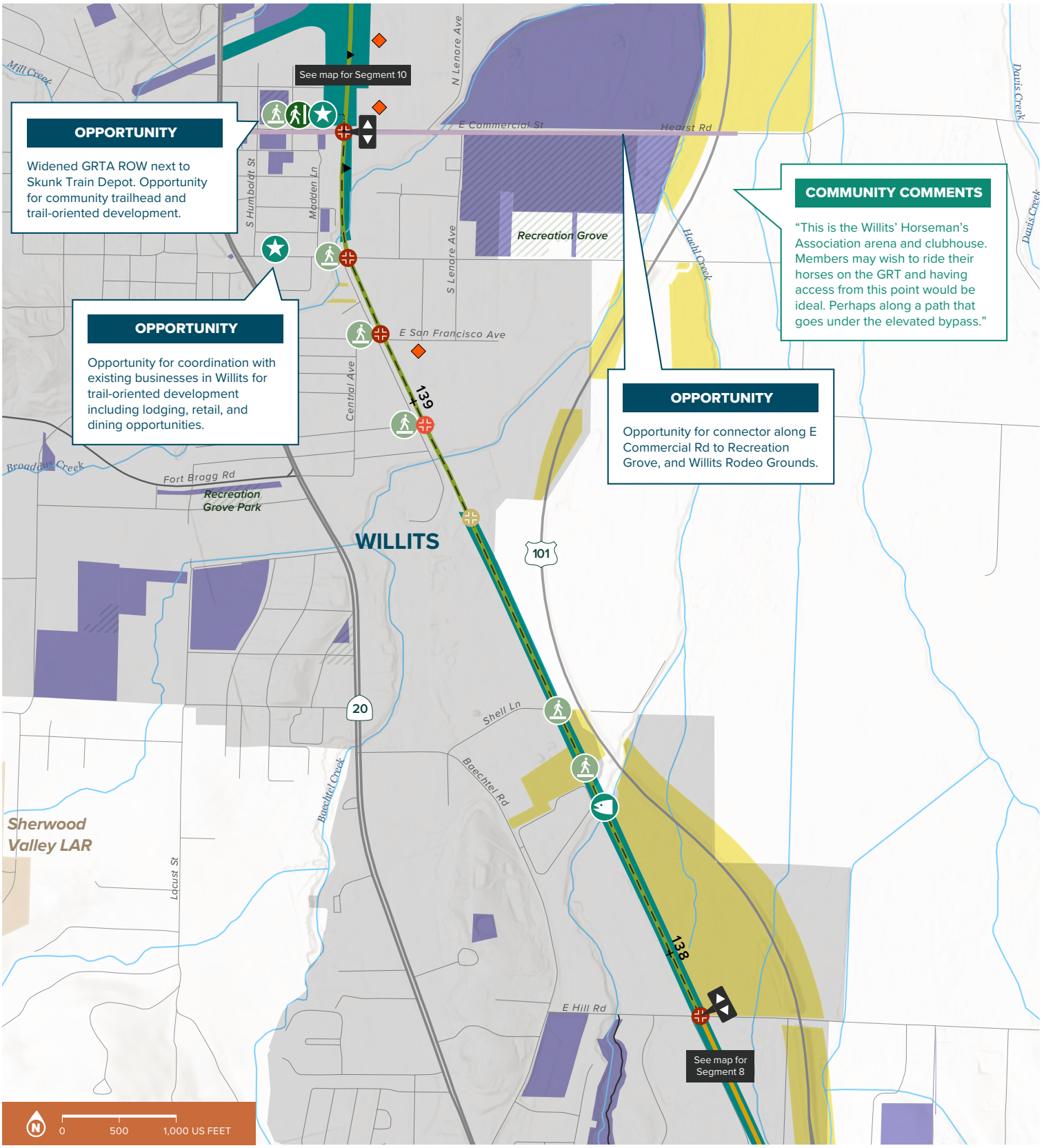

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NORTH WILLITS

Segment 10

SEGMENT EXTENTS

Commercial St, Willits to Hwy 101, Outlet Creek Split

COUNTY

Mendocino County

LENGTH

3.7 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE

Paved Multi-Use Trail

PRIORITIZATION

Tier 1

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SEGMENT DETAILS

- Segment Breakpoint
- Design Concept
- GRT Milepost

TRAIL TYPES

- Paved Trail
- Crushed Stone Trail
- Connector

TRAIL STATUS

- Existing
- Planned

TRAIL AMENITIES*

Trailheads

- Community Gateway
- Community Trailhead

Potential Opportunity Sites

- Parks / Rest Areas

INFRASTRUCTURE

Roadway Crossings**

- Crossing, Highway
- Crossing, Major Public
- Crossing, Minor Public
- Crossing, Private
- Underpass

Infrastructure Conditions***

- Bridge
- Bride, Damaged
- Rail Debris
- Hazardous Materials

BOUNDARIES

- City/Town/Place
- Parks & Public Lands

OWNERSHIP

- GRTA
- State
- Local

ENVIRONMENTAL

- Water

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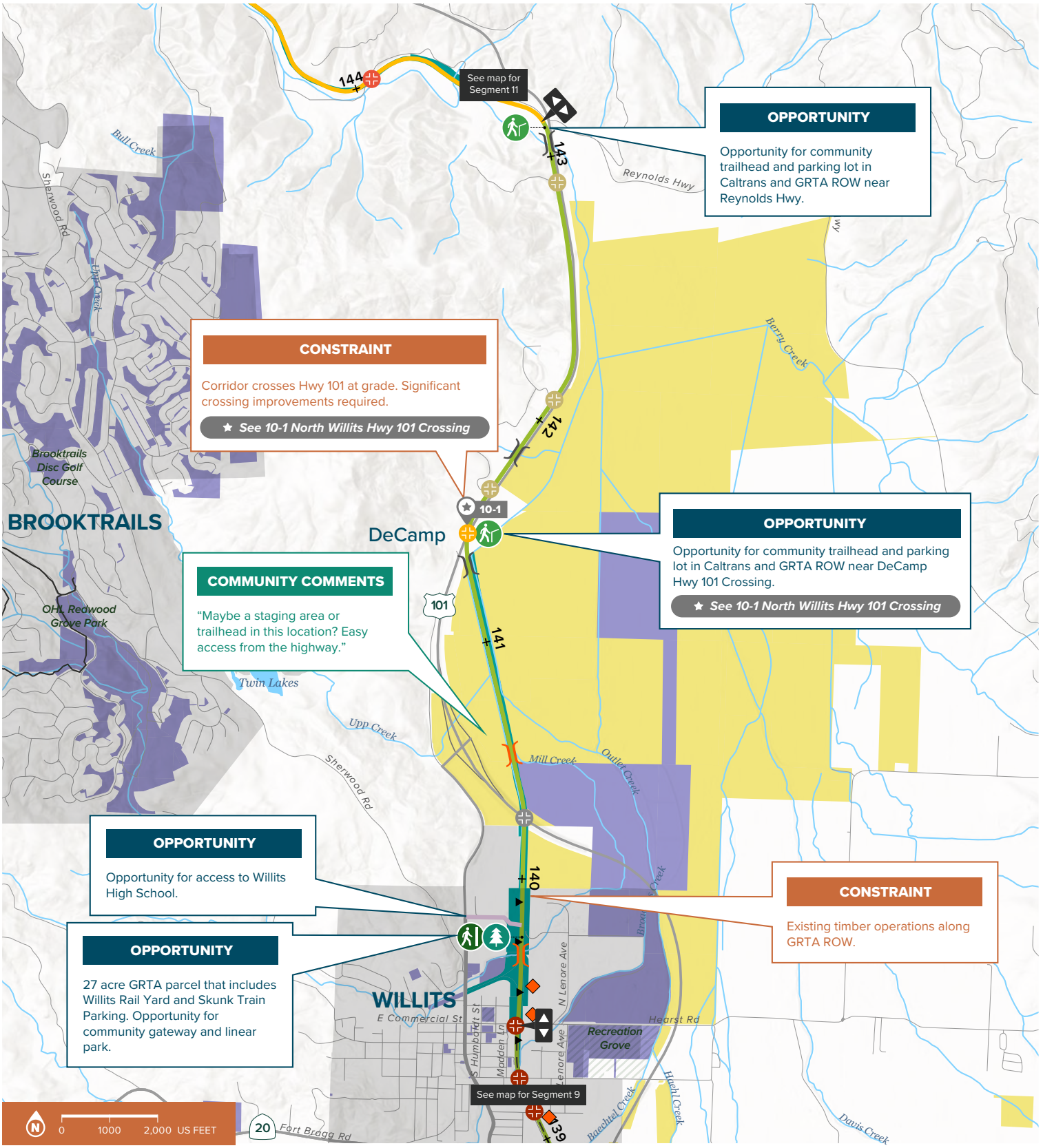

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10-1 North Willits Hwy 101 Crossing

PRELIMINARY DESIGN ALTERNATIVES

The GRT corridor crosses HWY 101 at-grade north of Willits. The crossing location is an opportunity for a community trailhead and parking lot in GRTA and Caltrans right-of-way.

A total of two design alternatives were considered:

- At-grade crossing with Rectangular Rapid Flashing Beacon (RRFB)
- Bicycle/pedestrian Bridge over Hwy 101

ALTERNATIVE A – AT GRADE CROSSING

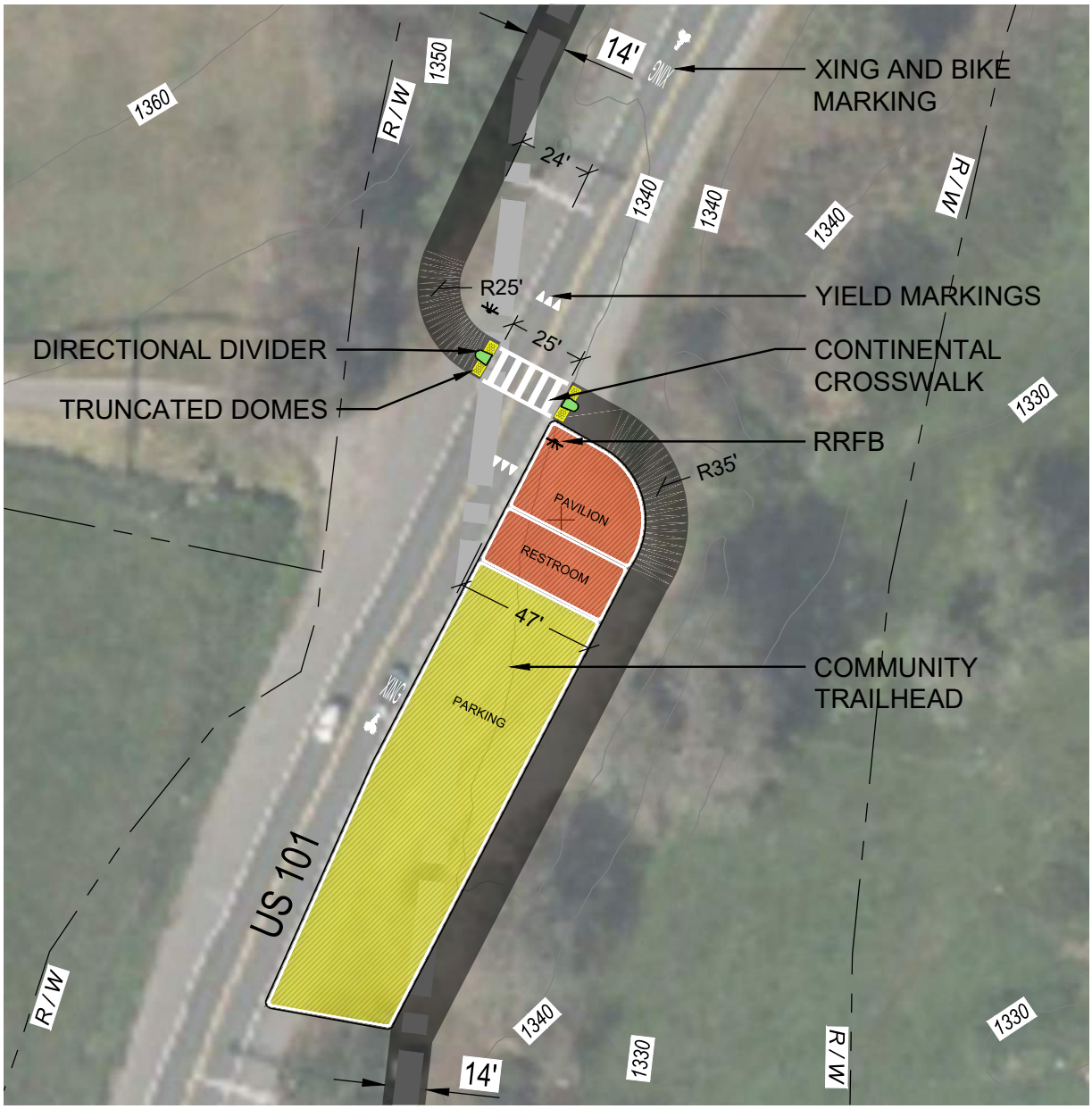
This alternative consists of an at-grade crossing of HWY 101 north of a proposed new community trailhead and parking area. RRFBs and high-visibility cross walk striping will be installed to control traffic.

PROS	CHALLENGES
Minimal new crossing infrastructure required	Dangerous during high volume vehicular traffic periods
Cost efficient	Not an all ages and abilities crossing treatment
Ease of installation	

ALTERNATIVE B – BICYCLE AND PEDESTRIAN OVERCROSSING

This alternative consists of installing a new bicycle and pedestrian overcrossing of HWY 101

PROS	CHALLENGES
All ages and abilities facilities and safest crossing alternative	Very high implementation costs
Potential to be a signature architectural feature for the Great Redwood Trail and the region	Significant level of oversight and coordination with Caltrans
	Lengthy design and construction schedules



LEGEND:

- EXISTING RAIL BED
- GREAT REDWOOD TRAIL, PAVED
- TRAILHEAD AMENITIES
- TRAILHEAD RECREATION SPACES
- TRAILHEAD ACCESS IMPROVEMENTS
- TRAILHEAD PARKING

NOTE: DESIGN INTENT TO REDUCE IMPERVIOUS SURFACES

0 50' 100'

Scale: 1" = 50'

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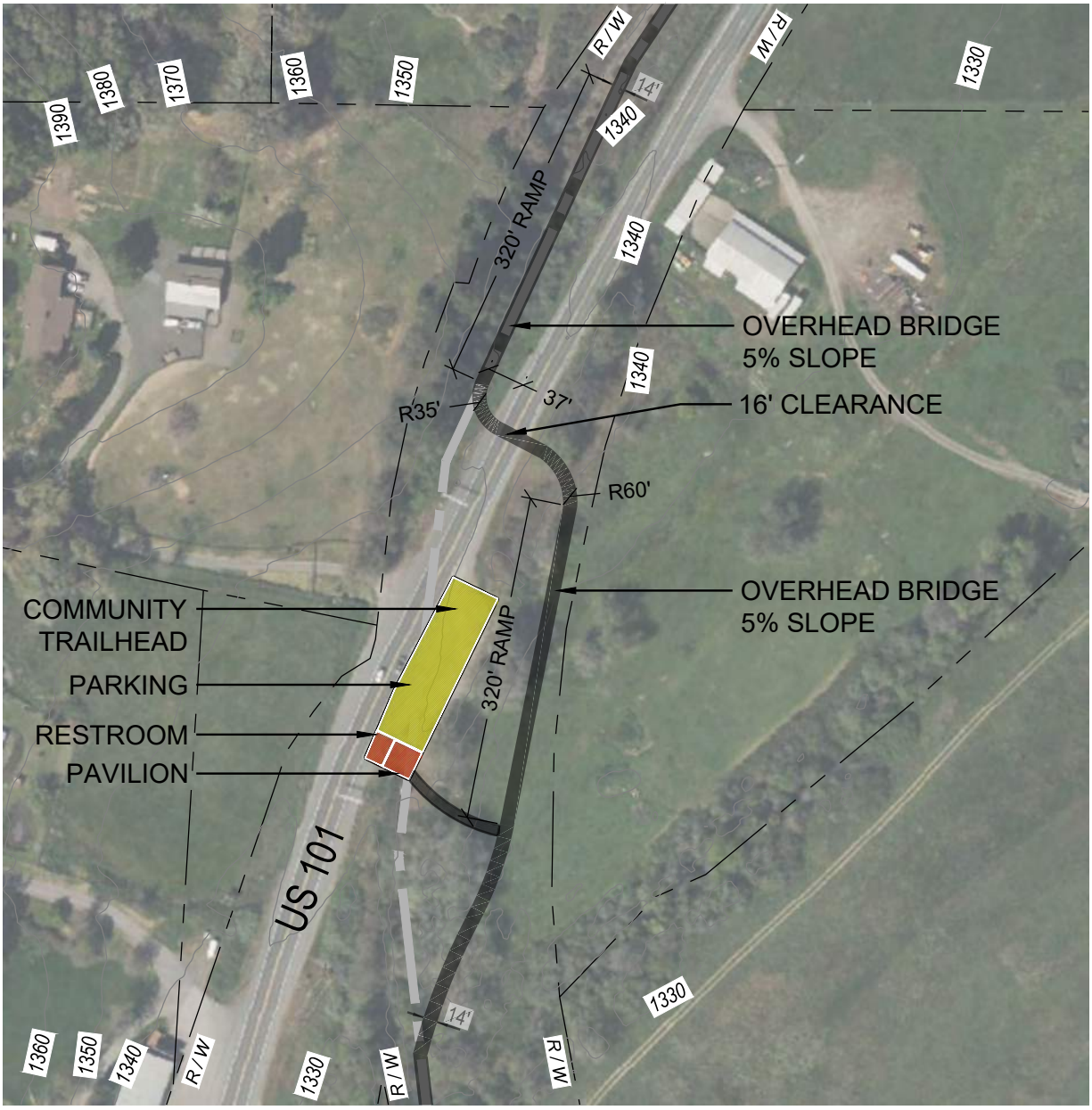
GREAT REDWOOD TRAIL MASTER PLAN
NORTH WILLITS - ALTERNATIVE A

MM 141.5

FIGURE 1

Dwg filename: N:\Shared\PROJECTS\2022\00-2022-180 CA Great Redwood Trail Master Plan\CAD\02_Exhibits\MM141.5-Z2-North Willits\22-180_EXH_WIL101-ALT_A.dwg Last saved by: katrinaortiz Plot date: 1/23/2024 4:54 PM Plotstyle table: ALTA NCS Standard.stb



LEGEND:

- EXISTING RAIL BED
- GREAT REDWOOD TRAIL, PAVED
- TRAILHEAD AMENITIES
- TRAILHEAD RECREATION SPACES
- TRAILHEAD ACCESS IMPROVEMENTS
- TRAILHEAD PARKING

NOTE: DESIGN INTENT TO REDUCE IMPERVIOUS SURFACES

0 150' 300'

Scale: 1" = 150'

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GREAT REDWOOD TRAIL MASTER PLAN
NORTH WILLITS - ALTERNATIVE B

MM 141.5

FIGURE 2

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OUTLET CREEK CANYON

Segment 11

SEGMENT EXTENTS
Hwy 101, Outlet Creek Split to SR 162, Longvale

COUNTY
Mendocino County

LENGTH
9.0 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE
Crushed Stone Multi-use Trail

PRIORITIZATION
Tier 3

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SEGMENT DETAILS
- Segment Breakpoint
- Design Concept
- \+ GRT Milepost

TRAIL TYPES
- Paved Trail
- Crushed Stone Trail
- Connector

TRAIL AMENITIES*
Existing Amenities
- Campground
- Restroom

Trailheads
- Community Trailhead
- Backcountry Trailhead
- Backcountry Access Point

Potential Opportunity Sites
- Campground
- Parks / Rest Areas

INFRASTRUCTURE
Roadway Crossings**
- Crossing, Highway
- Crossing, Minor Public
- Crossing, Private
- Underpass

Infrastructure Conditions***
- Bridge
- Bridge, Damaged
- Tunnel
- ▲ Rail Debris

BOUNDARIES
- City/Town/Place
- Parks & Public Lands

OWNERSHIP
- GRTA
- State
- Nonprofit
- Local

ENVIRONMENTAL
- Water

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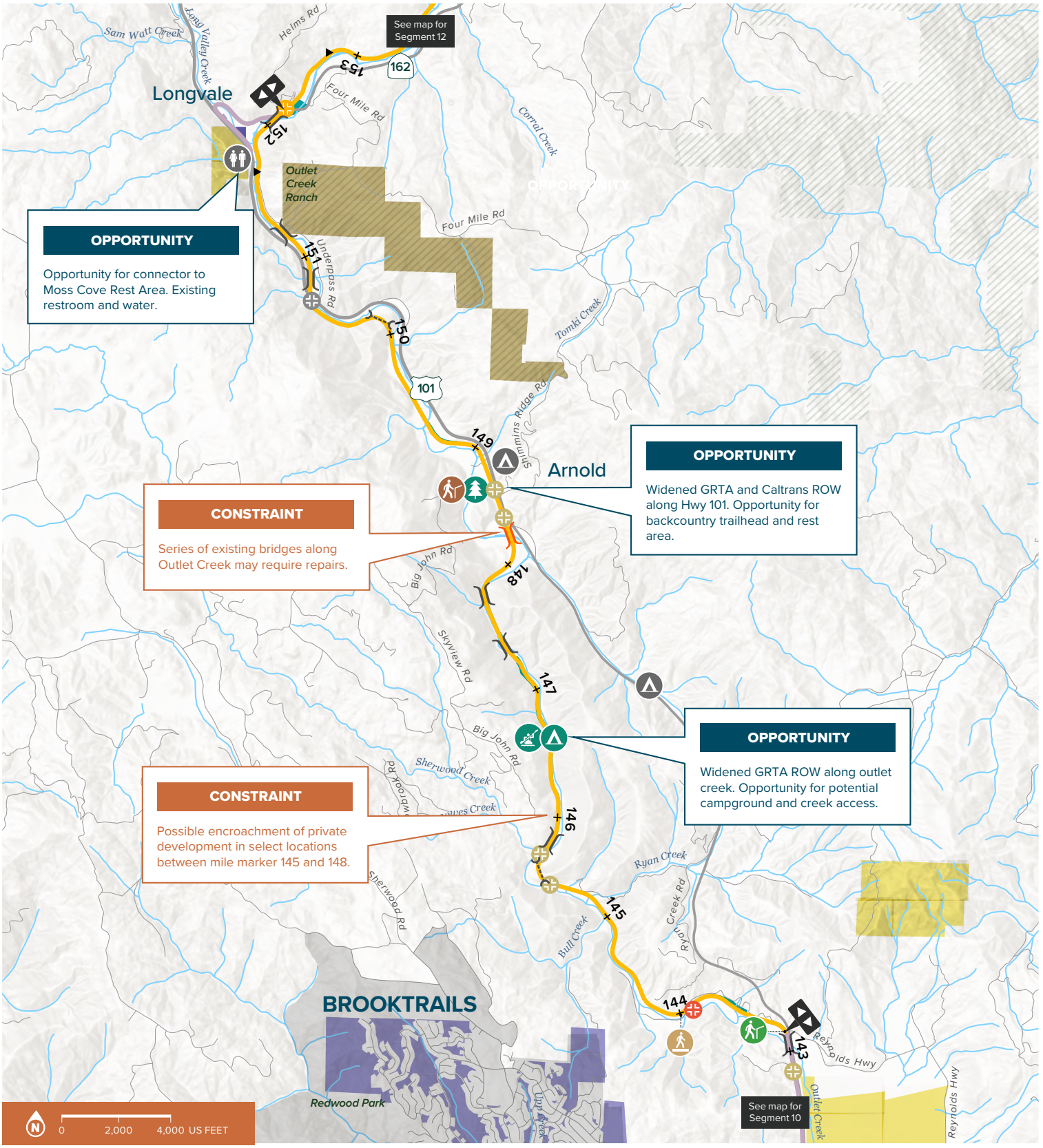

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LONGVALE TO FARLEY

Segment 12

SEGMENT EXTENTS

SR 162, Longvale to Farley Station

COUNTY

Mendocino County

LENGTH

6.1 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE

Crushed Stone Multi-use Trail

PRIORITIZATION

Tier 3

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SEGMENT DETAILS

- Segment Breakpoint
- Design Concept
- \+ GRT Milepost

TRAIL TYPES

- Crushed Stone Trail
- Parallel Route

TRAIL AMENITIES*

Trailheads

- Backcountry Trailhead
- Backcountry Access Point

Potential Opportunity Sites

- Campground
- Parks / Rest Areas

INFRASTRUCTURE

Roadway Crossings**

- Crossing, Highway
- Crossing, Private

Infrastructure Conditions***

- Geomorphic, Major
- Bridge
- Bridge, Damaged
- Tunnel, Damaged
- ▲ Rail Debris

BOUNDARIES

- Parks & Public Lands

OWNERSHIP

- GRTA
- State
- Nonprofit
- Local

ENVIRONMENTAL

- Water

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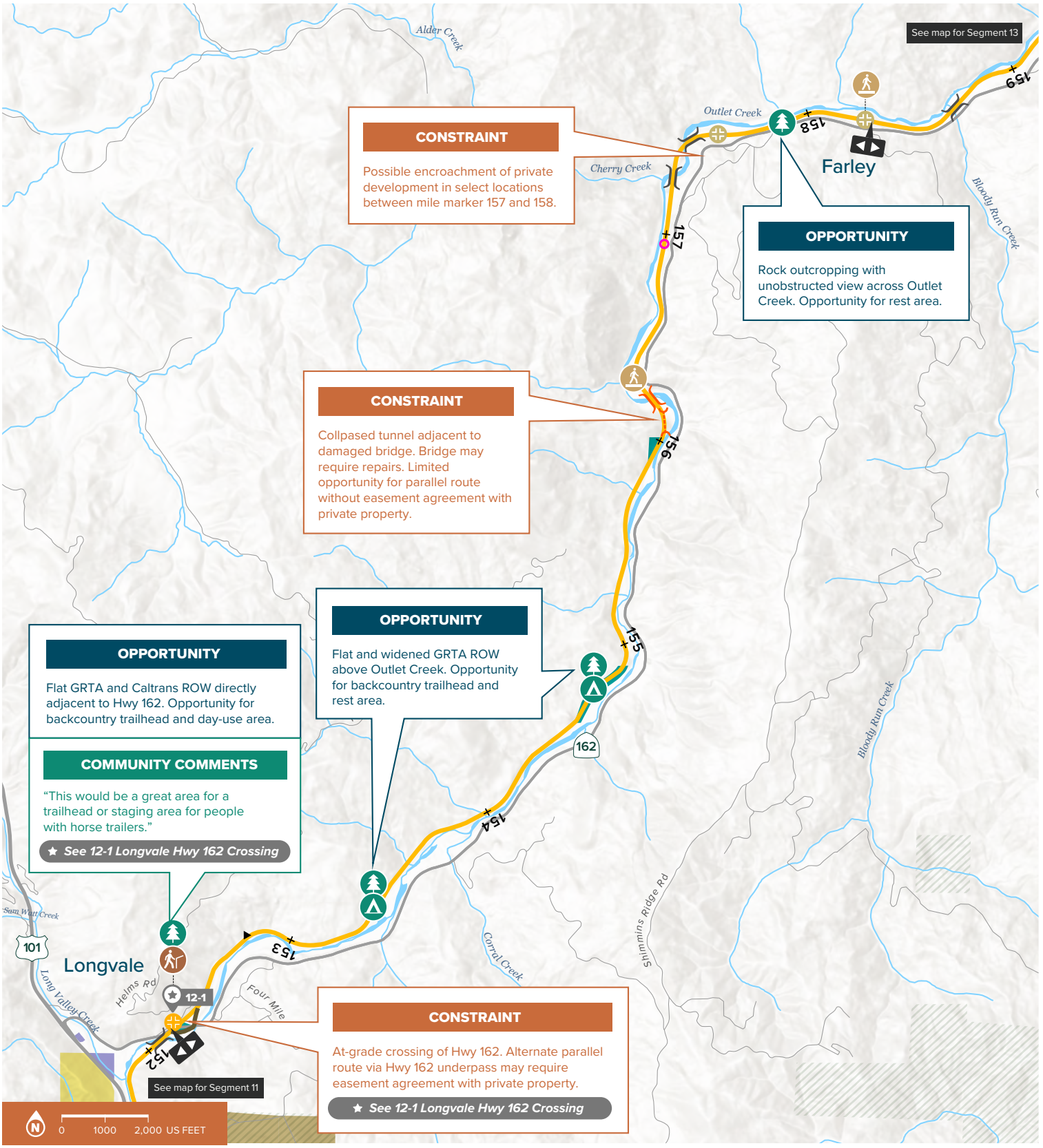

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12-1 Longvale Hwy 162 Crossing

LEGEND:

- EXISTING RAIL BED
- GREAT REDWOOD TRAIL, CRUSHED STONE
- TRAILHEAD AMENITIES
- TRAILHEAD RECREATION SPACES
- TRAILHEAD ACCESS IMPROVEMENTS
- TRAILHEAD PARKING

NOTE: DESIGN INTENT TO REDUCE IMPERVIOUS SURFACES.
RIGHT-OF-WAY IS APPROXIMATE

0 50' 100'
Scale: 1" = 50'

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GREAT REDWOOD TRAIL MASTER PLAN
LONGVALE TO FARLEY

MM 152.15

FIGURE 3

Dwg filename: N:\Shared\PROJECTS\2022\100-2022-180 CA Great Redwood Trail Master Plan\CAD\02_Exhibits\MM152.15-Z2-Longvale to Farley\22-180_EXH_LONFAR.dwg Last saved by: katrinaortiz Plot date: 1/23/2024 4:55 PM Plotstyle table: ALTA NCS Standard.stb

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FARLEY TO DOS RIOS

Segment 13

SEGMENT EXTENTS

Farley Station to Laytonville Dos Rios Rd, Dos Rios

COUNTY

Mendocino County

LENGTH

8.3 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE

Crushed Stone Multi-use Trail

PRIORITIZATION

Tier 3

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SEGMENT DETAILS

- Segment Breakpoint
- Design Concept
- \+ GRT Milepost

TRAIL TYPES

- Crushed Stone Trail
- Backcountry Trail
- Connector

TRAIL AMENITIES*

Existing Amenities

- River Access

Trailheads

- Backcountry Trailhead
- Backcountry Access Point

Potential Opportunity Sites

- Campground
- River Access
- Parks / Rest Areas
- Creek Restoration

INFRASTRUCTURE

Roadway Crossings**

- Crossing, Private
- Underpass

Infrastructure Conditions***

- Geomorphic, Major
- Bridge
- Bridge, Damaged
- Tunnel
- Tunnel, Damaged
- Hazardous Materials

BOUNDARIES

- Parks & Public Lands

OWNERSHIP

- GRTA
- Federal
- Local

ENVIRONMENTAL

- Water

*All amenities are potential opportunities for planning purposes only.

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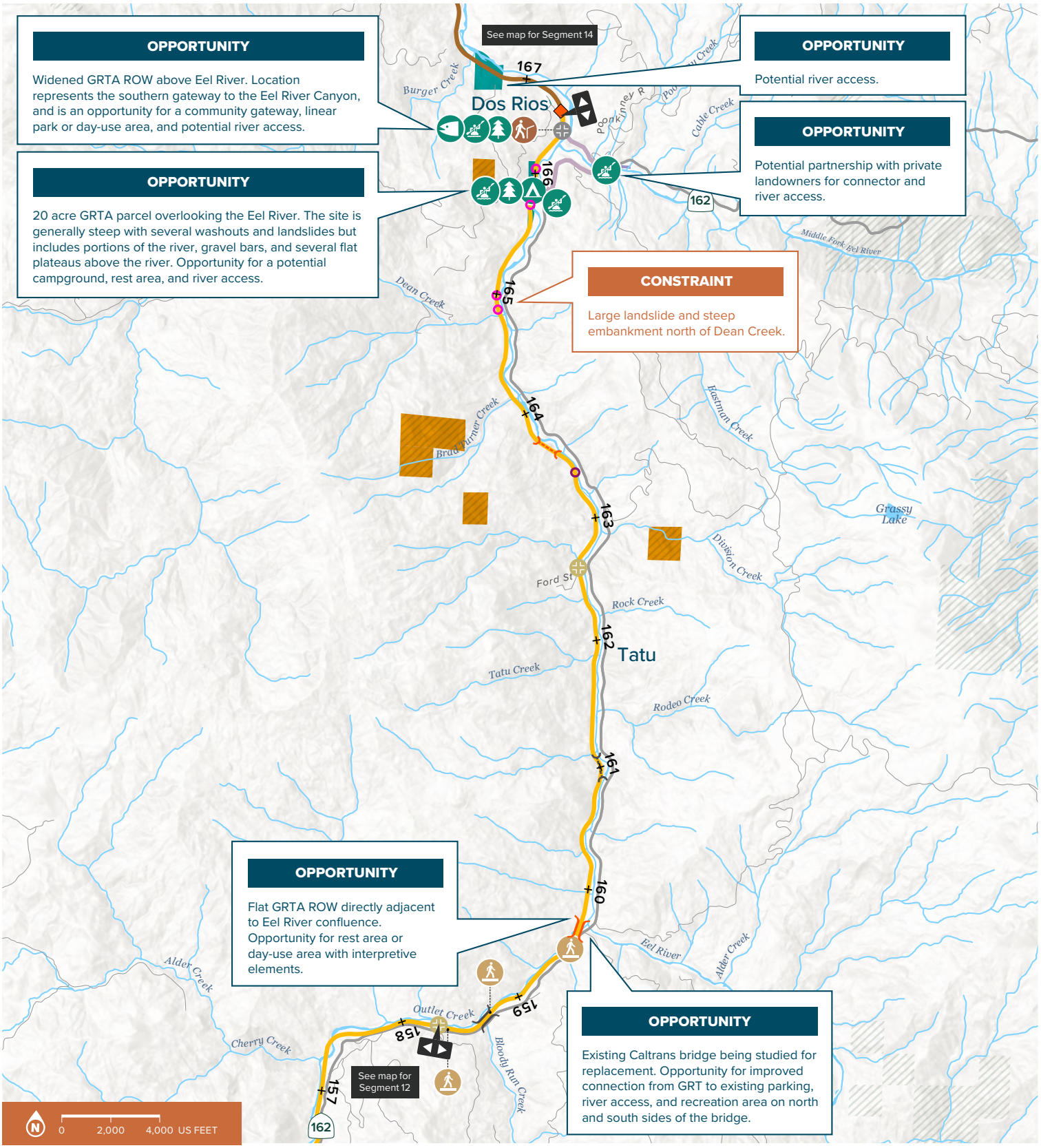

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WOODMAN CREEK

Segment 14

SEGMENT EXTENTS
Dos Rios to Woodman Creek Rd

COUNTY
Mendocino County

LENGTH
4.7 Miles

TRAIL TYPE
Backcountry Trail

PRIORITIZATION
Tier 3

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SEGMENT DETAILS
- Segment Breakpoint
- Design Concept
- \+ GRT Milepost

TRAIL TYPES
- Crushed Stone Trail
- Backcountry Trail
- Connector

TRAIL AMENITIES*
Trailheads
- Backcountry Trailhead

Potential Opportunity Sites
- Campground
- River Access

INFRASTRUCTURE
Roadway Crossings**
- Crossing, Private
- Underpass

Infrastructure Conditions***
- Geomorphic, Major
- Geomorphic, Minor
- Bridge
- Tunnel, Damaged
- Hazardous Materials

BOUNDARIES
- Parks & Public Lands

OWNERSHIP
- GRTA
- Federal
- Local

ENVIRONMENTAL
- Water

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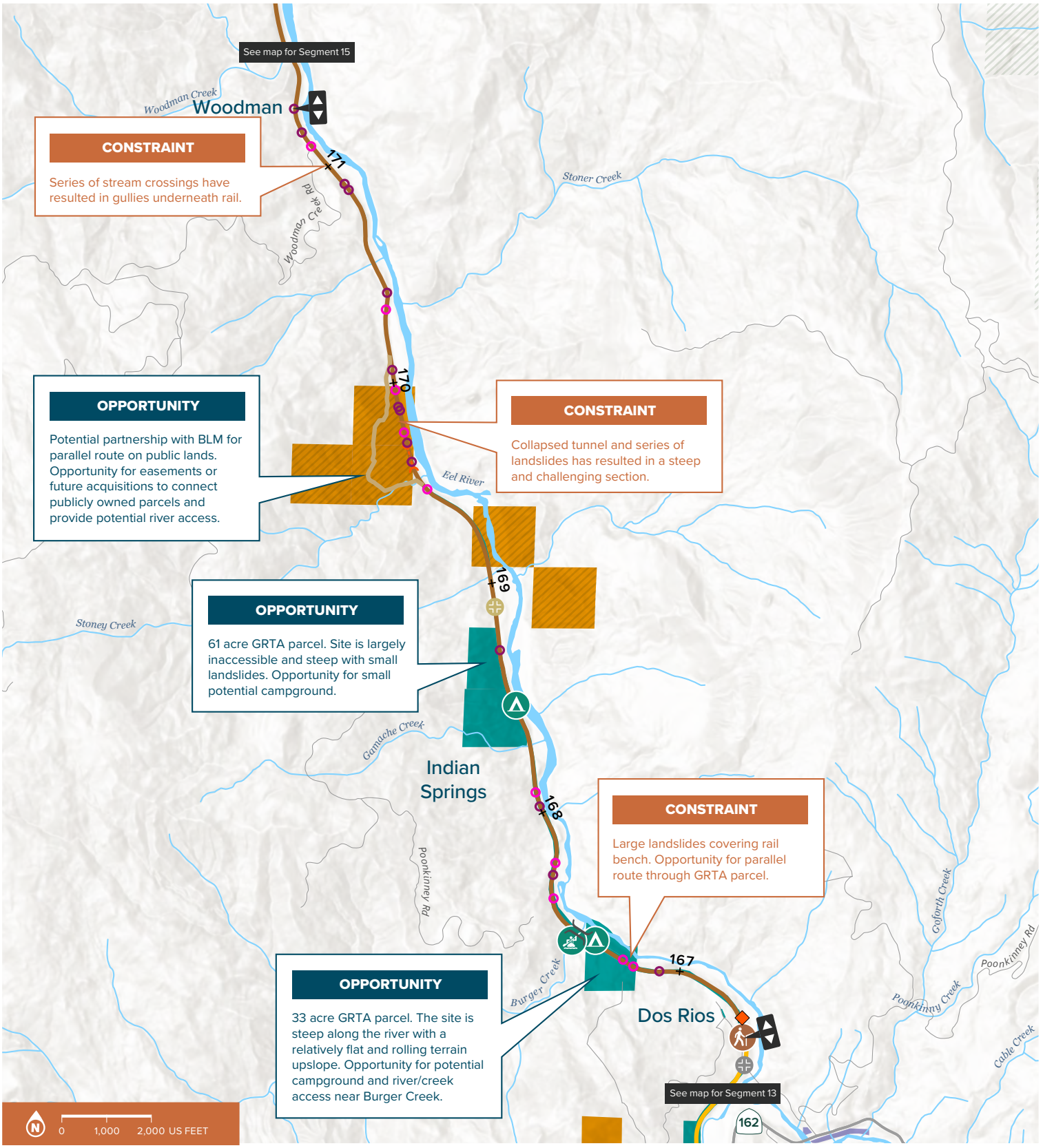

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WOODMAN CREEK TO SHELLROCK CREEK

Segment 15

SEGMENT EXTENTS
Woodman Creek Rd to Shell Rock Creek

COUNTY
Mendocino County

LENGTH
7.1 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE
Backcountry Trail

PRIORITIZATION
Tier 3

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SEGMENT DETAILS
- Segment Breakpoint
- Design Concept
- \+ GRT Milepost

TRAIL TYPES
- Backcountry Trail
- Parallel Route

TRAIL AMENITIES*
Potential Opportunity Sites
- Campground
- River Access
- Parks / Rest Areas
- Creek Restoration

INFRASTRUCTURE
Infrastructure Conditions***
- Geomorphic, Major
- Geomorphic, Minor
- Bridge
- Tunnel, Damaged
- Rail Debris
- Hazardous Materials

BOUNDARIES
- City/Town/Place
- Tribal
- Parks & Public Lands

OWNERSHIP
- GRTA
- Federal
- Nonprofit
- Tribal

ENVIRONMENTAL
- Water

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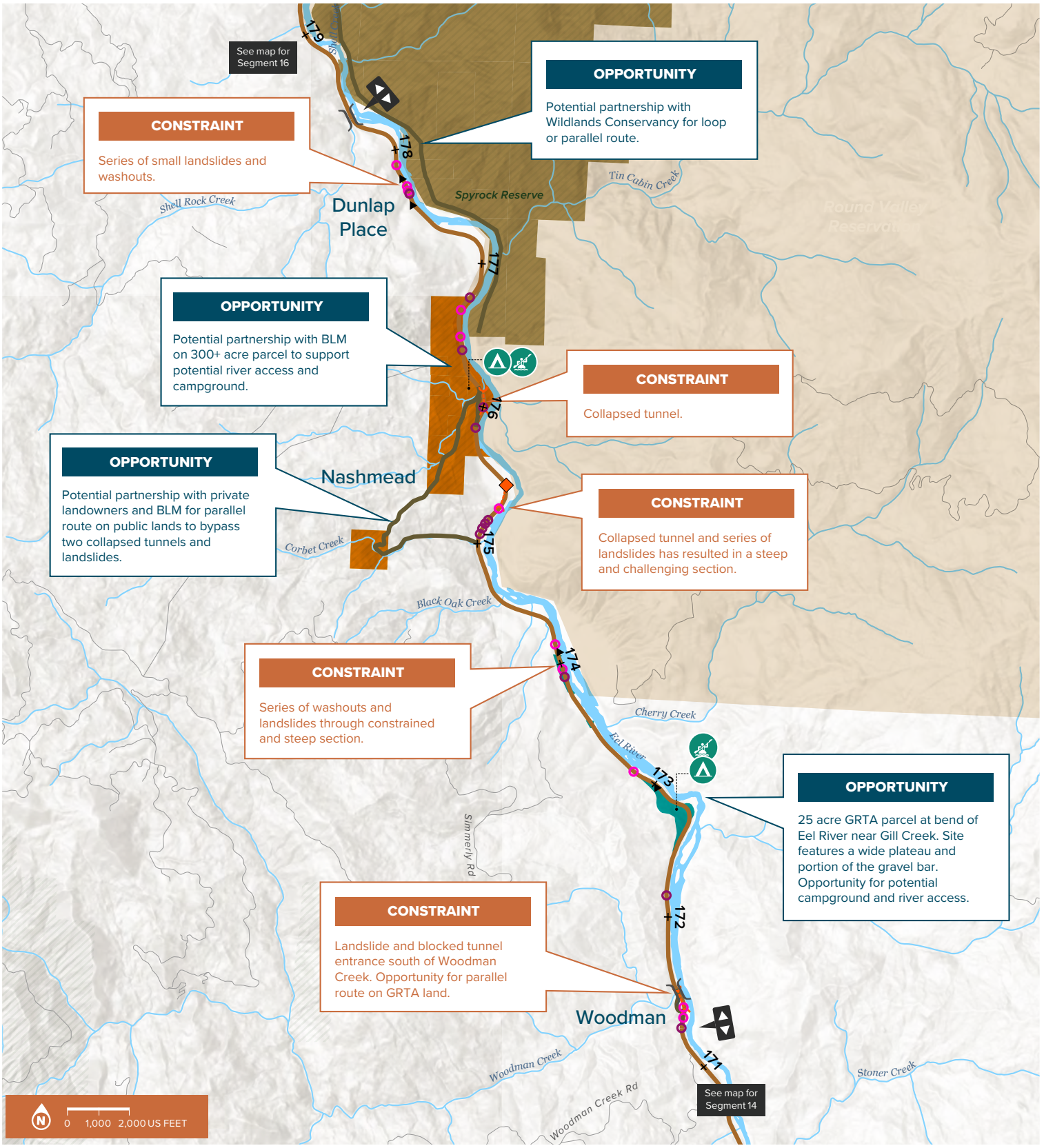

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SPYROCK

Segment 16

SEGMENT EXTENTS

Shell Rock Creek to Blue Rock Creek

COUNTY

Mendocino County

LENGTH

4.6 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE

Backcountry Trail

PRIORITIZATION

Tier 3

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SEGMENT DETAILS

- Segment Breakpoint
- Design Concept
- GRT Milepost

TRAIL TYPES

- Backcountry Trail
- Parallel Route

TRAIL AMENITIES*

Potential Opportunity Sites

- Trail-Oriented Development
- Campground

INFRASTRUCTURE

Infrastructure Conditions**

- Geomorphic, Major
- Geomorphic, Minor
- Bridge
- Tunnel
- Tunnel, Damaged
- Rail Debris
- Hazardous Materials

BOUNDARIES

- Tribal
- Parks & Public Lands

OWNERSHIP

- GRTA
- Federal
- Nonprofit
- Tribal

ENVIRONMENTAL

- Water

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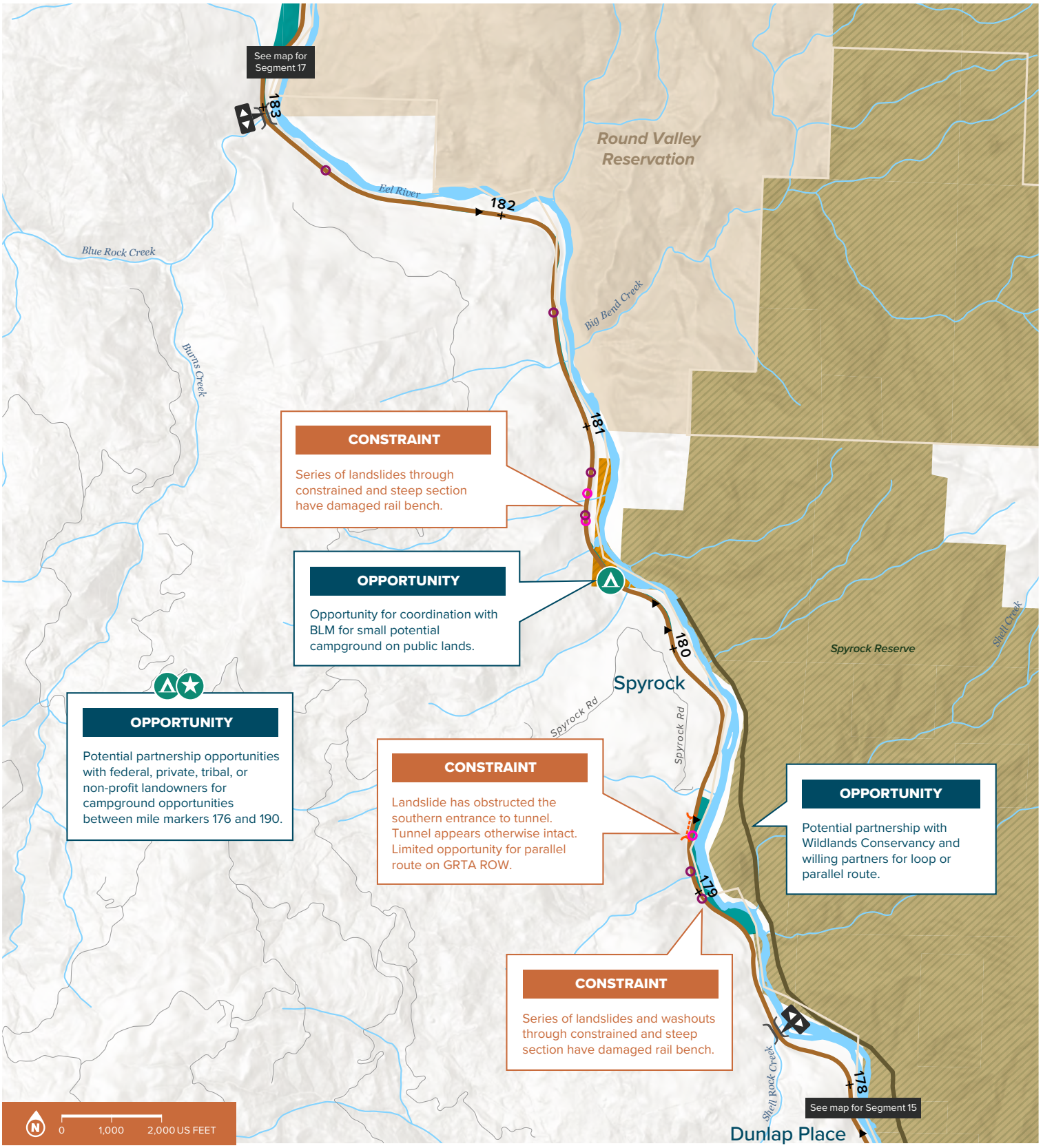

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SHELL ROCK TO ISLAND MOUNTAIN

Segment 17

SEGMENT EXTENTS
Blue Rock Creek to Island Mountain Rd

COUNTY
Mendocino/Trinity County

LENGTH
11.7 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE
Backcountry Trail

PRIORITIZATION
Tier 3

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SEGMENT DETAILS
- Segment Breakpoint
- Design Concept
- \+ GRT Milepost

TRAIL TYPES
- Backcountry Trail

TRAIL AMENITIES*
Trailheads
- Backcountry Trailhead
- Backcountry Access Point

Potential Opportunity Sites
- Campground
- River Access
- Creek Restoration

INFRASTRUCTURE
Roadway Crossings**
- Crossing, Private

Infrastructure Conditions***
- Geomorphic, Major
- Geomorphic, Minor
- Bridge
- Tunnel
- Tunnel, Damaged
- Rail Debris
- Hazardous Materials

BOUNDARIES
- Tribal
- Parks & Public Lands

OWNERSHIP
- GRTA
- Federal
- Nonprofit
- Tribal

ENVIRONMENTAL
- Water

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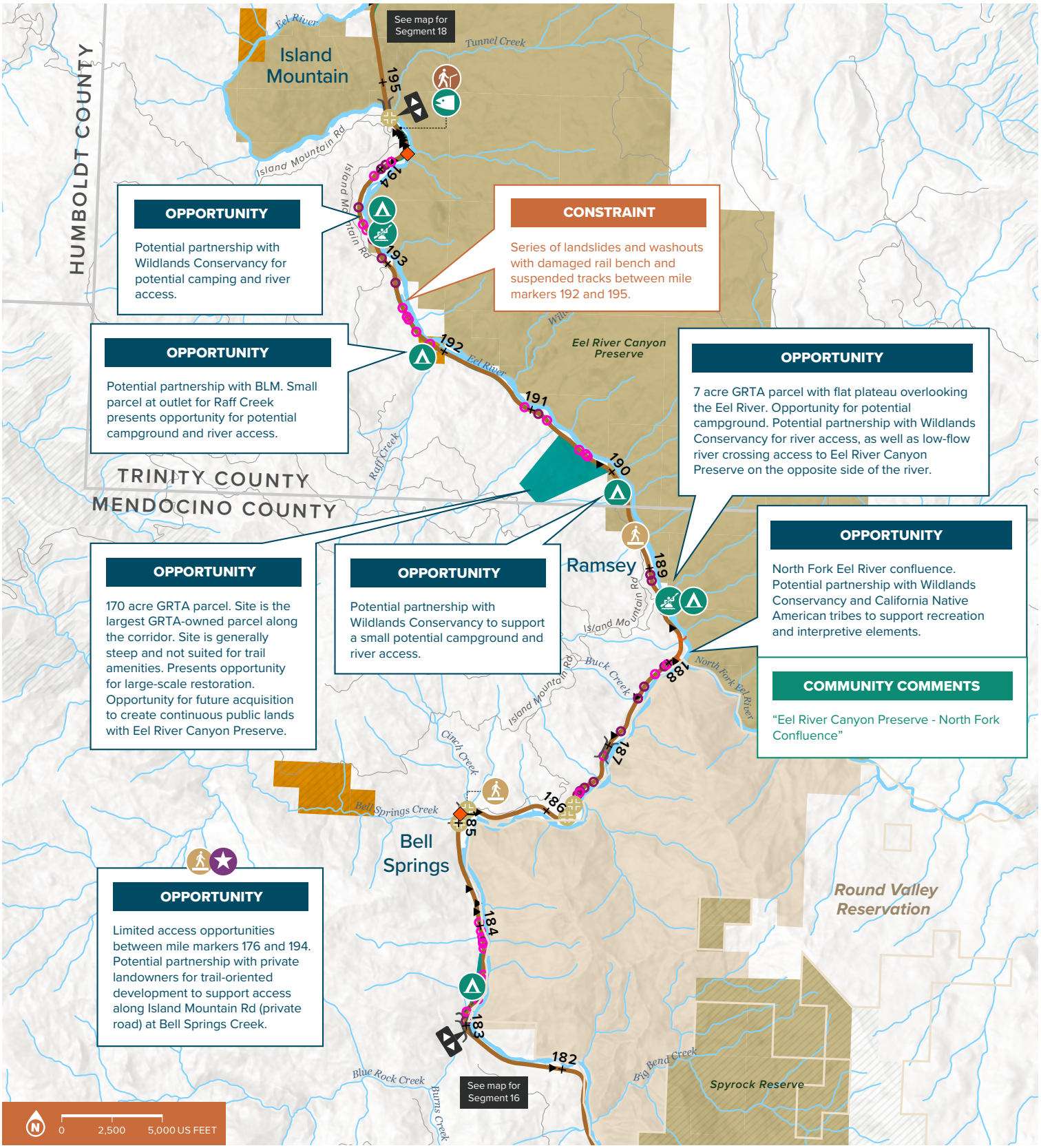

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EEL RIVER CANYON PRESERVE

Segment 18

SEGMENT EXTENTS

Island Mountain Rd to
Cain Rock Railroad Bridge, Alderpoint

COUNTY

Trinity/Humboldt County

LENGTH

12.1 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE

Backcountry Trail

PRIORITIZATION

Tier 1

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SEGMENT DETAILS

- Segment Breakpoint
- Design Concept
- \+ GRT Milepost

TRAIL TYPES

- Backcountry Trail
- Parallel Route

TRAIL AMENITIES*

Trailheads

- Backcountry Trailhead
- Backcountry Access Point

Potential Opportunity Sites

- Campground
- River Access
- Creek Restoration

INFRASTRUCTURE

Roadway Crossings**

- Crossing, Private

Infrastructure Conditions***

- Geomorphic, Major
- Geomorphic, Minor
- Bridge
- Tunnel
- Tunnel, Damaged
- Rail Debris
- Hazardous Materials

BOUNDARIES

- City/Town/Place
- Parks & Public Lands

OWNERSHIP

- GRTA
- Federal
- Nonprofit

ENVIRONMENTAL

- Water

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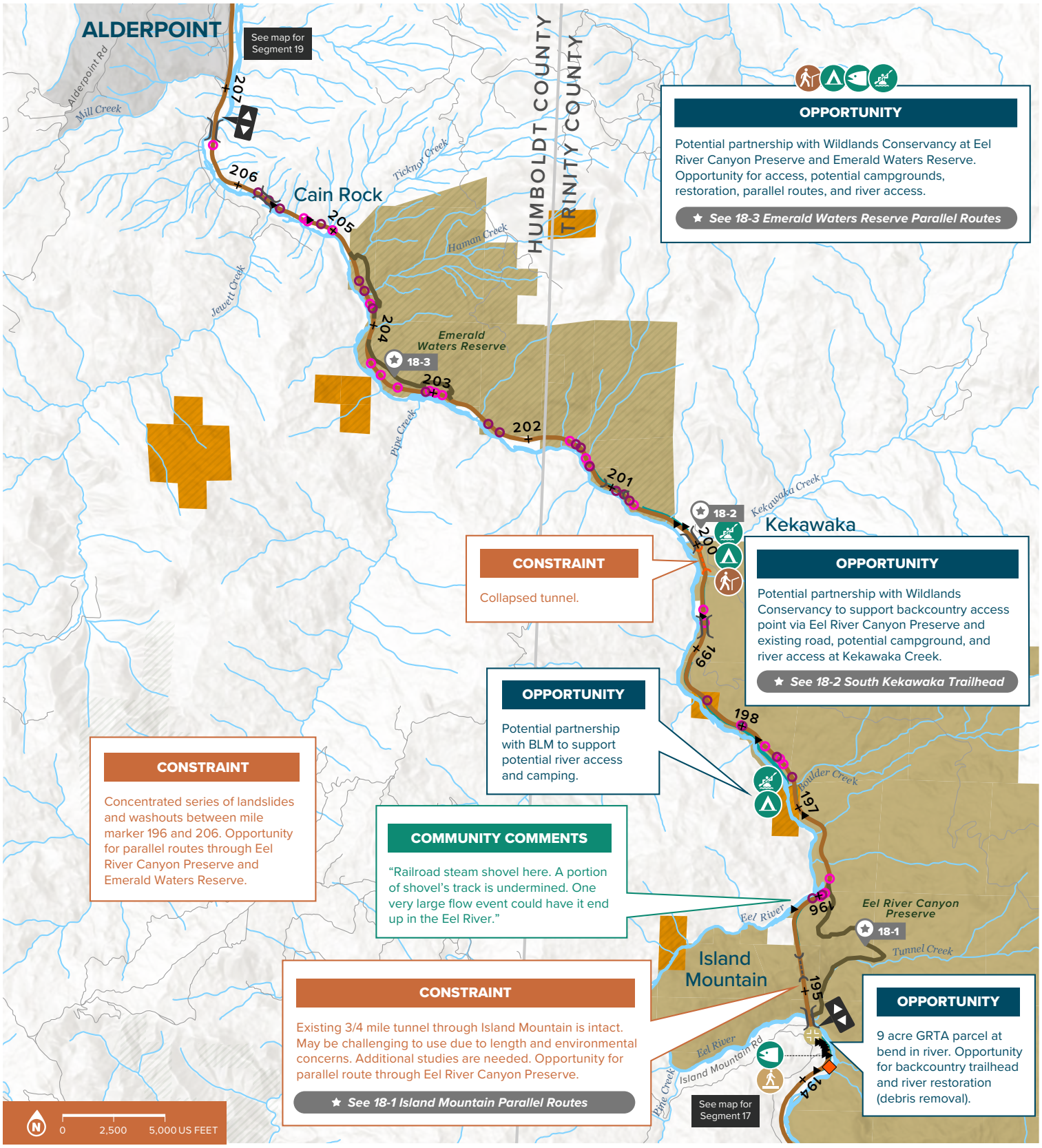

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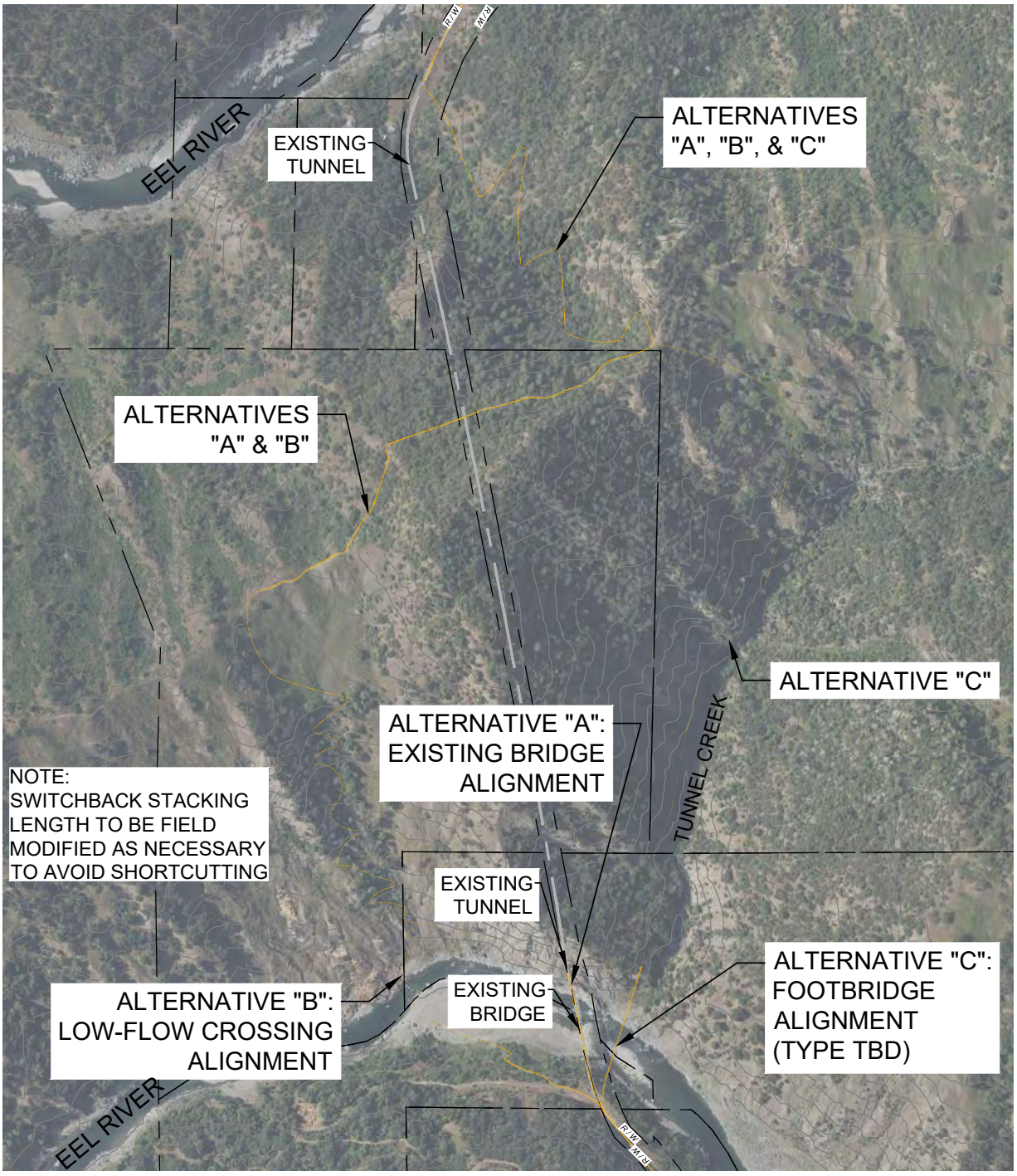
18-1 Island Mountain Parallel Routes



LEGEND:

EXISTING RAIL BED, APPROX.

GREAT REDWOOD TRAIL, BACKCOUNTRY

0 750' 1500'

Scale: 1" = 750'

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GREAT REDWOOD TRAIL MASTER PLAN
ISLAND MOUNTAIN - ALTERNATIVES A, B, & C

MM 194.5

FIGURE 1

PRELIMINARY DESIGN ALTERNATIVES

A total of three (3) potential trail alignments were developed:

- Alternative “A” – Existing Bridge Alignment
- Alternative “B” – Low Flow Crossing Alignment
- Alternative “C” – Footbridge Alignment

All trails are assumed to have accessibility criteria waived. Where the trail is in an on-contour traverse orientation, the trail bed width is assumed to be 18” per the California State Parks Trails Handbook for a Class III Path. As the trail moves to a cross-contour orientation, it is assumed to be a 40” trail bed width in accordance with a Class I Path. Each Trail Alignment follows the same descent from the existing dirt road at the top of the ridge to the north side of the tunnel. Each proposed Trail Alignment is described in more detail in subsequent sections.

TRAIL ALIGNMENT ALTERNATIVE “A” - EXISTING BRIDGE

This alignment alternative utilizes the existing bridge. The trail alignment traverses from the southern entrance of the tunnel across the hillslope, generally following contour line 175’. Once the traverse reaches the first location with relatively flatter slopes and vegetation, the trail turns to switchback up the slope to the existing dirt road at the top of the ridge. The trail then follows the dirt road for approximately 2,700’ before descending to the railroad on the north side of the tunnel. Average longitudinal slopes are between 6% and 8%, with maximum slopes of 17%. Assuming the existing bridge is in relatively good condition and not in need of significant repair, this would be the preferred alternative (Table 20, Figure 76-Figure 78).

Table 20: *Evaluation of Trail Alignment Alternative “A” - Existing Bridge*

PROS	PRELIMINARY CHALLENGE/CONS
Utilizes existing bridge	Approx. 950’ of difficult traverse across steep, potentially unstable, slope

Figure 76: *Alignment Alternative "A" – Existing Bridge Plan View (Total Horizontal Length = 9,777')*

Figure 77: *Alignment Alternative "A" – Existing Bridge Profile View (Total Profile Length = 10,454')*

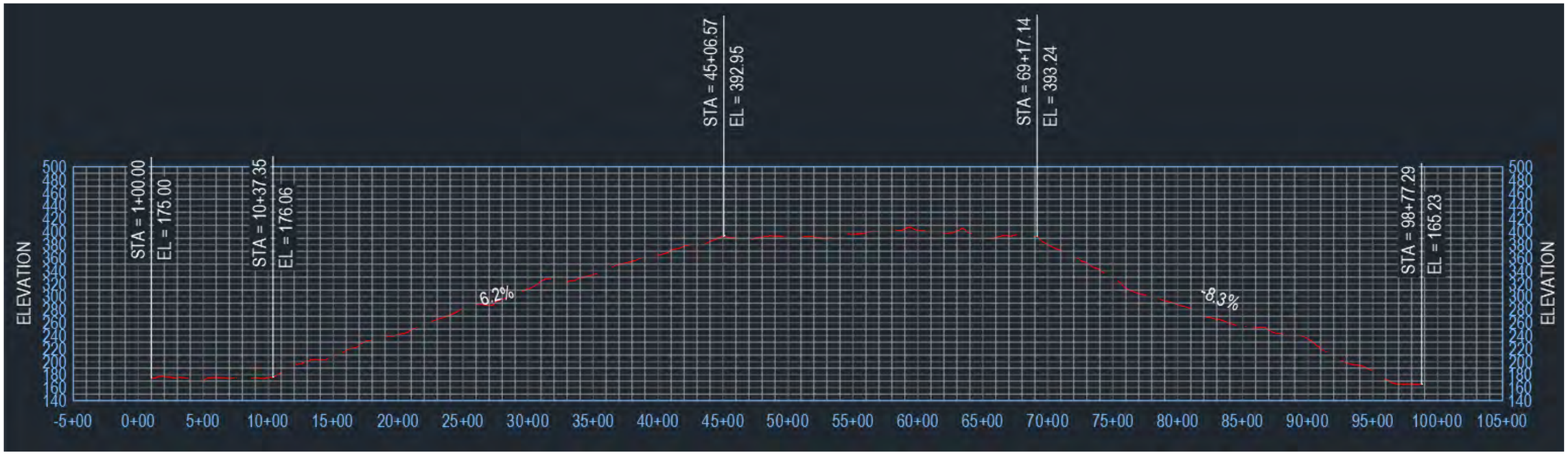
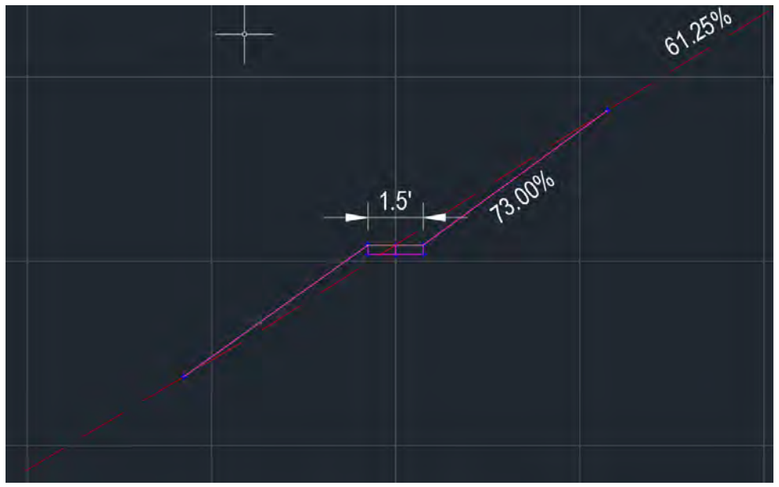


Figure 78: *Alignment Alternative "A" – Existing Bridge Cross Section: On-Contour Traverse Slope (18" trail bed width; note that cross-contour trail bed width is to be 40")*



Traverse Alt 1: 1.5' wide Native Material Pathway

Traverse Alt 2: 1.5' wide built pathway with cable railing or similar.

TRAIL ALIGNMENT ALTERNATIVE "B" – LOW-FLOW CROSSING

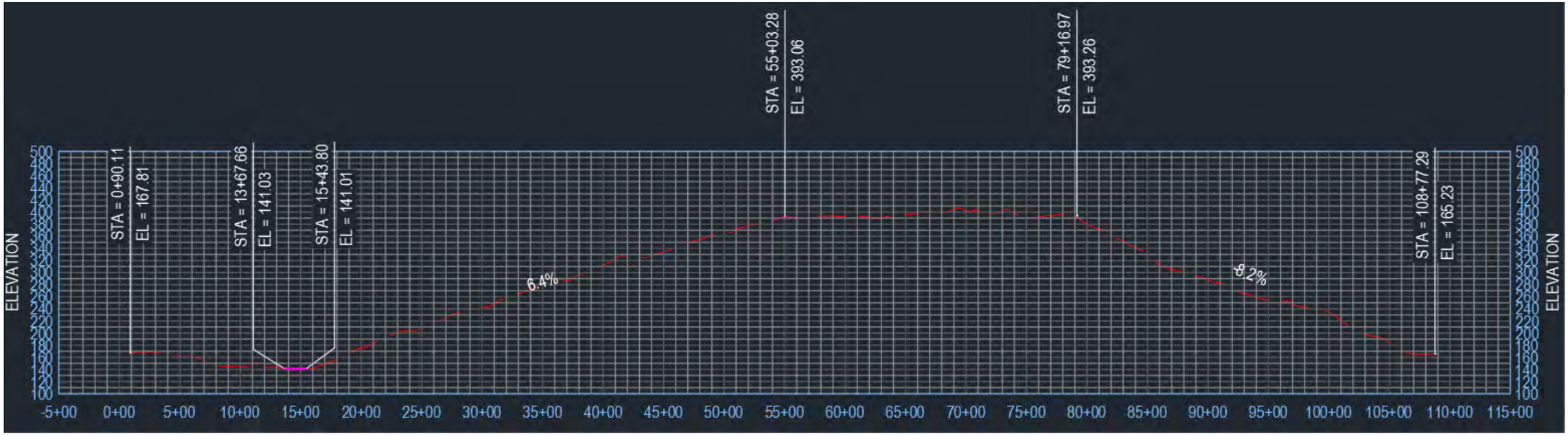
This alignment alternative features a low-flow river crossing with either no bridge or a seasonal footbridge. The trail alignment stays on river left past the existing bridge to cross the river at the downstream end of the gravel bar that forms under the bridge. Once the river is crossed, the trail switchbacks up the slope to the existing dirt road. The trail then follows the dirt road for approximately 2,700' before descending to the railroad on the north side of the tunnel. Average longitudinal slopes are between 6% and 8%, with maximum slopes of 17% (Table 21, Figure 79, Figure 80)

Table 21: *Evaluation of Alignment Alternative "B" – Low-flow Crossing*

PROS	PRELIMINARY CHALLENGE/CONS
Utilizes existing dirt road, reducing need for new ground disturbance	Trail and river crossing is not on property with an agreed upon easement
Wet crossing eliminates need for new bridge	Seasonal footbridge requires maintenance
	Wet crossing/trail only accessible during low flows

Figure 79: *Alignment Alternative "B" – Low-Āow Crossing Plan View (Total Horizontal Length – 10,787')*

Figure 80: *Alignment Alternative "B" – Low-flow Crossing Plan View (Total Profile Length – 11,517')*



TRAIL ALIGNMENT ALTERNATIVE "C" – FOOTBRIDGE

This alignment alternative features a permanent suspension footbridge. The trail alignment crosses the river just upstream of the existing bridge via a new suspension footbridge. Once the river is crossed, the trail traverses along Tunnel Creek for approximately 2,300' before turning to switchback up the slope. The trail then crosses the existing dirt road at the top of the ridge before descending to the railroad on the north side of the tunnel. Average longitudinal slopes are between 8% and 10%, with maximum slopes of 21% (Table 22, Figure 81, Figure 82)

Table 22: *Evaluation of Alignment Alternative "C" – Footbridge*

PROS	PRELIMINARY CHALLENGE/CONS
Shortest alignment alternative	Feasibility of a suspension footbridge
Suspension footbridge likely less costly than a new bridge	5,700' traverse along Tunnel Creek Wet crossing/trail only accessible during low flows

Figure 81: *Alignment Alternative "C" – Footbridge Plan View (Total Horizontal Length = 7,942')*

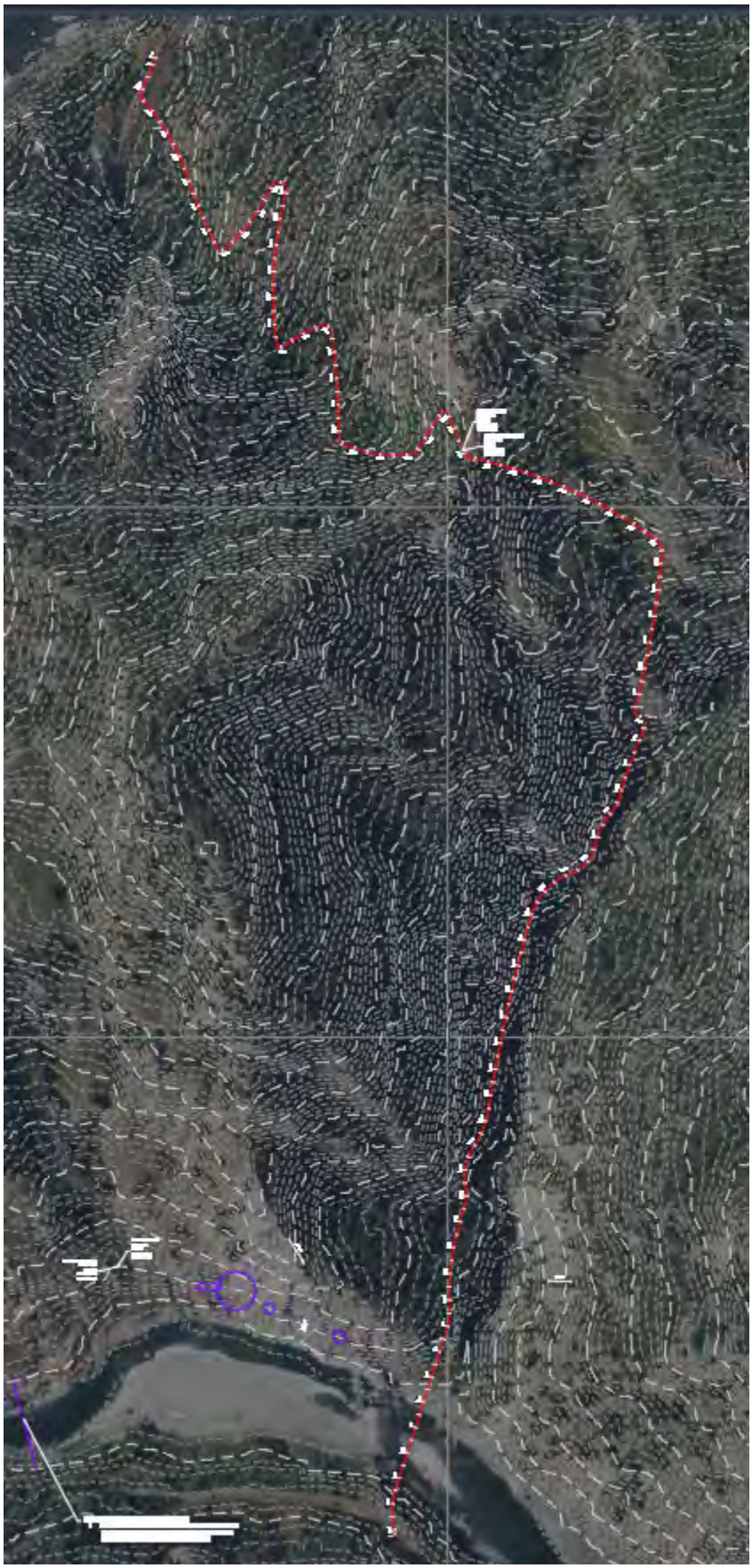
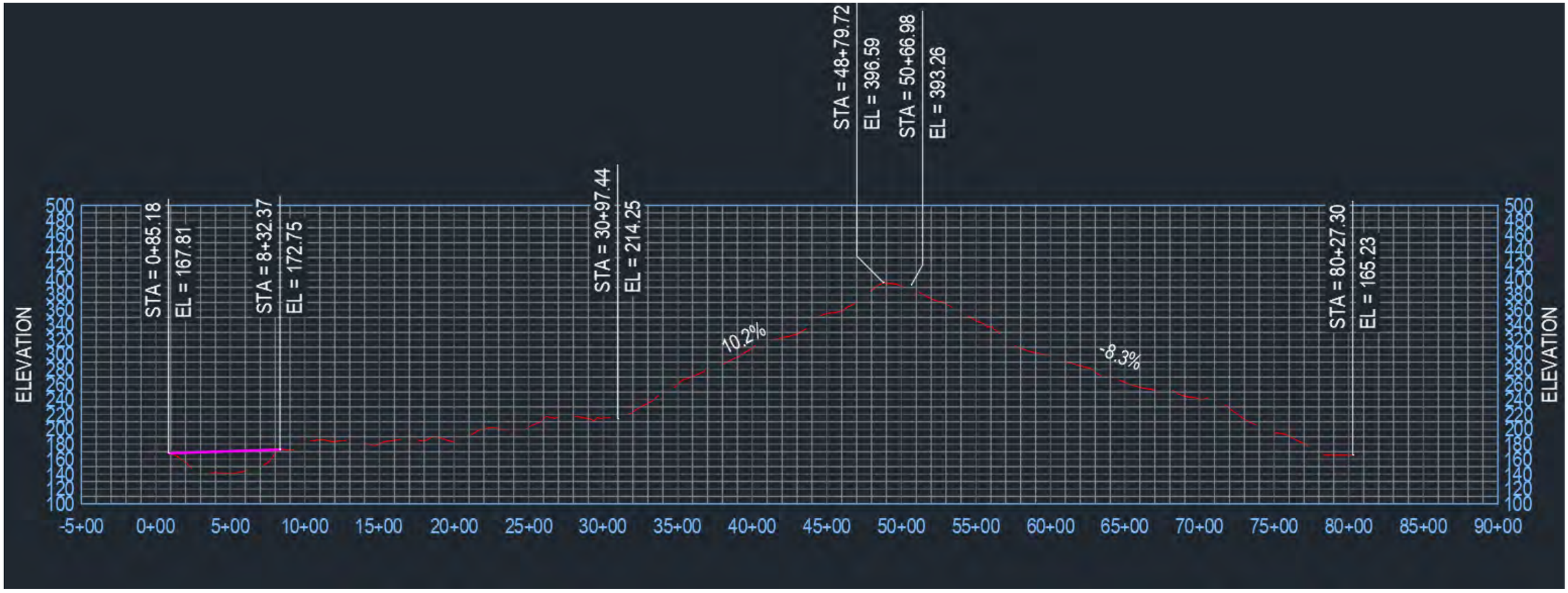


Figure 82: *Alignment Alternative "C" – Footbridge Plan View (Total Profile Length = 8,764')*



18-2 South Kekawaka Trailhead

LEGEND:

- EXISTING RAIL BED
- GREAT REDWOOD TRAIL, BACKCOUNTRY
- TRAILHEAD AMENITIES
- TRAILHEAD RECREATION SPACES
- TRAILHEAD ACCESS IMPROVEMENTS
- TRAILHEAD PARKING

NOTE: DESIGN INTENT TO REDUCE IMPERVIOUS SURFACES

0 100' 200'

Scale: 1" = 100'

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GREAT REDWOOD TRAIL MASTER PLAN
SOUTH KEKAWAKA TRAILHEAD

MM 199.8

FIGURE 4

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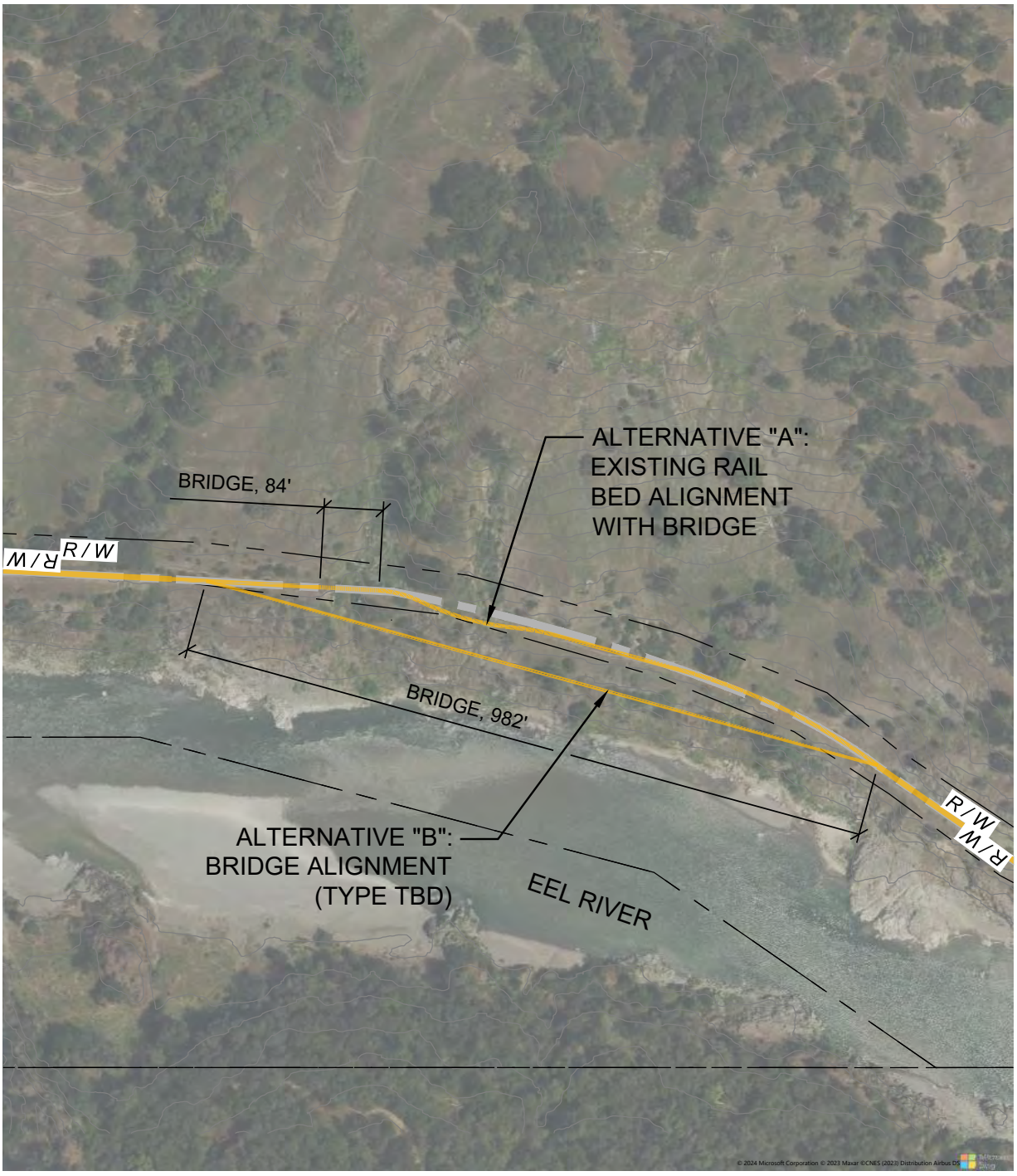
18-3 Emerald Waters Reserve Parallel Routes



LEGEND:

EXISTING RAIL BED, APPROX.

GREAT REDWOOD TRAIL, BACKCOUNTRY

0 200' 400'

Scale: 1" = 200'

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GREAT REDWOOD TRAIL MASTER PLAN
EMERALD WATERS RESERVE ALTERNATIVES A & B

MM 203

FIGURE 1

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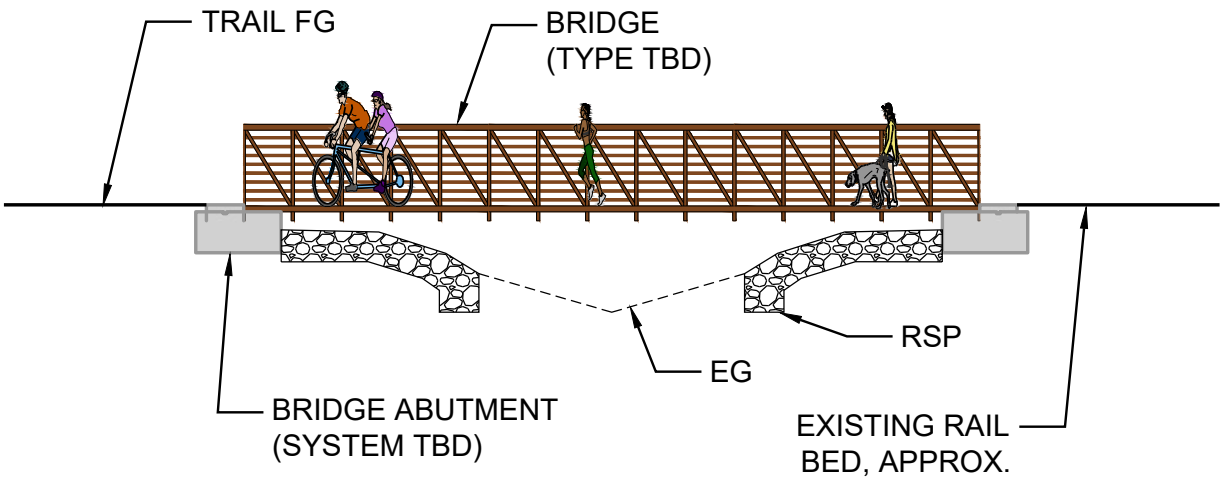

ALTERNATIVE "A" BRIDGE PROFILE

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GREAT REDWOOD TRAIL MASTER PLAN
EMERALD WATERS RESERVE ALTERNATIVES A & B

MM 203

FIGURE 2

PRELIMINARY DESIGN ALTERNATIVES

A total of three (3) potential trail alignments were considered:

- Alternative “A” – Existing Rail Bed Alignment
- Alternative “B” – Footbridge Alignment
- Reroute Alignment

TRAIL ALIGNMENT ALTERNATIVE “A” - EXISTING RAIL BED

This alternative utilizes the existing railroad alignment, which would be the preferred alternative. An approximately 84’ long bridge would be used to span the gully that has developed, due to slope failure, which has destroyed a segment of the existing railroad (Table 23, Figure 83).

Table 23: *Evaluation of Alternative “A” - Existing Rail Bed*

PROS	PRELIMINARY CHALLENGE/CONS
Utilizes existing railroad alignment	Proximity of major slope failure

Figure 83: *Alignment Alternative “A” - Existing Rail Bed Plan View*

TRAIL ALIGNMENT ALTERNATIVE “B” - FOOTBRIDGE

This alignment alternative would leave the railroad before encountering the slope failure and rejoin the existing railroad on the far side of the slope failure via a footbridge. This alternative would require a footbridge of approximately 980 linear feet (Table 24, Figure 84).

Table 24: *Evaluation of Alignment Alternative “B” - Footbridge*

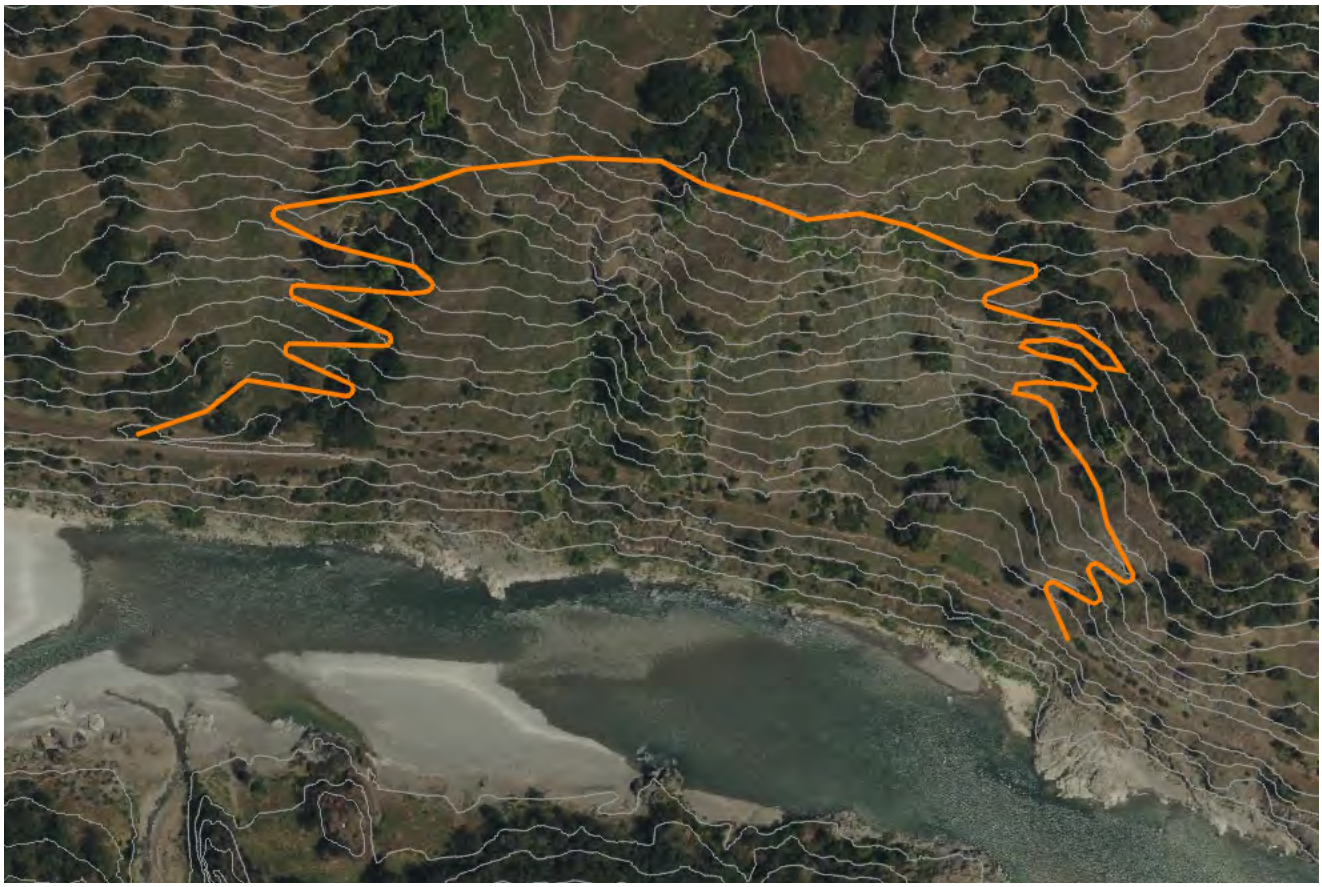
PROS	PRELIMINARY CHALLENGE/CONS
Avoids construction within slope failure area	Feasibility of an ~980 linear feet footbridge in remote area

Figure 84: *Alignment Alternative “B” – Footbridge Plan View*

REROUTE ALIGNMENT

This alignment alternative would leave the railroad before encountering the slope failure and rejoin the existing railroad on the far side of the slope failure via a reroute (Figure 3). This alternative would require an approximately 0.75-mile reroute over steep and rugged terrain and is therefore considered infeasible for this location.

Figure 85: *Reroute Alignment*



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ALDERPOINT

Segment 19

SEGMENT EXTENTS

Cain Rock Railroad Bridge, Alderpoint to Steelhead Creek

COUNTY

Humboldt County

LENGTH

5.0 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE

Backcountry Trail

PRIORITIZATION

Tier 1

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SEGMENT DETAILS

- Segment Breakpoint
- Design Concept
- \+ GRT Milepost

TRAIL TYPES

- Backcountry Trail
- Loop, non-GRT

TRAIL AMENITIES*

Existing Amenities

- River Access

Trailheads

- Community Gateway
- Backcountry Trailhead

Potential Opportunity Sites

- Campground
- River Access
- Parks / Rest Areas

INFRASTRUCTURE

Roadway Crossings**

- Crossing, Minor Public
- Underpass

Infrastructure Conditions***

- Geomorphic, Major
- Geomorphic, Minor
- Bridge
- Bridge, Damaged
- Tunnel
- Rail Debris
- Hazardous Materials

BOUNDARIES

- City/Town/Place

OWNERSHIP

- GRTA
- Local

ENVIRONMENTAL

- Water

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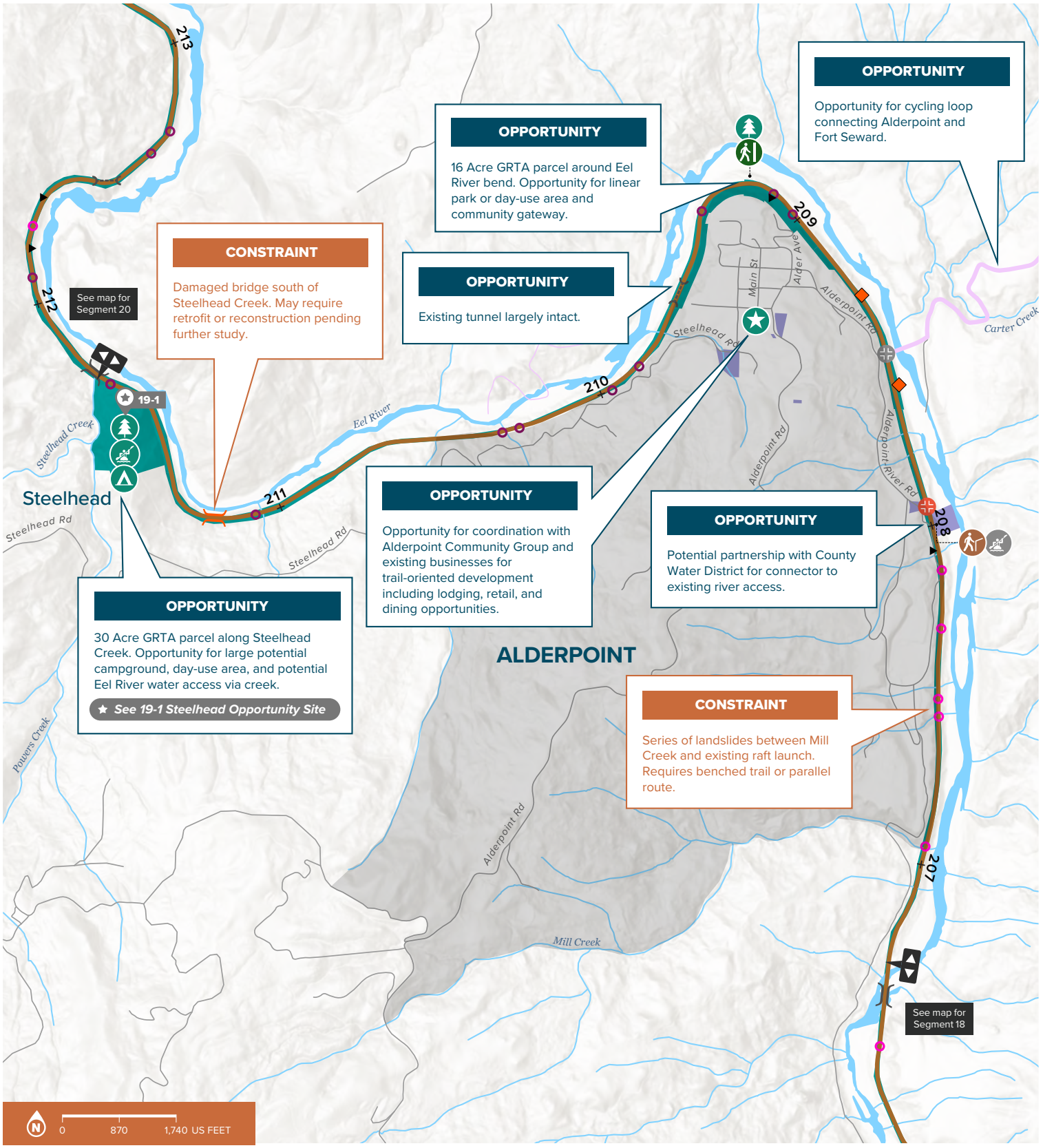

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19-1 Steelhead Opportunity Site

LEGEND:

- EXISTING RAIL BED
- GREAT REDWOOD TRAIL, BACKCOUNTRY
- TRAILHEAD AMENITIES
- TRAILHEAD RECREATION SPACES
- TRAILHEAD ACCESS IMPROVEMENTS
- TRAILHEAD PARKING

NOTE: DESIGN INTENT TO REDUCE IMPERVIOUS SURFACES

0 100' 200'

Scale: 1" = 100'

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GREAT REDWOOD TRAIL MASTER PLAN
ALDERPOINT TO STEELHEAD CREEK

MM 211.7

FIGURE 5

Dwg filename: N:\Shared\PROJECTS\2022\100-2022-180 CA Great Redwood Trail Master Plan\CAD\02_Exhibits\MM211.7-Z1-Steelhead to Fort Seward\22-180_EXH_STEEL.dwg Last saved by: SamAg Plot date: 2/8/2024 9:29 AM Plotstyle table: ALTA NCS Standard.stb

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STEELHEAD TO FORT SEWARD

Segment 20

SEGMENT EXTENTS

Steelhead Creek to Fort Seward Railroad Station

COUNTY

Humboldt County

LENGTH

4.8 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE

Backcountry Trail

PRIORITIZATION

Tier 1

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SEGMENT DETAILS

- Segment Breakpoint
- Design Concept
- \+ GRT Milepost

TRAIL TYPES

- Backcountry Trail
- Loop, non-GRT

TRAIL AMENITIES*

Trailheads

- Backcountry Access Point

Potential Opportunity Sites

- Trail-Oriented Development
- River Access
- Parks / Rest Areas

INFRASTRUCTURE

Roadway Crossings**

- Crossing, Major Public
- Underpass

Infrastructure Conditions***

- Geomorphic, Major
- Geomorphic, Minor
- Bridge
- Bridge, Damaged
- Tunnel
- Rail Debris
- Hazardous Materials

BOUNDARIES

- City/Town/Place
- Parks & Public Lands

OWNERSHIP

- GRTA
- Federal
- Local

ENVIRONMENTAL

- Water

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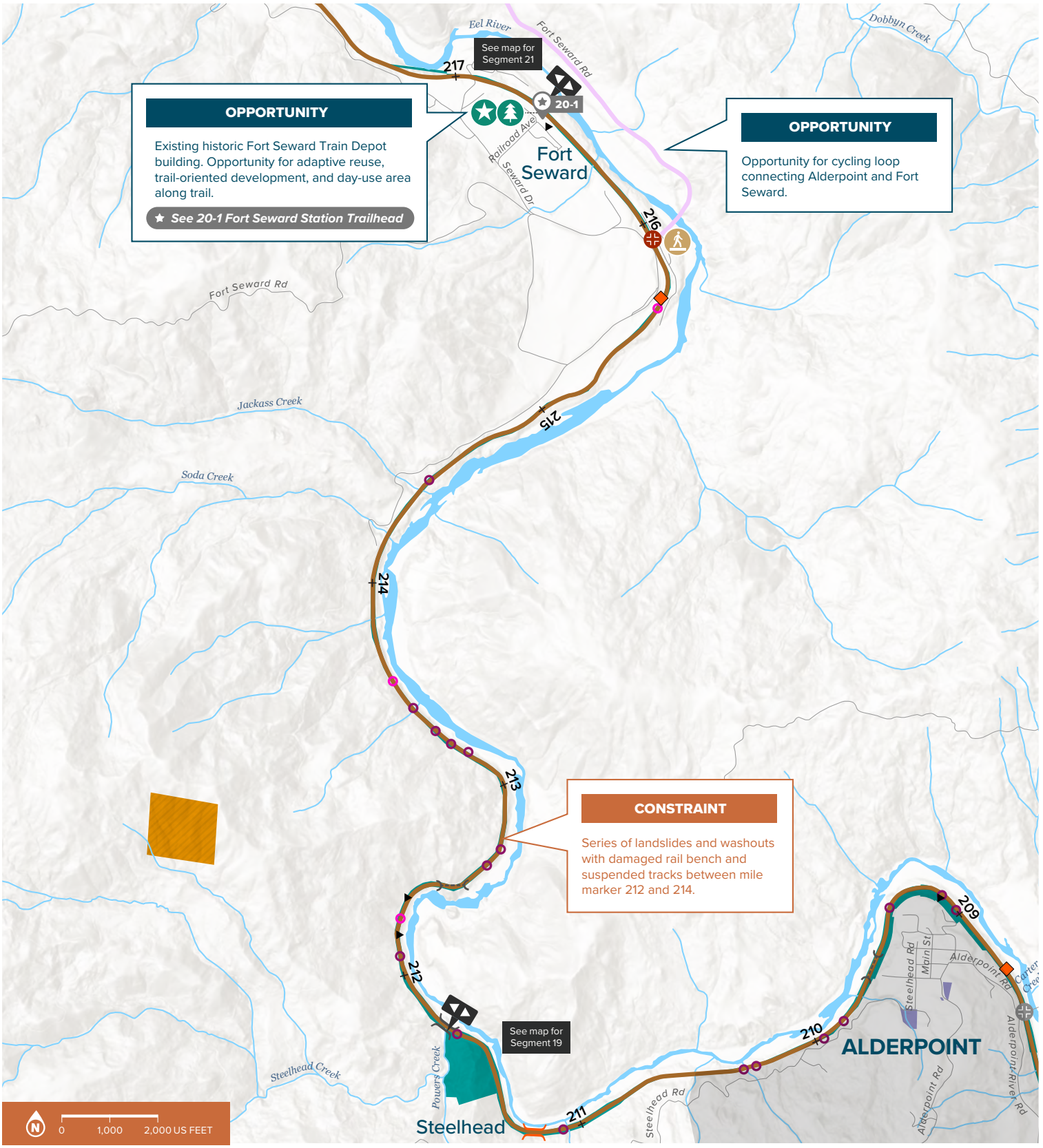
***Private crossings may or may not be licensed.*

****Conditions reflect best available data as of 2023. It is understood that conditions are rapidly changing based on 2020 report data. Select points have been updated based on new information.*



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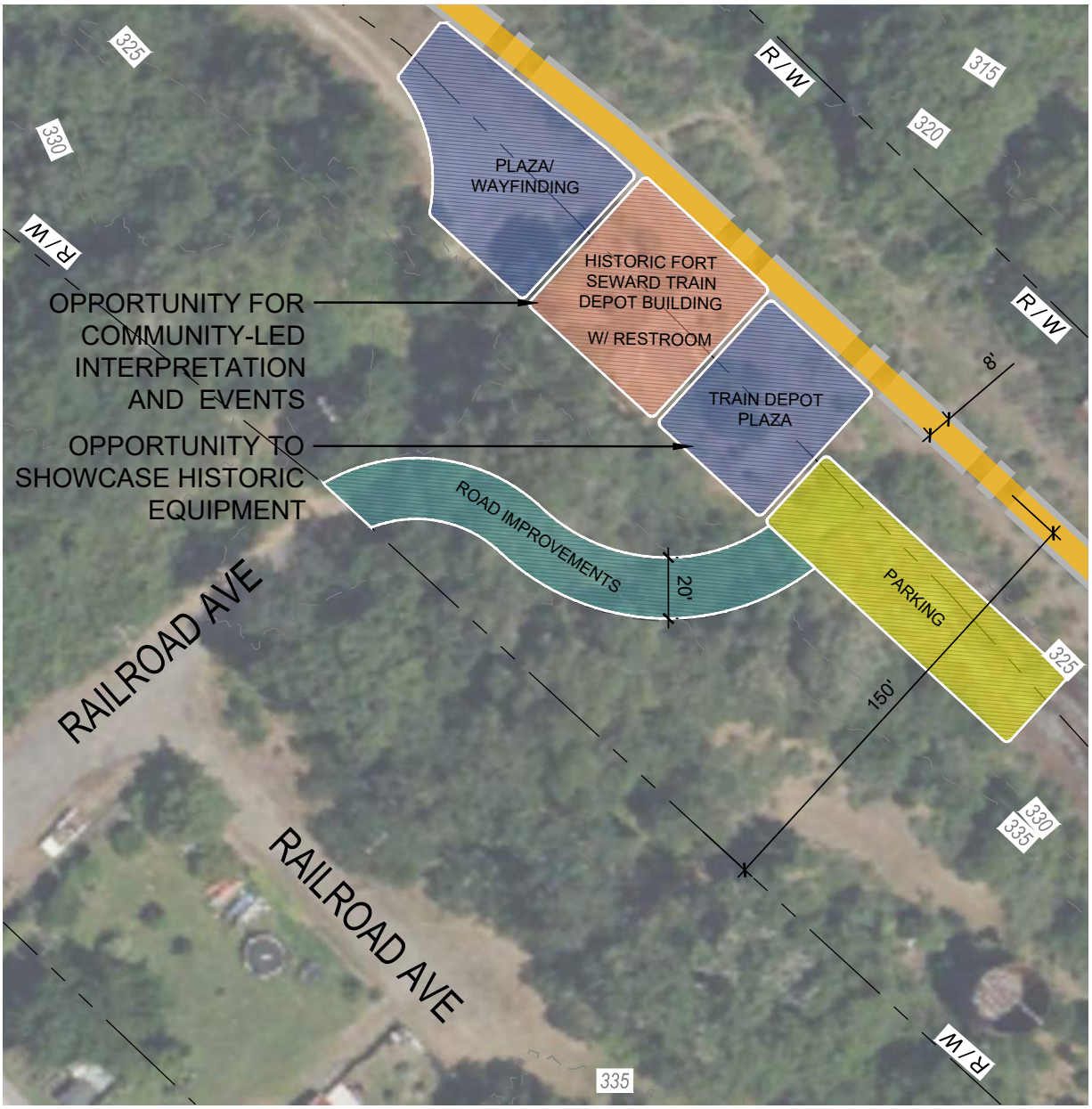
20-1 Fort Seward Station Trailhead



LEGEND:

- EXISTING RAIL BED
- GREAT REDWOOD TRAIL, BACKCOUNTRY
- TRAILHEAD AMENITIES
- TRAILHEAD RECREATION SPACES
- TRAILHEAD ACCESS IMPROVEMENTS
- TRAILHEAD PARKING

NOTE: DESIGN INTENT TO REDUCE IMPERVIOUS SURFACES

0 50' 100'

Scale: 1" = 50'

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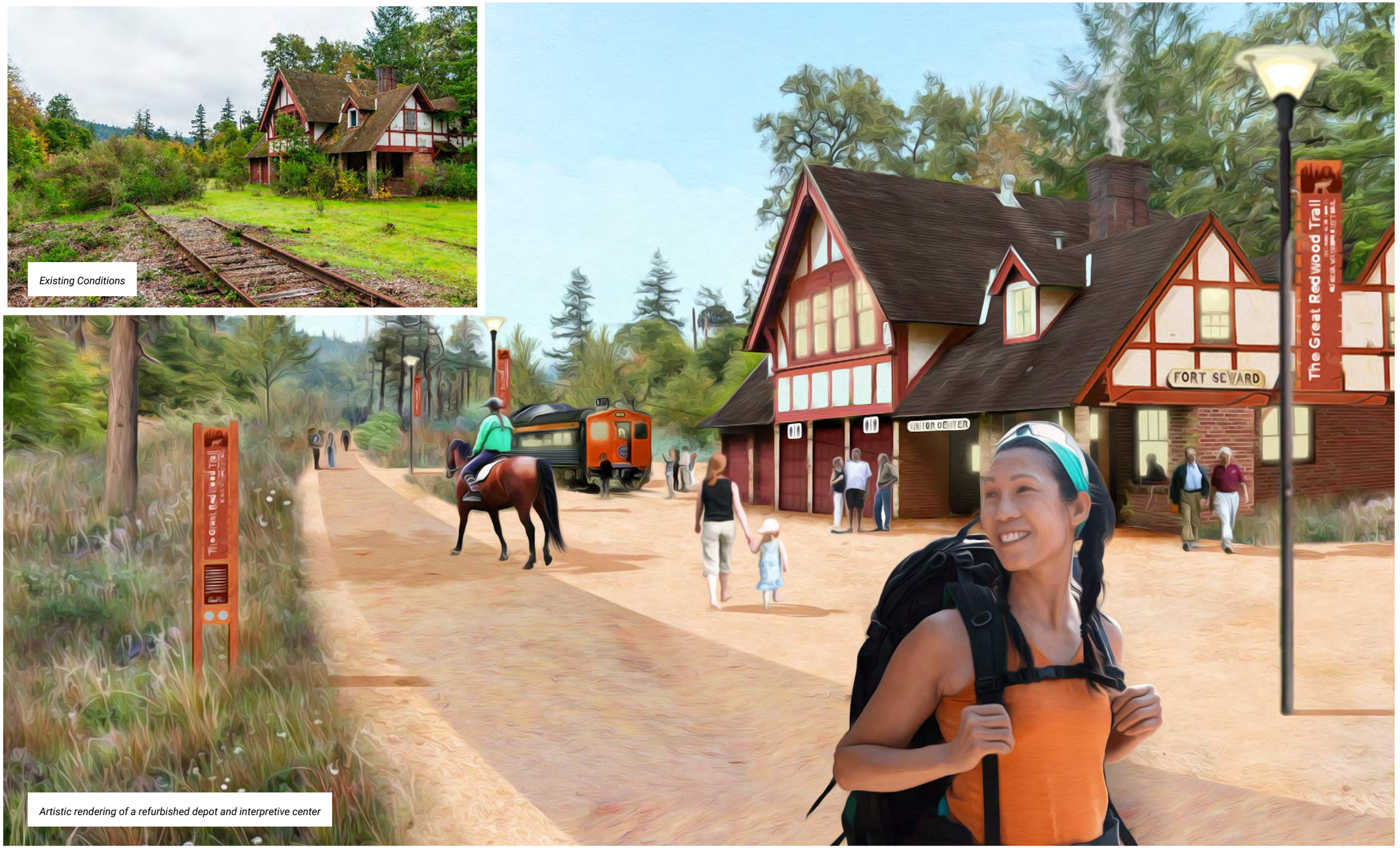
GREAT REDWOOD TRAIL MASTER PLAN
FORT SEWARD TO BROCK CREEK

MM 216.6

FIGURE 6

Dwg filename: N:\Shared\PROJECTS\2022\100-2022-180 CA Great Redwood Trail Master Plan\CAD\02_Exhibits\MM216.6-Z1-Fort Seward to Brock Creek\22-180_EXH_BROCK-CRK.dwg Last saved by: katrinaoritz Plot date: 1/23/2024 4:56 PM Plotstyle table: ALTA NCS Standard.stb

Existing Conditions



Artistic rendering of a refurbished depot and interpretive center

FORT SEWARD TO BROCK CREEK

Segment 21

SEGMENT EXTENTS
Fort Seward Railroad Station to Brock Creek

COUNTY
Humboldt County

LENGTH
5.2 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE
Backcountry Trail

PRIORITIZATION
Tier 2

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SEGMENT DETAILS
- Segment Breakpoint
- Design Concept
- \+ GRT Milepost

TRAIL TYPES
- Backcountry Trail

TRAIL AMENITIES*
Potential Opportunity Sites
- Campground
- River Access
- Creek Restoration

INFRASTRUCTURE
Roadway Crossings**
- Crossing, Private

Infrastructure Conditions***
- Geomorphic, Major
- Geomorphic, Minor
- Bridge, Damaged
- Rail Debris
- Hazardous Materials

BOUNDARIES
- Parks & Public Lands

OWNERSHIP
- GRTA
- Federal

ENVIRONMENTAL
- Water

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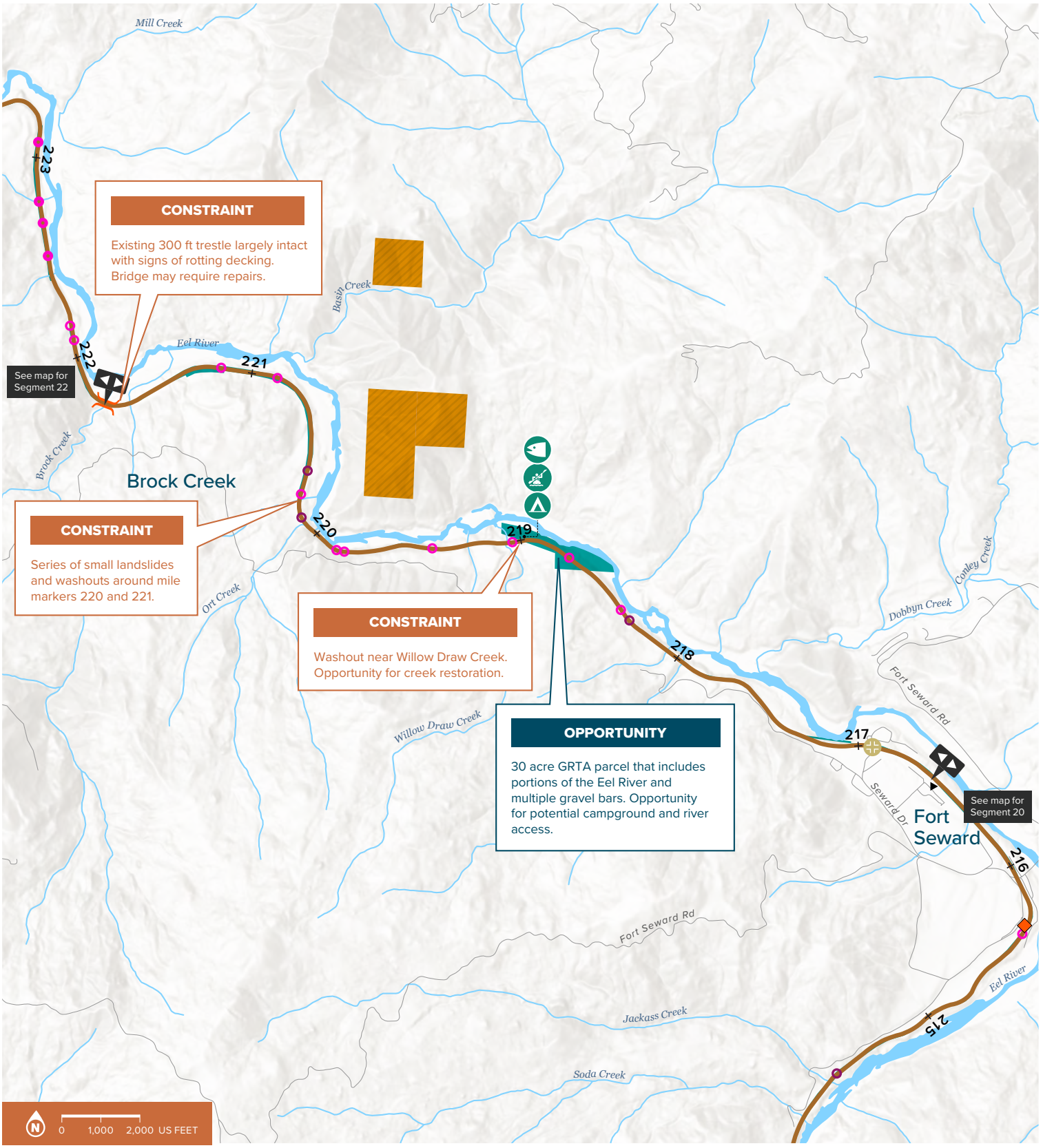

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BROCK CREEK TO EEL ROCK

Segment 22

SEGMENT EXTENTS
Brock Creek to Eel Rock Rd

COUNTY
Humboldt County

LENGTH
3.3 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE
Backcountry Trail

PRIORITIZATION
Tier 2

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SEGMENT DETAILS
- Segment Breakpoint
- Design Concept
- GRT Milepost

TRAIL TYPES
- Backcountry Trail

TRAIL AMENITIES*
Trailheads
- Backcountry Access Point

Potential Opportunity Sites
- Trail-Oriented Development

INFRASTRUCTURE
Roadway Crossings**
- Crossing, Private

Infrastructure Conditions***
- Geomorphic, Major
- Geomorphic, Minor
- Bridge, Damaged

BOUNDARIES
- Parks & Public Lands

OWNERSHIP
- GRTA
- Federal

ENVIRONMENTAL
- Water

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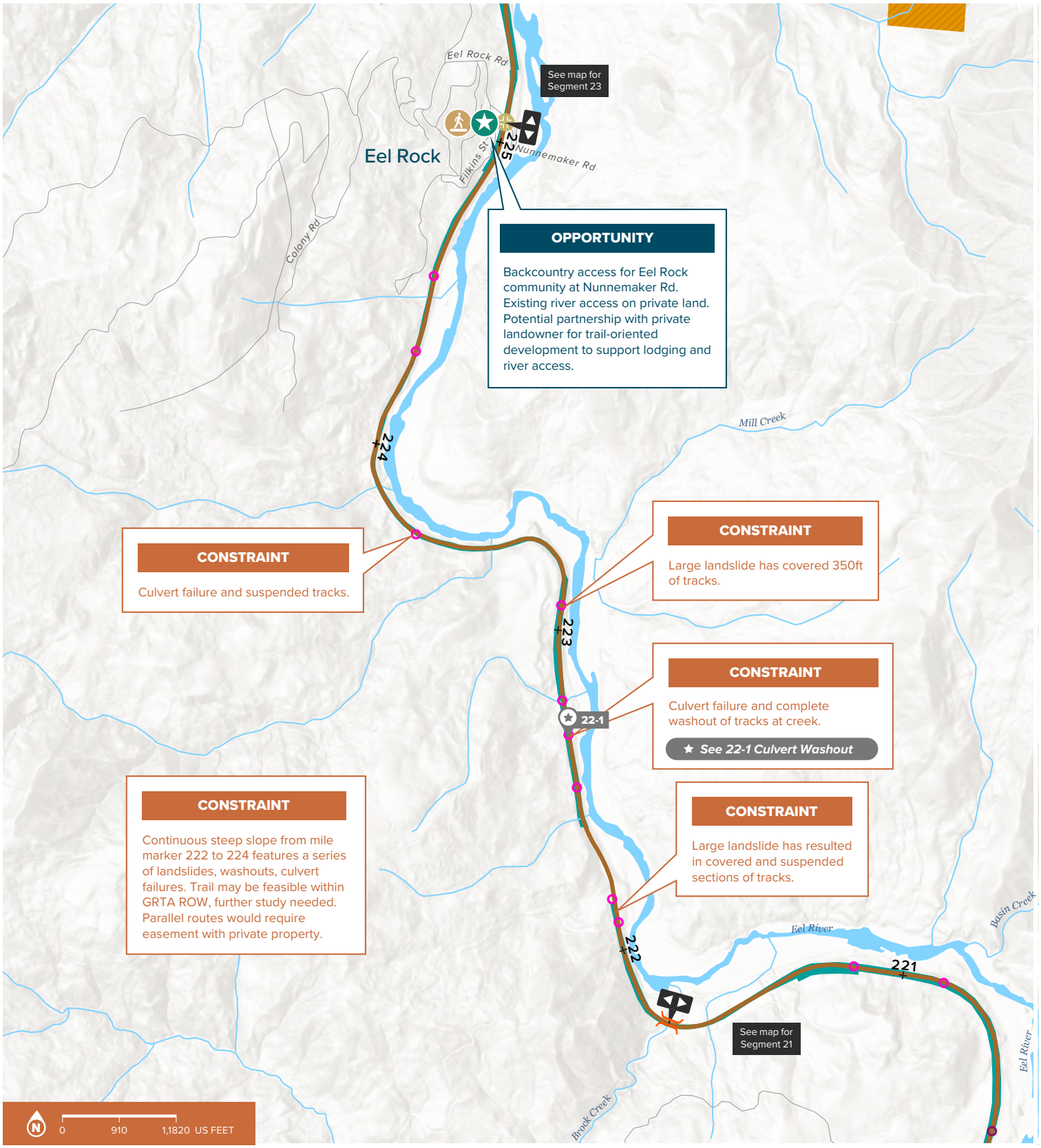

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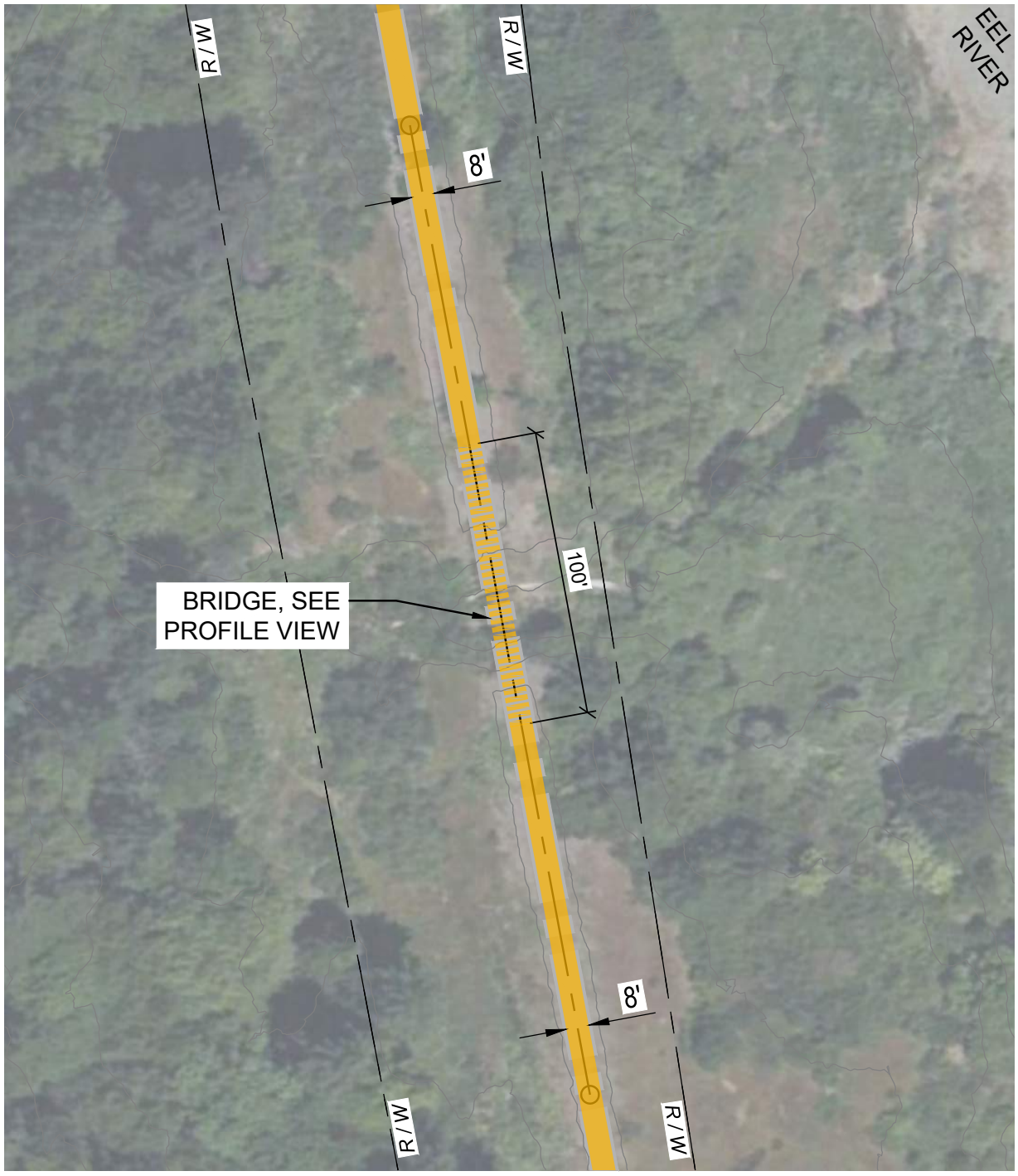
22-1 Culvert Washout



LEGEND:

EXISTING RAIL BED, APPROX.

GREAT REDWOOD TRAIL, BACKCOUNTRY

0 50' 100'

Scale: 1" = 50'

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GHD
GHD Inc.
718 Third Street
Eureka California 95501 USA
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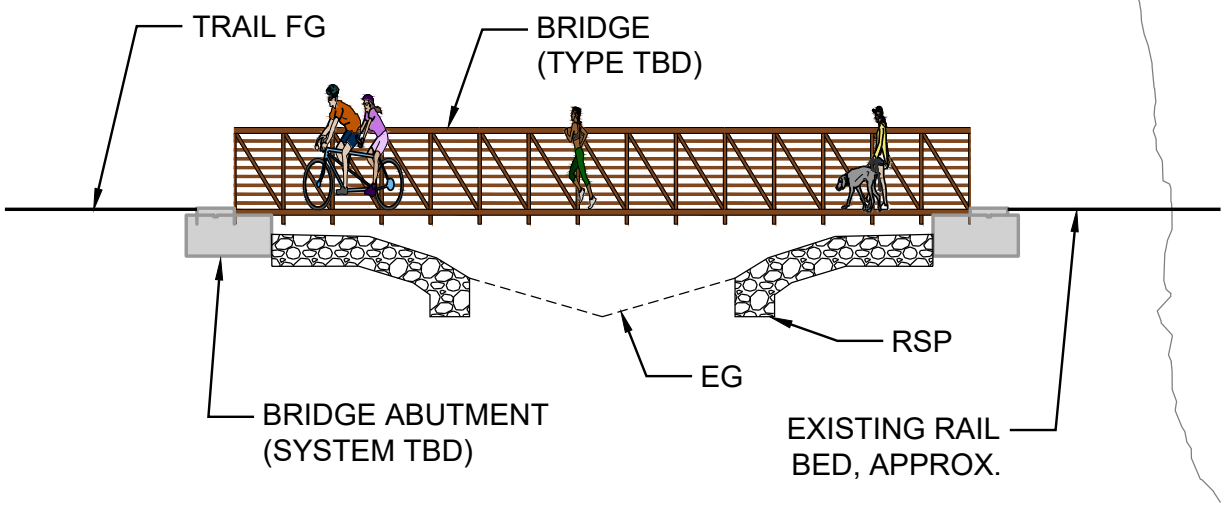
GREAT REDWOOD TRAIL MASTER PLAN
BROCK CREEK TO EEL ROCK

MM 222.5

FIGURE 1



BRIDGE PROFILE

NTS

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GHD Inc.
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Eureka California 95501 USA
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GREAT REDWOOD TRAIL MASTER PLAN
BROCK CREEK TO EEL ROCK

MM 222.5

FIGURE 2

SEGMENTS AND REACHES

A total of one (1) potential trail alignment was considered:

- Existing Rail Bed Alignment

TRAIL ALIGNMENT ALTERNATIVE - EXISTING RAIL BED

This alternative utilizes the existing railroad alignment (Figure 86). A footbridge would be used to span the failure that has destroyed a segment of the existing railroad. This alternative would require a footbridge of approximately 100 linear feet. Trail alignment considerations are summarized in Table 25.

Table 25: *Evaluation of Alignment Alternative - Existing Rail Bed*

PROS	PRELIMINARY CHALLENGE/CONS
Utilizes existing railroad alignment	Stabilizing existing drainage area

Figure 86: *Alignment Alternative - Existing Rail Bed Plan View*

EEL ROCK TO MCCANN

Segment 23

SEGMENT EXTENTS
Eel Rock Rd to Dyerville Loop Rd, McCann

COUNTY
Humboldt County

LENGTH
7.2 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE
Backcountry Trail

PRIORITIZATION
Tier 2

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SEGMENT DETAILS
- Segment Breakpoint
- Design Concept
- \+ GRT Milepost

TRAIL TYPES
- Backcountry Trail

TRAIL AMENITIES*
Trailheads
- Backcountry Access Point

Potential Opportunity Sites
- Trail-Oriented Development
- Campground
- River Access

INFRASTRUCTURE
Roadway Crossings**
- Crossing, Minor Public
- Crossing, Private

Infrastructure Conditions***
- Geomorphic, Major
- Geomorphic, Minor
- Bridge
- Bridge, Damaged
- Tunnel
- Tunnel, Damaged
- Rail Debris

BOUNDARIES
- Parks & Public Lands

OWNERSHIP
- GRTA
- Federal
- Local

ENVIRONMENTAL
- Water

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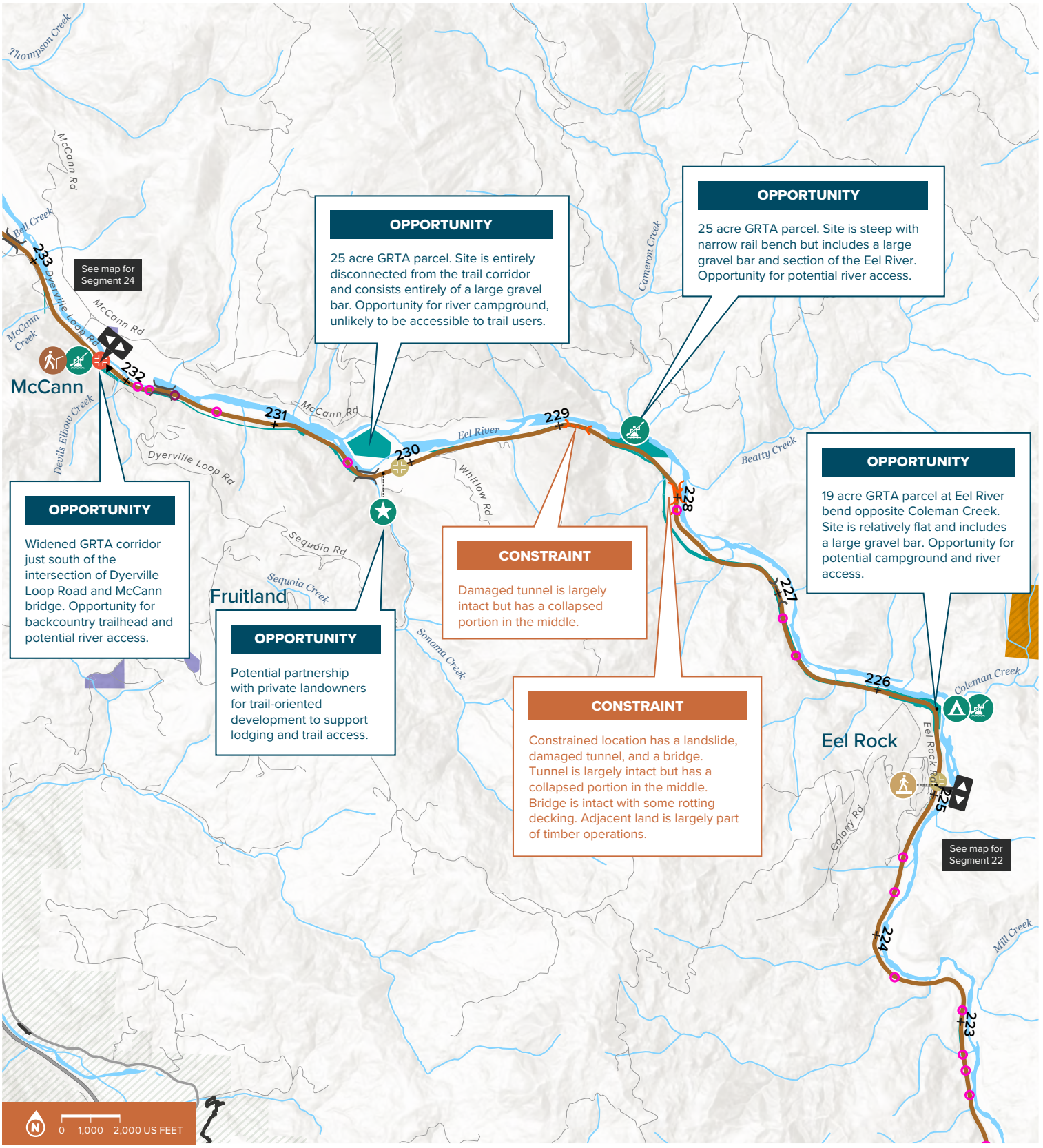

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MCCANN TO FOUNDER'S GROVE

Segment 24

SEGMENT EXTENTS

Dyerville Loop Rd, McCann to Dyerville Loop Rd, Founders Grove

COUNTY

Humboldt County

LENGTH

5.2 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE

Backcountry Trail

PRIORITIZATION

Tier 1

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SEGMENT DETAILS

- Segment Breakpoint
- Design Concept
- GRT Milepost

TRAIL TYPES

- Crushed Stone Trail
- Backcountry Trail
- Loop, non-GRT

TRAIL STATUS

- Existing

TRAIL AMENITIES*

Existing amenities

- Campground

Trailheads

- Backcountry Trailhead
- Backcountry Access Point

Potential Opportunity Sites

- Trail-Oriented Development
- Campground
- River Access
- Parks / Rest Areas

INFRASTRUCTURE

Roadway Crossings**

- Crossing, Minor Public

Infrastructure Conditions***

- Geomorphic, Major
- Geomorphic, Minor
- Bridge
- Bridge, Damaged
- Tunnel
- Rail Debris
- Hazardous Materials

BOUNDARIES

- City/Town/Place
- Parks & Public Lands

OWNERSHIP

- GRTA
- State
- Local

ENVIRONMENTAL

- Water

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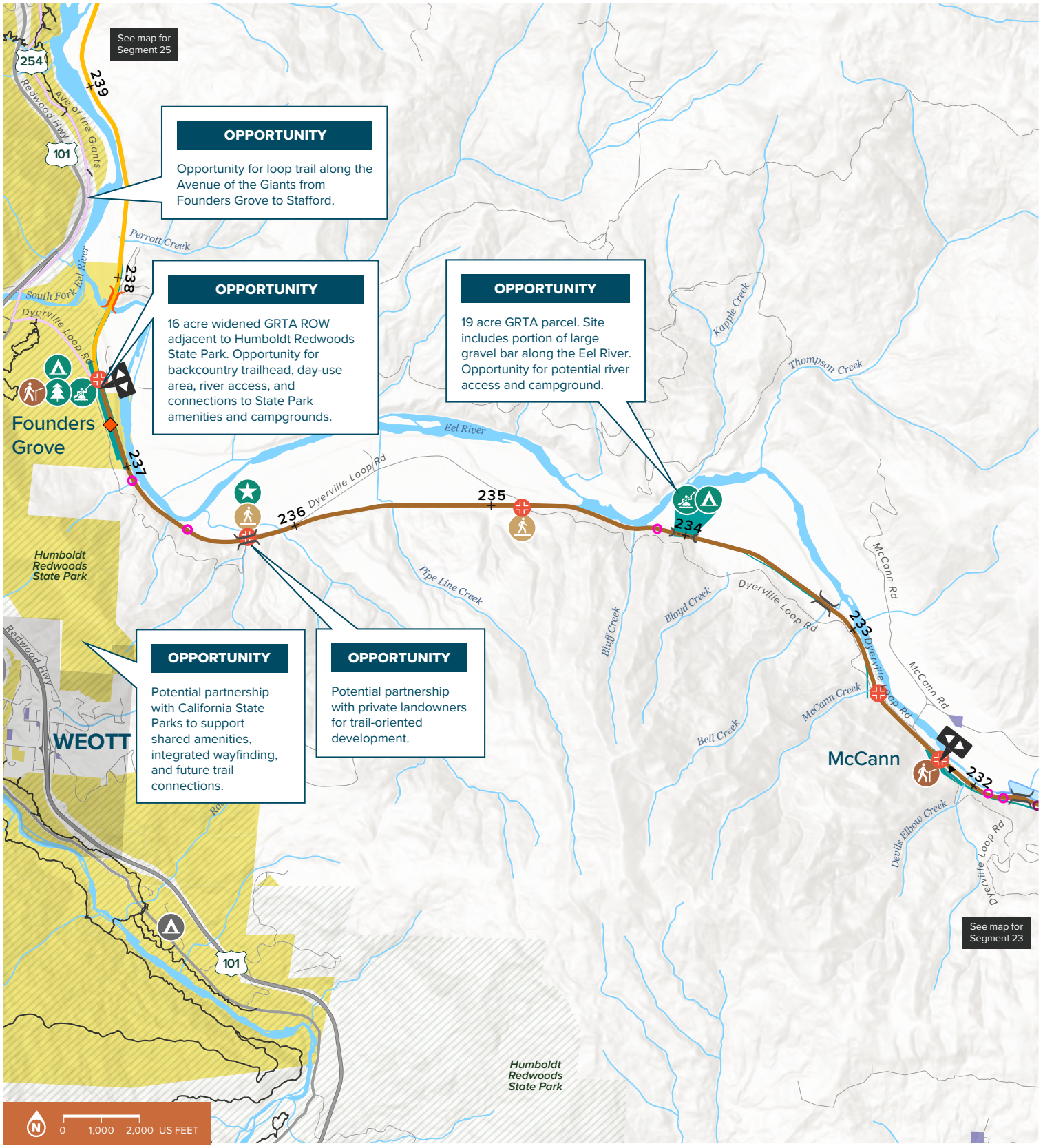

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FOUNDER'S GROVE TO PEPPERWOOD

Segment 25

SEGMENT EXTENTS

Dyerville Loop Rd, Founders Grove to Larabee Ranch Rd

COUNTY

Humboldt County

LENGTH

5.0 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE

Crushed Stone Multi-use Trail

PRIORITIZATION

Tier 3

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SEGMENT DETAILS

- Segment Breakpoint
- Design Concept
- \+ GRT Milepost

TRAIL TYPES

- Crushed Stone Trail
- Backcountry Trail
- Loop, non-GRT

TRAIL STATUS

- Existing

TRAIL AMENITIES*

Existing amenities

- Campground

Trailheads

- Community Access Point
- Backcountry Trailhead

Potential Opportunity Sites

- River Access
- Parks / Rest Areas

INFRASTRUCTURE

Roadway Crossings**

- Crossing, Minor Public
- Crossing, Private

Infrastructure Conditions***

- Geomorphic, Major
- Bridge
- Bridge, Damaged
- Hazardous Materials

BOUNDARIES

- City/Town/Place
- Parks & Public Lands

OWNERSHIP

- GRTA
- State
- Local

ENVIRONMENTAL

- Water

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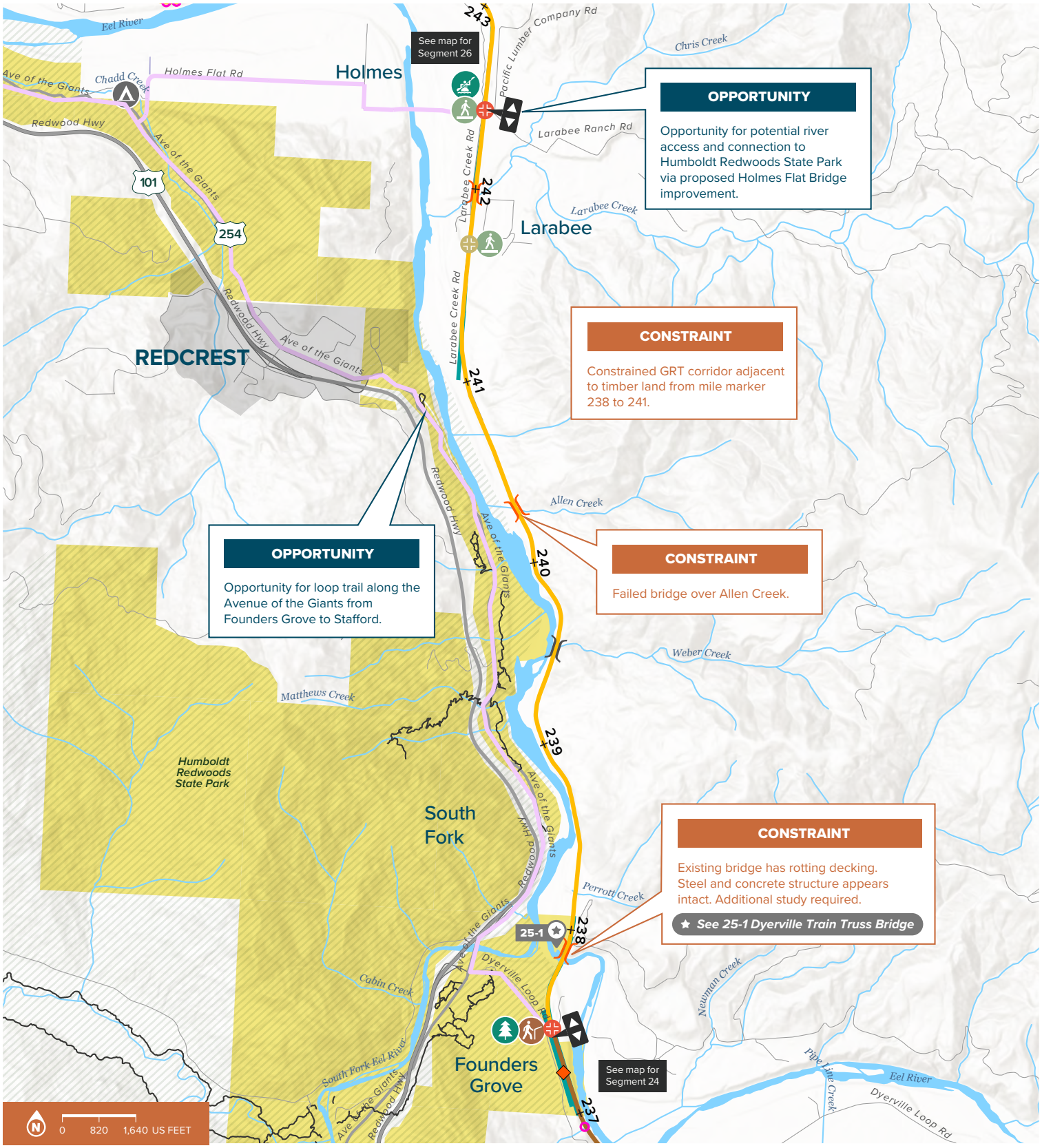

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25-1 Dyerville Train Truss Bridge

PRELIMINARY DESIGN ALTERNATIVES

A total of four (4) potential trail alignments were considered:

- Alternative “A” – Existing Bridge Alignment
- Alternative “B” – Low Flow Crossing Alignment
- Alternative “C” – Footbridge Alignment
- Dyerville Loop Road to Avenue of the Giants Alignment

TRAIL ALIGNMENT ALTERNATIVE “A” – EXISTING BRIDGE

This alternative utilizes the existing bridge. Assuming the bridge is in relatively good condition and not in need of significant repair, this would be the preferred alternative (Table 26, Figure 87).

Table 26: *Evaluation of Alignment Alternative “A” – Existing Bridge*

PROS	PRELIMINARY CHALLENGE/CONS
Utilizes existing bridge	Retrofit of existing bridge

Figure 87: *Alignment Alternative “A” - Existing Bridge Plan View*

TRAIL ALIGNMENT ALTERNATIVE “B” - LOW FLOW CROSSING

This alignment alternative features a low-flow river crossing with either no bridge or a seasonal footbridge. The trail alignment stays on river left past the existing bridge to cross the river at the downstream end of the gravel bar that forms under the bridge. Once the river is crossed, the trail zig zags up the slope to return to the railroad (Table 27, Figure 88).

Table 27: *Evaluation of Alignment Alternative “B” - Low Flow Crossing*

PROS	PRELIMINARY CHALLENGE/CONS
Wet crossing eliminates need for new bridge	Seasonal footbridge requires maintenance
	Wet crossing/trail only accessible during low flows

Figure 88: *Alignment Alternative “B” - Low Flow Crossing Plan View*

TRAIL ALIGNMENT ALTERNATIVE “C” - FOOTBRIDGE

This alignment alternative features a permanent footbridge. The new footbridge would be proximal to the existing bridge and utilize existing structural components as much as possible. If the footbridge is lower than the existing bridge, the trail would switchback up the slope to regain elevation to return to the railroad (Table 28, Figure 89).

Table 28: *Evaluation of Alignment Alternative “C” - Footbridge*

PROS	PRELIMINARY CHALLENGE/CONS
Wet crossing eliminates need for new bridge	Seasonal footbridge requires maintenance
	Wet crossing/trail only accessible during low flows

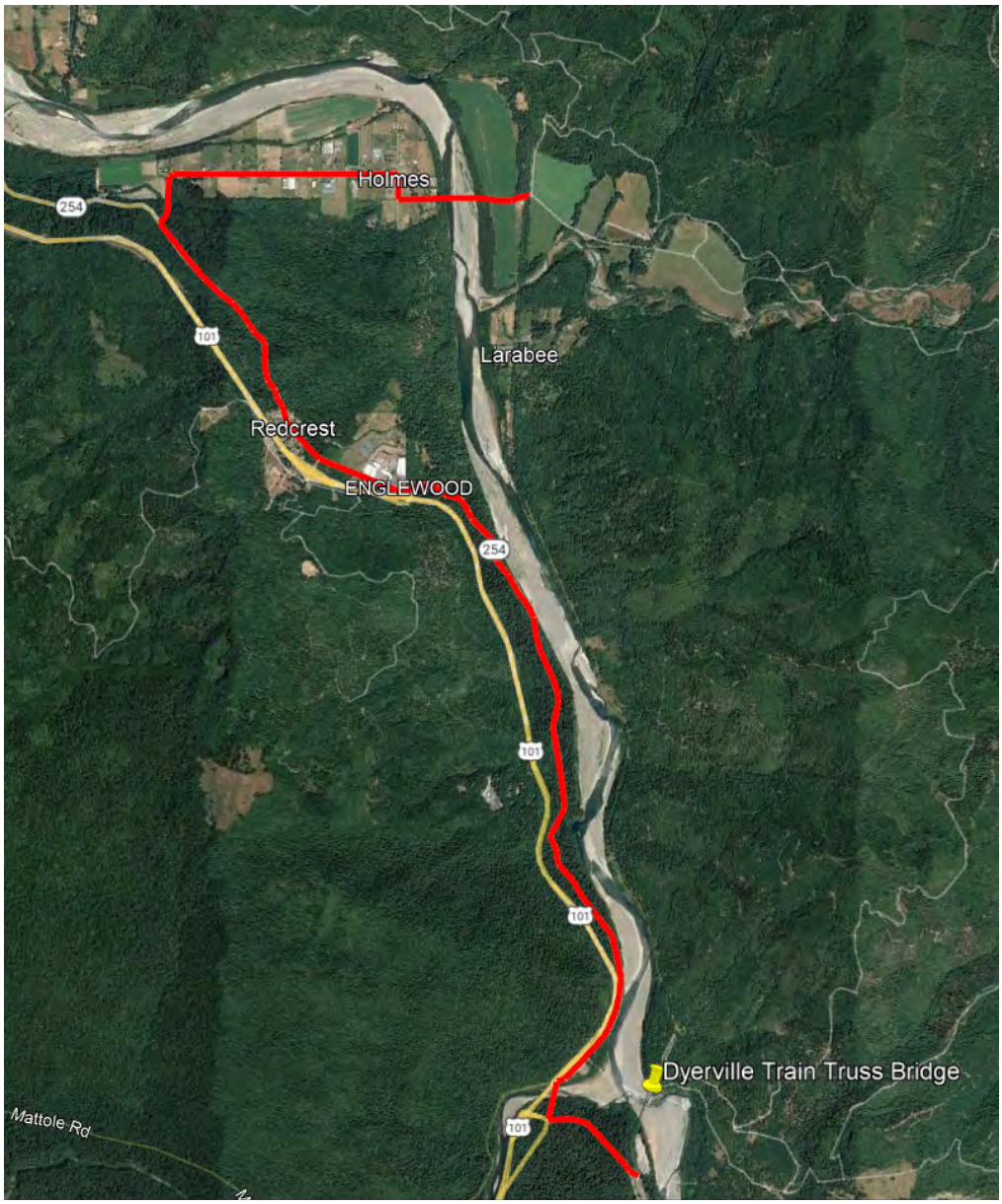
Figure 89: *Alignment Alternative “C” – Footbridge Plan View*

DYERVILLE LOOP ROAD TO AVENUE OF THE GIANTS ALIGNMENT

This alternative alignment routes from Dyerville Loop Road to Avenue of the Giants to avoid crossing the Eel River near the Dyerville Bridge (Figure 90).

The trail would deviate from the GRTA right-of-way for approximately 8.2 miles. Beginning at Dyerville Loop Road, the trail would join the Avenue of the Giants, a two-lane state highway that winds through scenic redwoods to the west of the Eel River. A wide variety of hiking trails, parkland, and other attractions are already accessible from the highway. The highway crosses the South Fork of the Eel River via a vehicle bridge that does not currently have a delineated lane for pedestrian or bicycle access. The trail would then follow Avenue of the Giants, a Caltrans facility, for 5.4 miles until Holmes Flat Road, which provides access to the until the next public river crossing via the Holmes Flat Road bridge. Holmes Flat Road bridge does not have a delineated lane for pedestrian access. Holmes Flat Road intersects the railroad on the east side of the Eel River, at which point the trail would rejoin the GRTA right-of-way. Homes Flat Road is a county roadway.

Figure 90: *Dyerville Loop Road to Avenue of the Giants Alignment Plan View*



Due to the significant detour from the GRTA right-of-way, this alignment would follow the public road right-of-way, traversing mainly adjacent to the Avenue of the Giants and local roadways through state parkland and rural residential areas. In some cases, there may not be room to accommodate a separate pedestrian/bicycle facility without a bridge expansion or property encroachment (further studies are required to evaluate these possibilities). The Avenue of the Giants winds through the redwood forest and removal of redwoods or other large trees would likely be required to accommodate the trail. There has been significant community pushback for tree removal proposals in the past. Additionally, this alignment would not provide access to the more remote, eastern side of the river along the GRTA right-of-way. These considerations are summarized in Table 29.

Due to the significant challenges and divergence from the GRTA objective of railbanking and staying with right-of-way, this alternative is considered to be impractical.

Table 29: *Evaluation of Dyerville Loop Road to Avenue of the Giants Alignment*

PROS	PRELIMINARY CHALLENGE/CONS
Avoids Dyerville Trestle Bridge	Longer alignment alternative
	Circumnavigates scenic viewsheds and experiences along 8.2 miles of the GRTA right-of-way
	Redwood tree impacts along Avenue of the Giants likely required
	Safety concerns with proximity to Avenue of the Giants and Holmes Road
	Shared vehicle-pedestrian bridges

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PEPPERWOOD TO STAFFORD

Segment 26

SEGMENT EXTENTS

Larabee Ranch Rd to Hwy 101, Shively Rd

COUNTY

Humboldt County

LENGTH

10.0 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE

Crushed Stone Multi-use Trail

PRIORITIZATION

Tier 3

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SEGMENT DETAILS

- Segment Breakpoint
- Design Concept
- \+ GRT Milepost

TRAIL TYPES

- Crushed Stone Trail
- Loop, non-GRT
- Parallel Route

TRAIL STATUS

- Existing

TRAIL AMENITIES*

Existing amenities

- Campground

Trailheads

- Community Trailhead
- Community Access Point

Potential Opportunity Sites

- Campground
- River Access
- Parks / Rest Areas

INFRASTRUCTURE

Roadway Crossings**

- Crossing, Minor Public
- Crossing, Private
- Underpass

Infrastructure Conditions***

- Geomorphic, Major
- Bridge
- Bridge, Damaged
- Tunnel, Damaged

BOUNDARIES

- City/Town/Place
- Parks & Public Lands

OWNERSHIP

- GRTA
- State
- Local

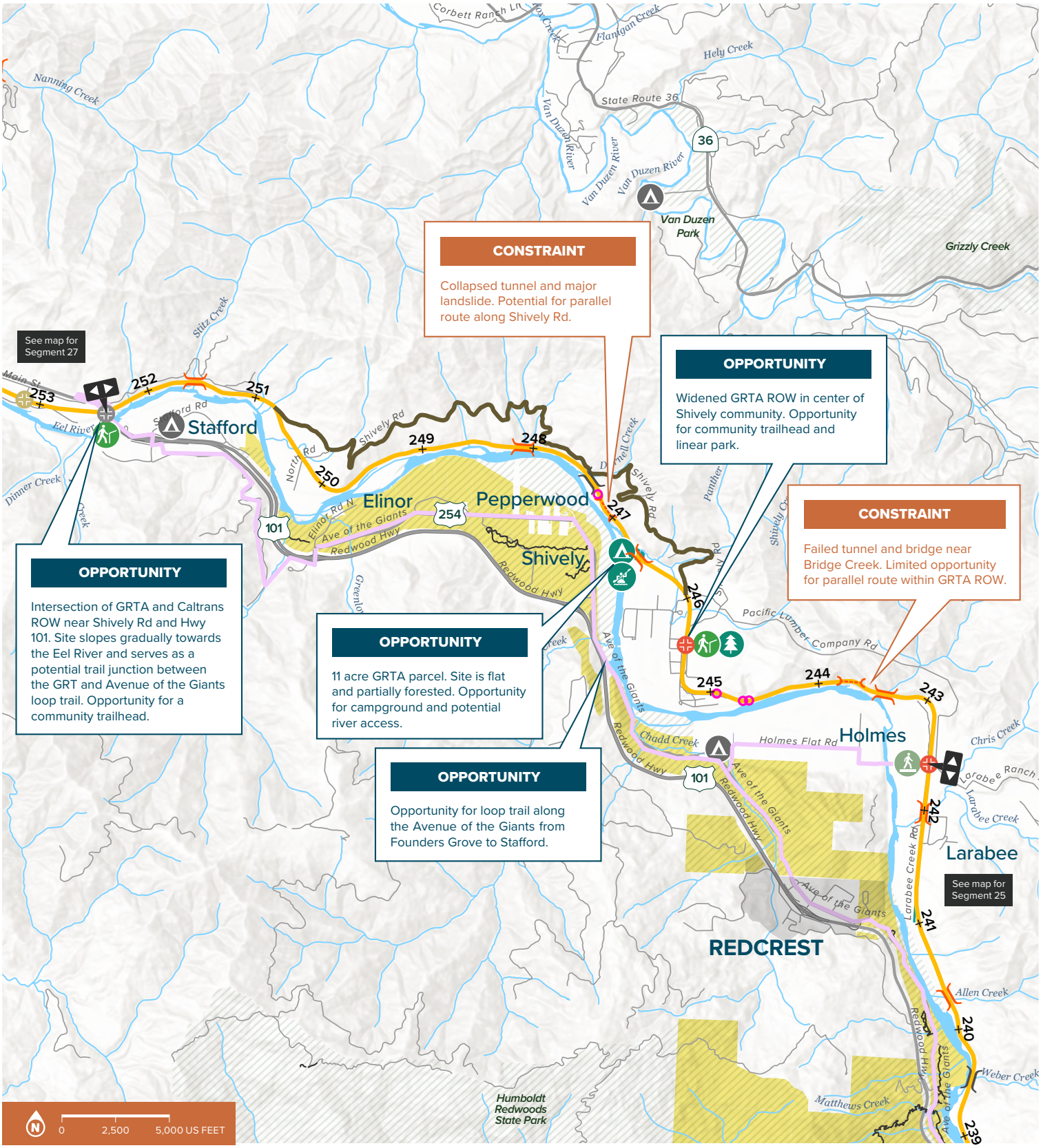
ENVIRONMENTAL

- Water

*All amenities are potential opportunities for planning purposes only.

**Private crossings may or may not be licensed.

***Conditions reflect best available data as of 2023. It is understood that conditions are rapidly changing based on 2020 report data. Select points have been updated based on new information.



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STAFFORD TO SCOTIA

Segment 27

SEGMENT EXTENTS

Hwy 101, Shively Rd to Fireman's Park, Scotia

COUNTY

Humboldt County

LENGTH

2.6 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE

Crushed Stone Multi-use Trail

PRIORITIZATION

Tier 3

The Master Plan trail segments are delineated for prioritization and high-level planning purposes only. They may be used to develop individual projects for advanced planning, environmental review (including CEQA), and design study in the future. However, individual projects might be comprised of an entire Master Plan segment, multiple segments, or portions of segments depending on a variety of factors including partner agencies (i.e., project proponents), funding, permitting, and additional engineering analysis.

SEGMENT DETAILS

- Segment Breakpoint
- Design Concept
- \+ GRT Milepost

TRAIL TYPES

- Crushed Stone Trail
- Loop, non-GRT

TRAIL AMENITIES*

Trailheads

- Community Gateway
- Community Trailhead

INFRASTRUCTURE

Roadway Crossings**

- Crossing, Minor Public
- Crossing, Private
- Underpass

BOUNDARIES

- City/Town/Place

OWNERSHIP

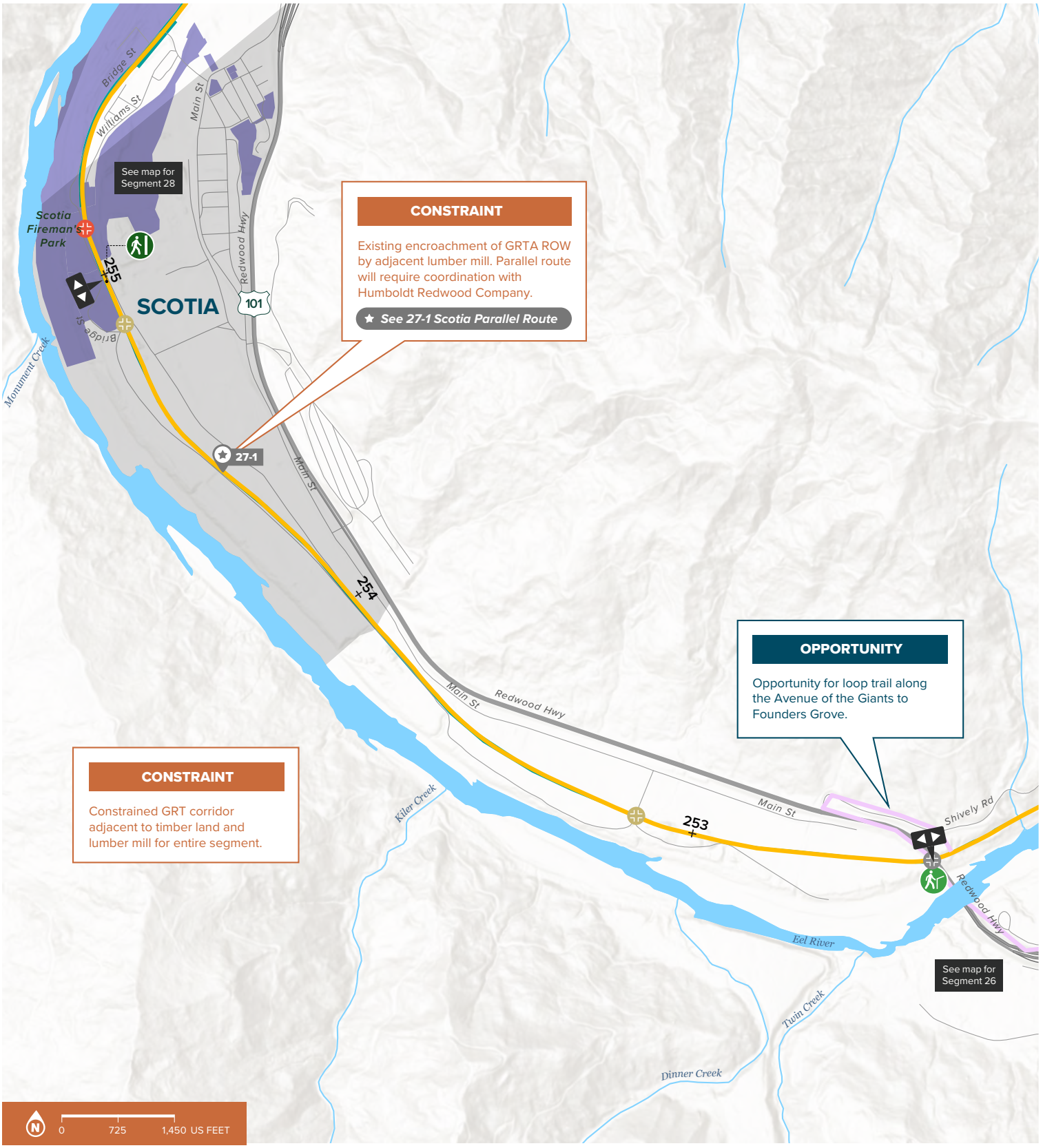
- GRTA
- Local

ENVIRONMENTAL

- Water

**All amenities are potential opportunities for planning purposes only.*

***Private crossings may or may not be licensed.*



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27-1 Scotia Parallel Route

PRELIMINARY DESIGN ALTERNATIVES

This segment provides an opportunity for better connectivity to Fireman's Park and Rio Dell. A total of two design alternatives were considered:

- A crushed stone trail along GRT right-of-way
- A combination of a paved Class I trail and on-street facility through the center of Scotia

ALTERNATIVE A – CRUSHED STONE TRAIL ALONG GRT RIGHT-OF-WAY

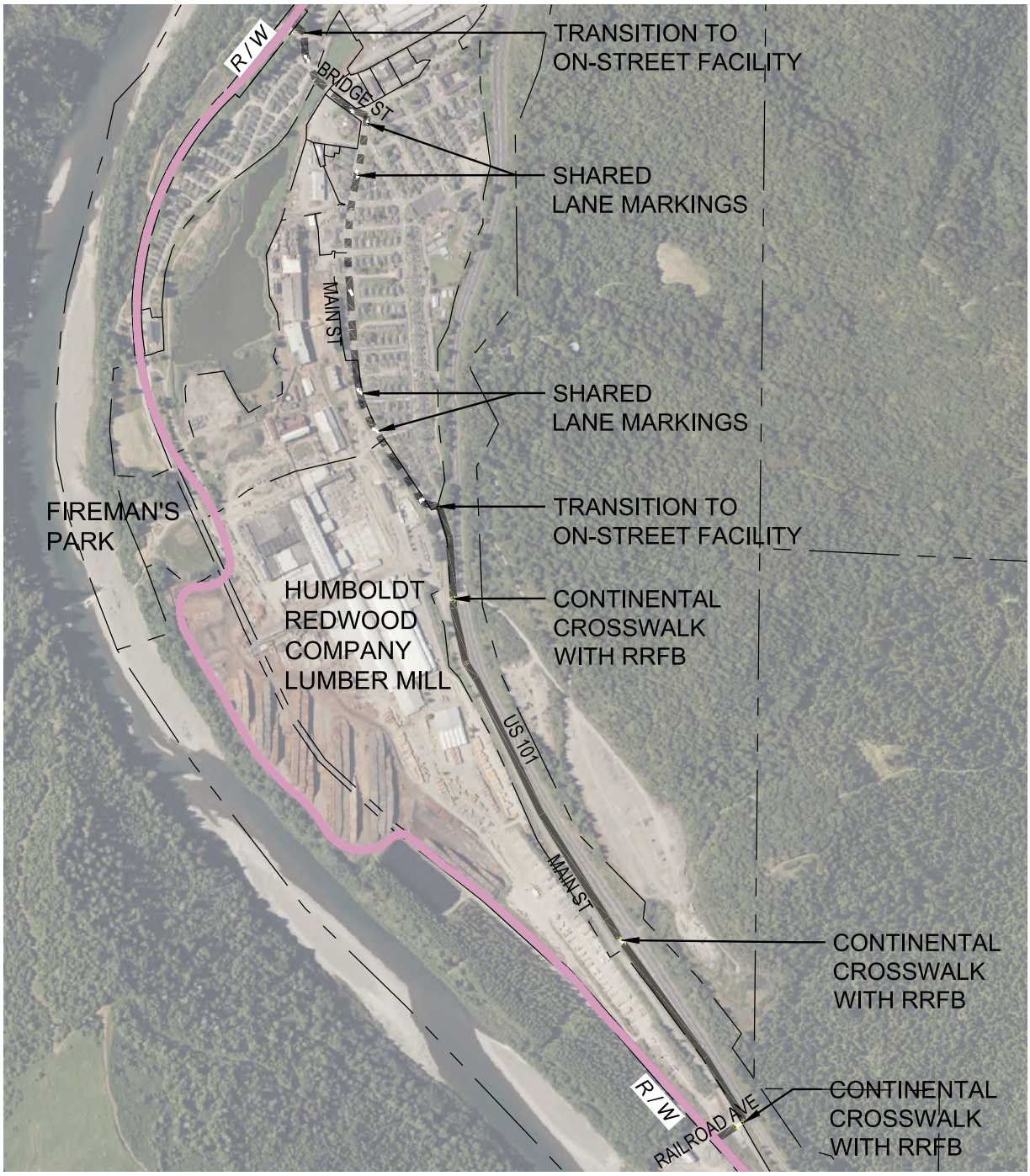
This alternative consists of a crushed stone trail along GRT right-of-way except for a short stretch where the alignment shifts west to reduce impact to HRC operations.

PROS	CHALLENGES
Separation from vehicular traffic	Would impact a portion of HRC operations
Direct connection to Fireman's Park	Potential environmental impacts to Eel River top of bank

ALTERNATIVE B – PAVED TRAIL AND ON-STREET FACILITY

This alternative consists of a paved Class I trail parallel to Main Street and HWY 101. North of B Street, the trail would transition to a shared bike route/on-street facility through the center of Scotia. Pedestrians would use the existing sidewalks. This alternative would avoid HRC operations.

PROS	CHALLENGES
Avoids HRC operations	Does not connect to Fireman's Park
Provides direct connection to center of Scotia	Cyclists would have to share road with vehicles



LEGEND:

GRT - OPT A - CRUSHED STONE

GRT - OPT B - PAVED + ON-STREET FACILITY

0 1000' 2000'

Scale: 1" = 1000'

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GREAT REDWOOD TRAIL MASTER PLAN
SCOTIA TO STAFFORD

MM 254

FIGURE 7

Dwg filename: N:\Shared\PROJECTS\2022\00-2022-180 CA Great Redwood Trail Master Plan\CAD\02_Exhibits\MM254-Z1-Scotia to Stafford\22-180_EXH_SCOSTAFF-OPTION A and B.dwg Last saved by: katrinacortiz Plot date: 1/23/2024 5:09 PM Plotstyle table: ALTA NCS Standard.stb

Figure 91: *Alternative A - Pathway adjacent to Humboldt Redwood Company*

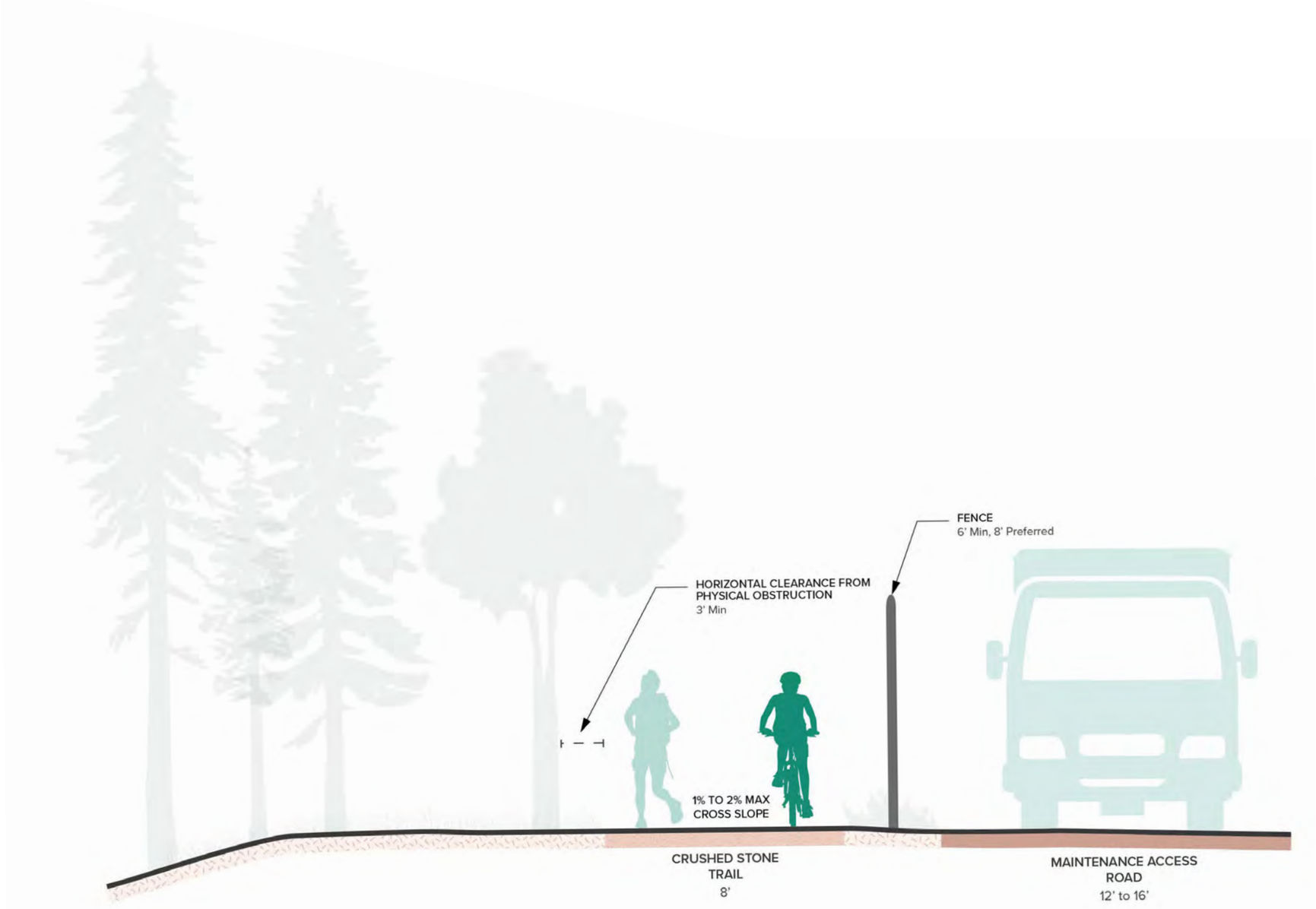
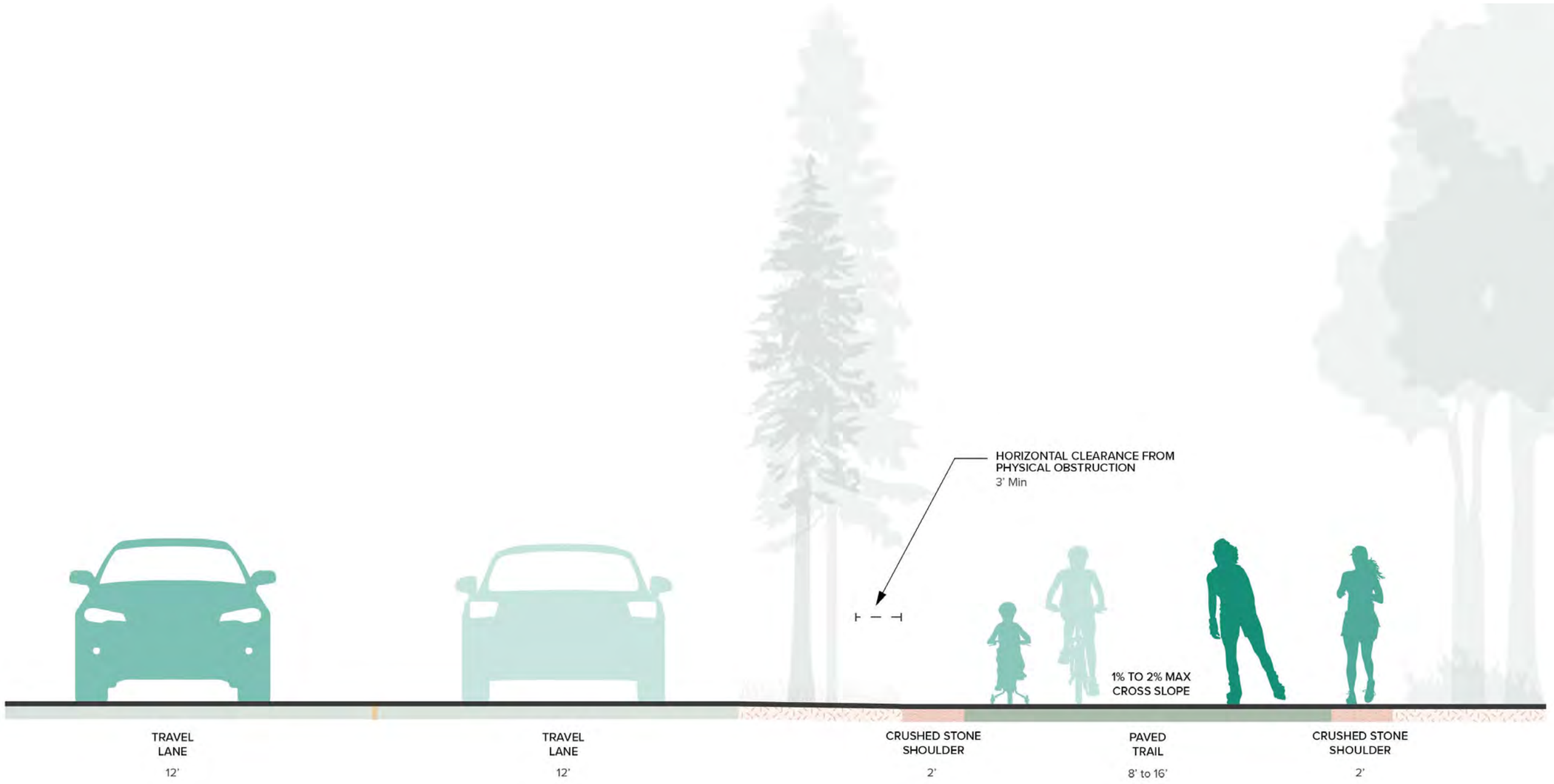


Figure 92: *Alternative B - Shared lane and sidewalks through central Scotia*

Figure 93: *Alternative B - Pathway adjacent to Main Street in southern Scotia Humboldt Redwood Company*



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SCOTIA FIREMAN'S PARK

Segment 28

SEGMENT EXTENTS

Fireman's Park, Scotia to Wildwood Ave Bridge, Scotia

COUNTY

Humboldt County

LENGTH

1.1 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE

Crushed Stone Multi-use Trail

PRIORITIZATION

Tier 2

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SEGMENT DETAILS

- Segment Breakpoint
- Design Concept
- GRT Milepost

TRAIL TYPES

- Crushed Stone Trail
- Backcountry Trail

TRAIL AMENITIES*

Existing Amenities

- Parks

Trailheads

- Community Gateway
- Community Access Point

Potential Opportunity Sites

- Trail-Oriented Development

INFRASTRUCTURE

Roadway Crossings**

- Crossing, Major Public
- Crossing, Minor Public
- Underpass

BOUNDARIES

- City/Town/Place
- Parks & Public Lands

OWNERSHIP

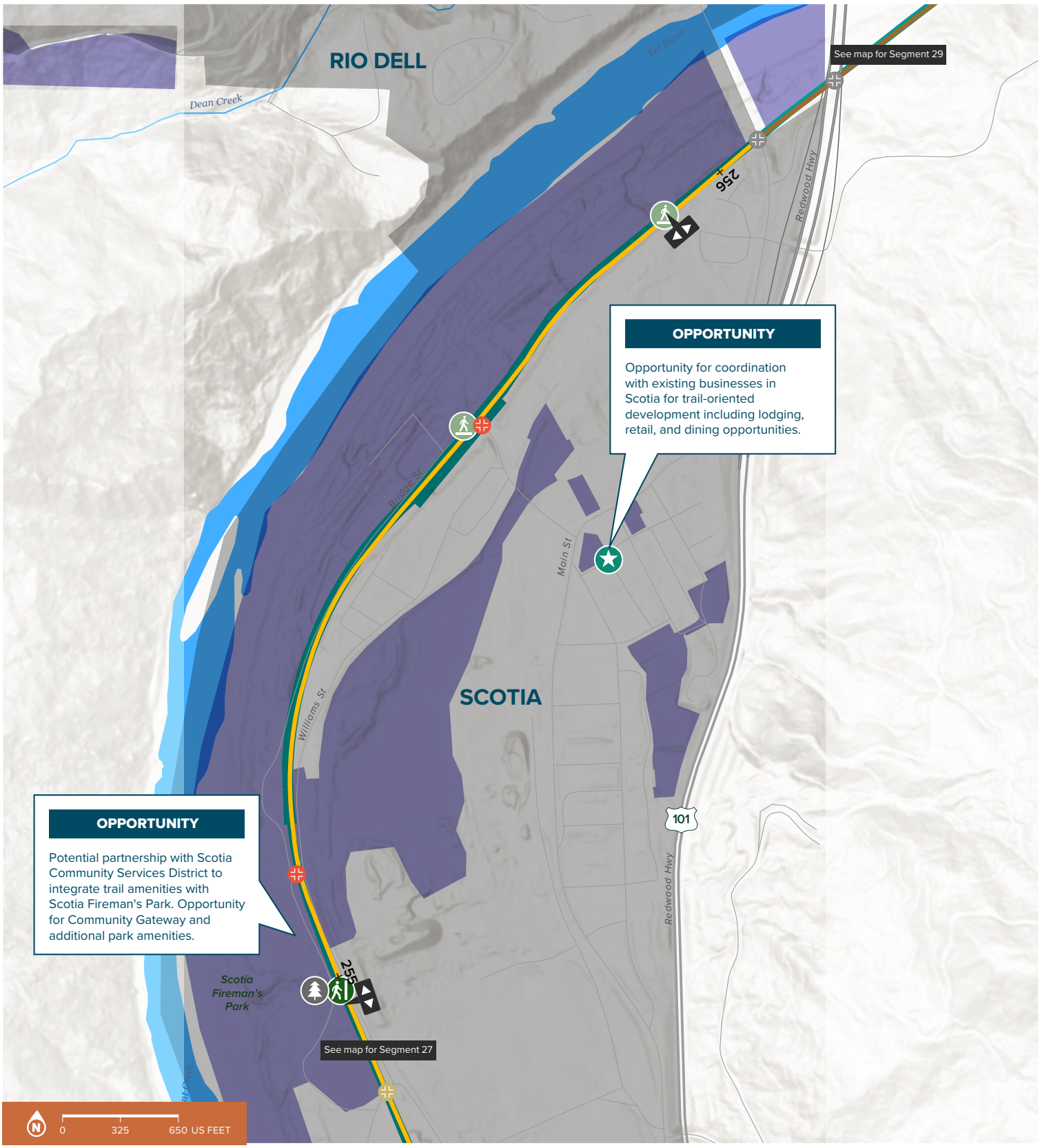
- GRTA
- Local

ENVIRONMENTAL

- Water

**All amenities are potential opportunities for planning purposes only.*

***Private crossings may or may not be licensed.*



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RIO DELL / SCOTIA BLUFFS TRAIL

Segment 29

SEGMENT EXTENTS

Wildwood Ave Bridge, Scotia to Metropolitan Heights Rd, North of Rio Dell

COUNTY

Humboldt County

LENGTH

3.5 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE

Backcountry Trail

PRIORITIZATION

Tier 1

The Master Plan trail segments are delineated for prioritization and high-level planning purposes only. They may be used to develop individual projects for advanced planning, environmental review (including CEQA), and design study in the future. However, individual projects might be comprised of an entire Master Plan segment, multiple segments, or portions of segments depending on a variety of factors including partner agencies (i.e., project proponents), funding, permitting, and additional engineering analysis.

SEGMENT DETAILS

- Segment Breakpoint
- Design Concept
- \+ GRT Milepost

TRAIL TYPES

- Paved Trail
- Crushed Stone Trail
- Backcountry Trail
- Parallel Routes

TRAIL AMENITIES

Existing amenities

- Parks / Rest Areas

Trailheads

- Community Trailhead
- Community Access Point

Potential Opportunity Sites

- Trail-Oriented Development

INFRASTRUCTURE

Roadway Crossings**

- Crossing, Minor Public
- Crossing, Private
- Underpass

Infrastructure Conditions***

- Geomorphic, Major
- Geomorphic, Minor
- Bridge, Damaged

BOUNDARIES

- City/Town/Place
- Parks & Public Lands

OWNERSHIP

- GRTA
- Local
- State

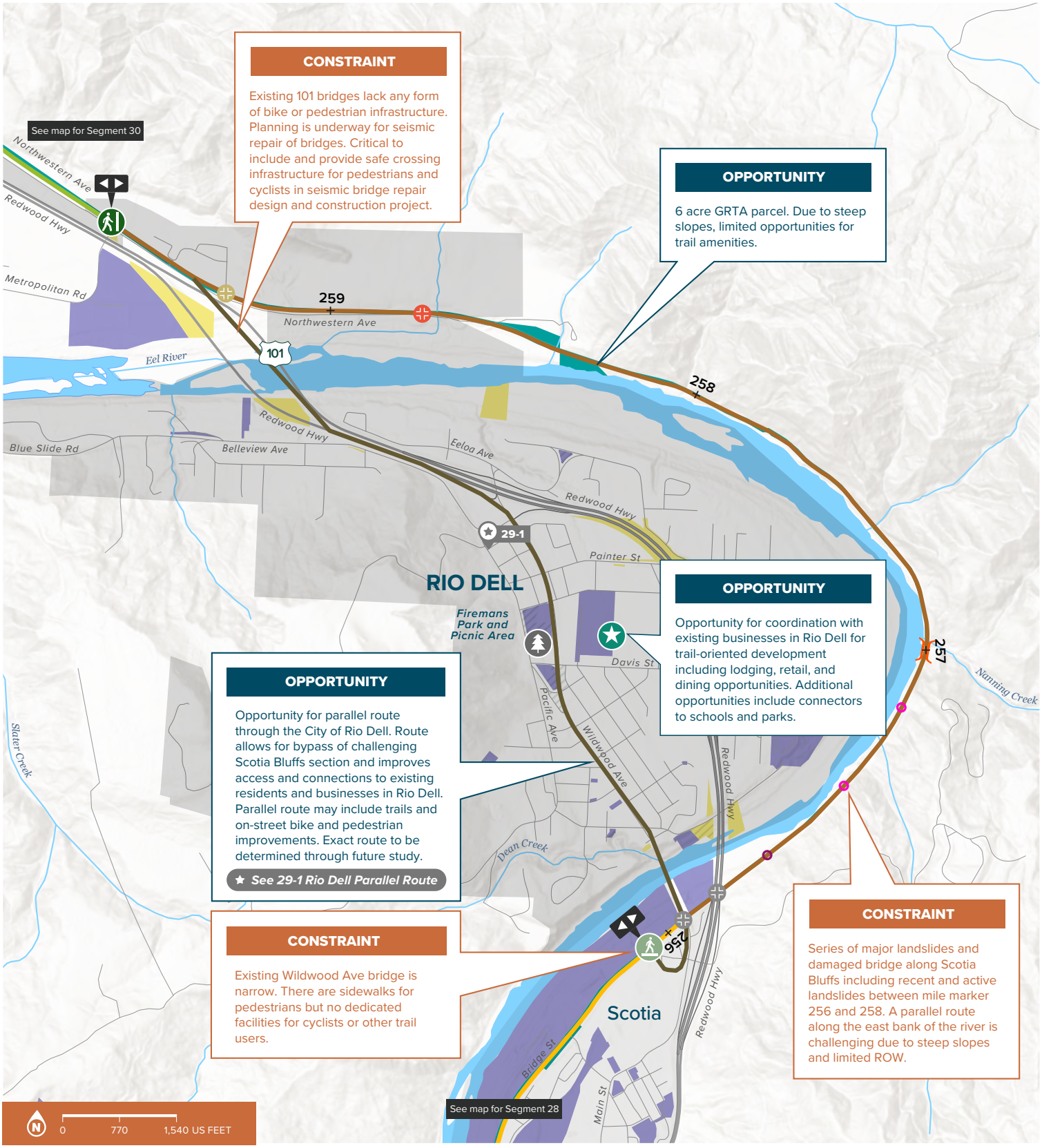
ENVIRONMENTAL

- Water

**All amenities are potential opportunities for planning purposes only.*

***Private crossings may or may not be licensed.*

****Conditions reflect best available data as of 2023. It is understood that conditions are rapidly changing based on 2020 report data. Select points have been updated based on new information.*



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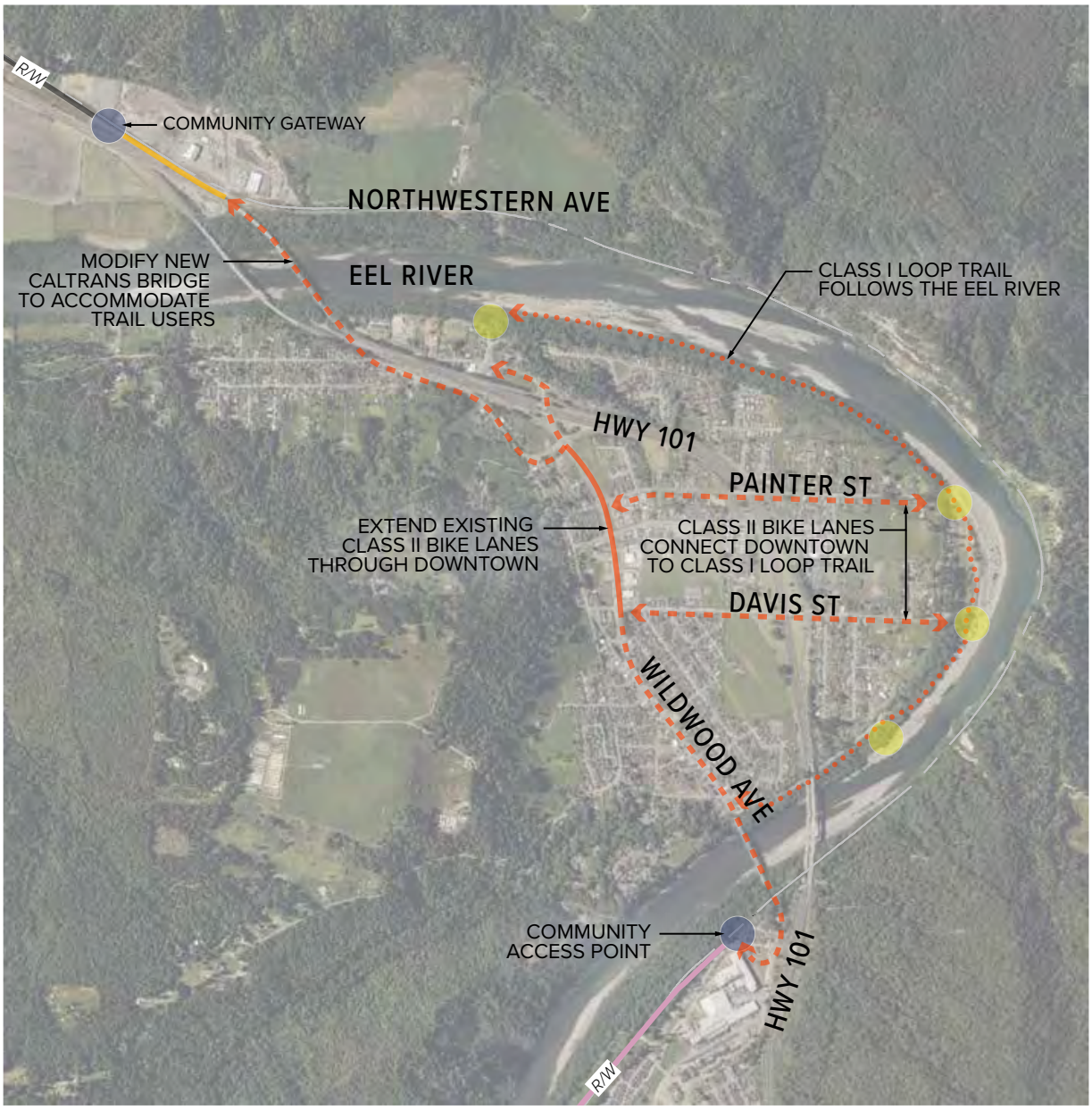
29-1 Rio Dell Parallel Route

PRELIMINARY DESIGN

Trail development along the Scotia Bluffs is unlikely due to a series of major landslides. As an alternative, there is an opportunity to take advantage of Rio Dell's adopted Circulation Diagram, which includes an improved network of bicycle and pedestrian facilities.

Challenges remain on both the north and south side of Rio Dell as the bridges do not include adequate bicycle facilities.



LEGEND:

- EXISTING RAIL BED
- GREAT REDWOOD TRAIL, TRAILHEAD
- PARKING / STAGING OPPORTUNITY
- EXISTING - CLASS II
- PROPOSED TOWN TRAIL* - CLASS II
- PROPOSED LOOP TRAIL* - CLASS I

*PER RIO DELL'S CIRCULATION DIAGRAM

NOTE: DESIGN INTENT TO REDUCE IMPERVIOUS SURFACES

- GRT - BACKCOUNTRY TRAIL
- GRT - CRUSHED STONE TRAIL
- GRT - PAVED TRAIL

0 1800' 3600'

Scale: 1" = 1800'

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GREAT REDWOOD TRAIL MASTER PLAN
SCOTIA BLUFFS TRAIL

MM 256

FIGURE 8

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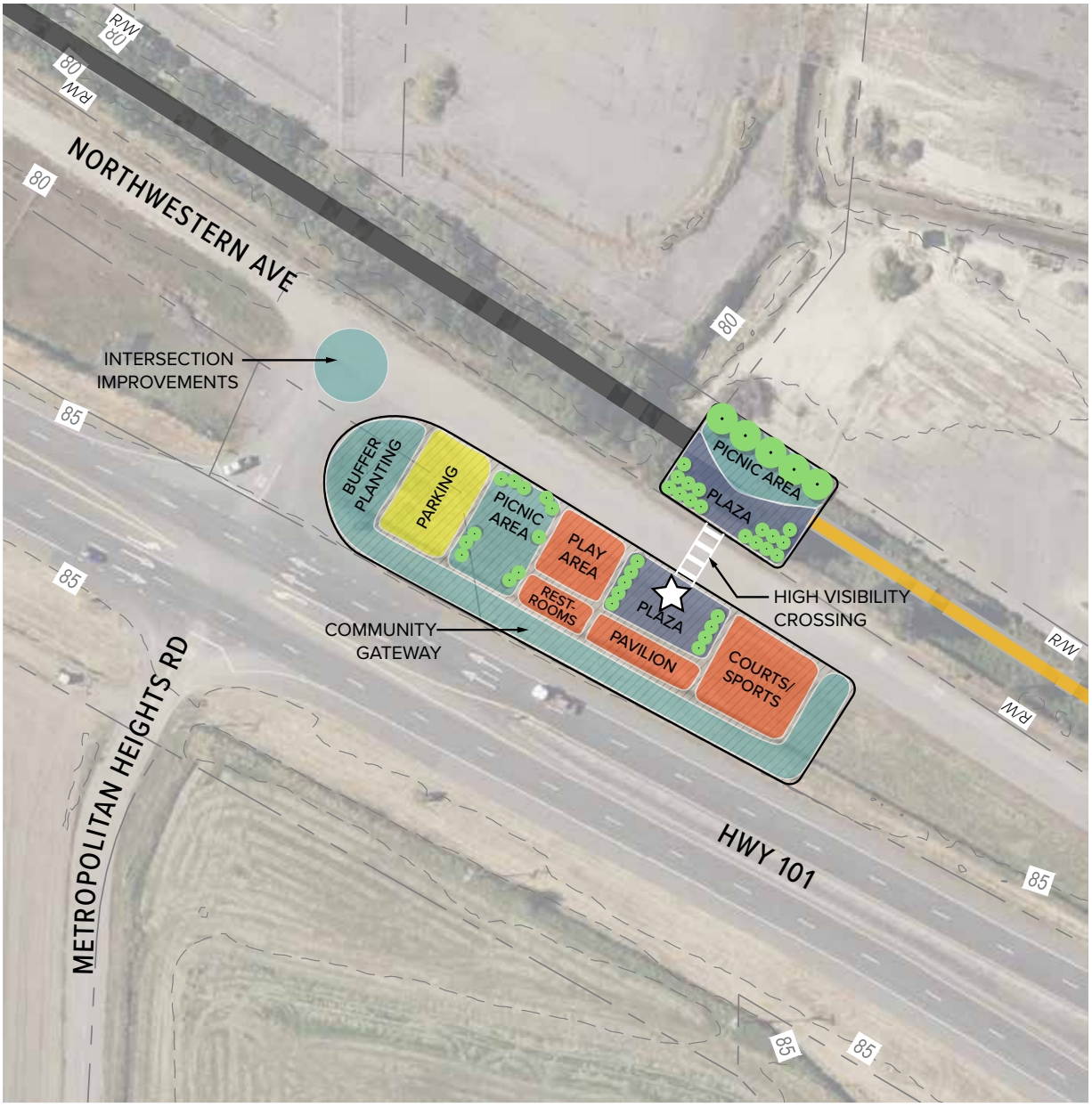

LEGEND:

- EXISTING RAIL BED
- TRAILHEAD AMENITIES
- TRAILHEAD RECREATION SPACES
- TRAILHEAD ACCESS IMPROVEMENTS
- TRAILHEAD PARKING
- GREAT REDWOOD TRAIL, PAVED
- GREAT REDWOOD TRAIL, BACKCOUNTRY

NOTE: DESIGN INTENT TO REDUCE IMPERVIOUS SURFACES

0 100' 200'

Scale: 1" = 100'

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GREAT REDWOOD TRAIL MASTER PLAN
SCOTIA BLUFFS COMMUNITY GATEWAY

MM 259.5

FIGURE 9

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ALTON

Segment 30

SEGMENT EXTENTS

Metropolitan Heights Rd, North of Rio Dell to Riverwalk Dr, Fortuna

COUNTY

Humboldt County

LENGTH

5.0 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE

Paved Multi-use Trail

PRIORITIZATION

Tier 1

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SEGMENT DETAILS

- Segment Breakpoint
- Design Concept
- GRT Milepost

TRAIL TYPES

- Paved Trail
- Crushed Stone Trail
- Backcountry Trail
- Loop
- Parallel Route

TRAIL STATUS

- Existing
- Planned

TRAIL AMENITIES*

Trailheads

- Community Gateway
- Community Trailhead
- Community Access Point

Potential Opportunity Sites

- Trail-Oriented Development
- Campground
- Parks / Rest Areas

INFRASTRUCTURE

Roadway Crossings**

- Crossing, Minor Public
- Crossing, Private
- Underpass

Infrastructure Conditions***

- Geomorphic, Major
- Bridge
- Bridge, Damaged
- Hazardous Materials

BOUNDARIES

- City/Town/Place
- Tribal
- Parks & Public Lands

OWNERSHIP

- GRTA
- State
- Federal
- Tribal
- Local

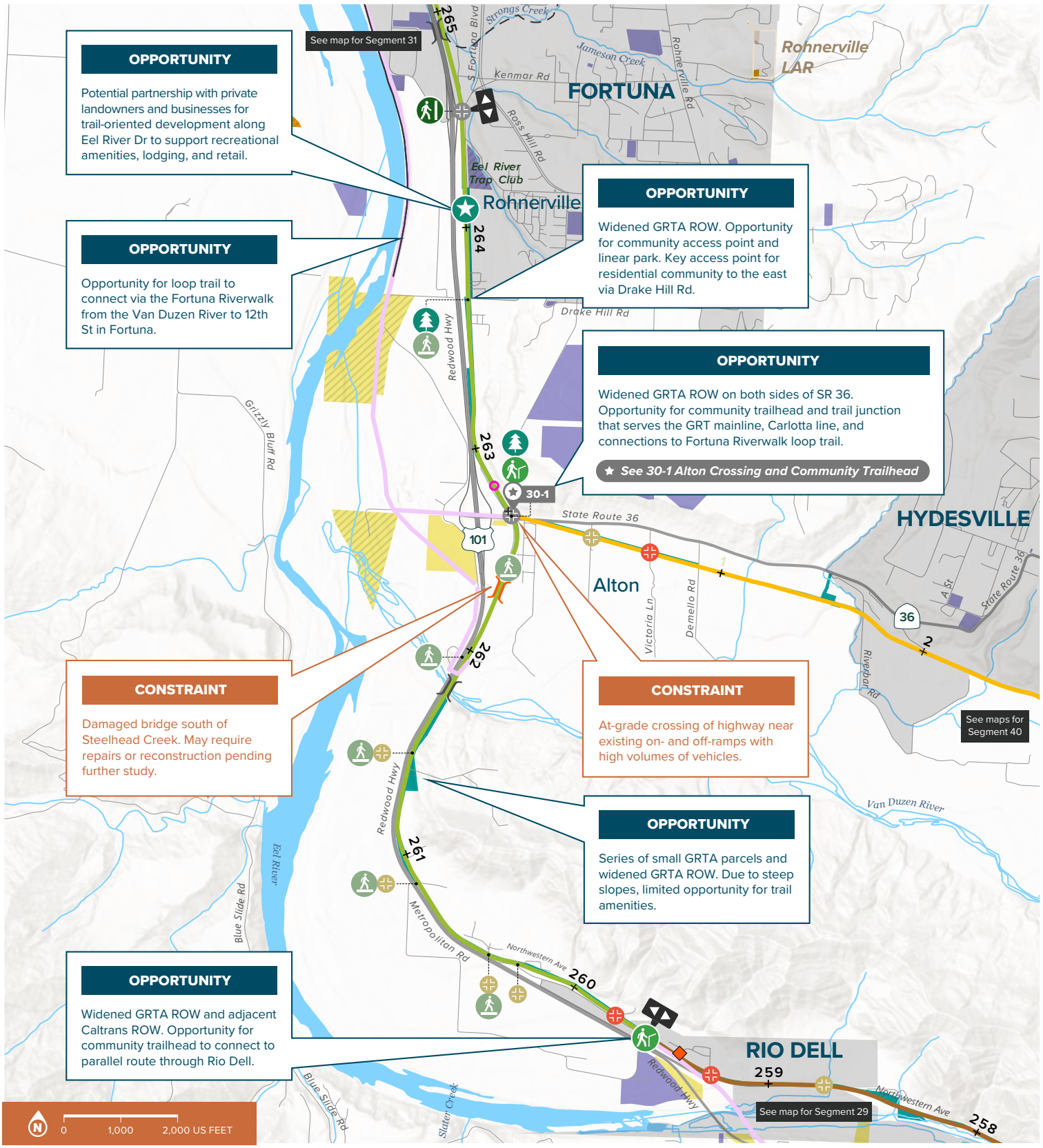
ENVIRONMENTAL

- Water

**All amenities are potential opportunities for planning purposes only.*

***Private crossings may or may not be licensed.*

****Conditions reflect best available data as of 2023. It is understood that conditions are rapidly changing based on 2020 report data. Select points have been updated based on new information.*



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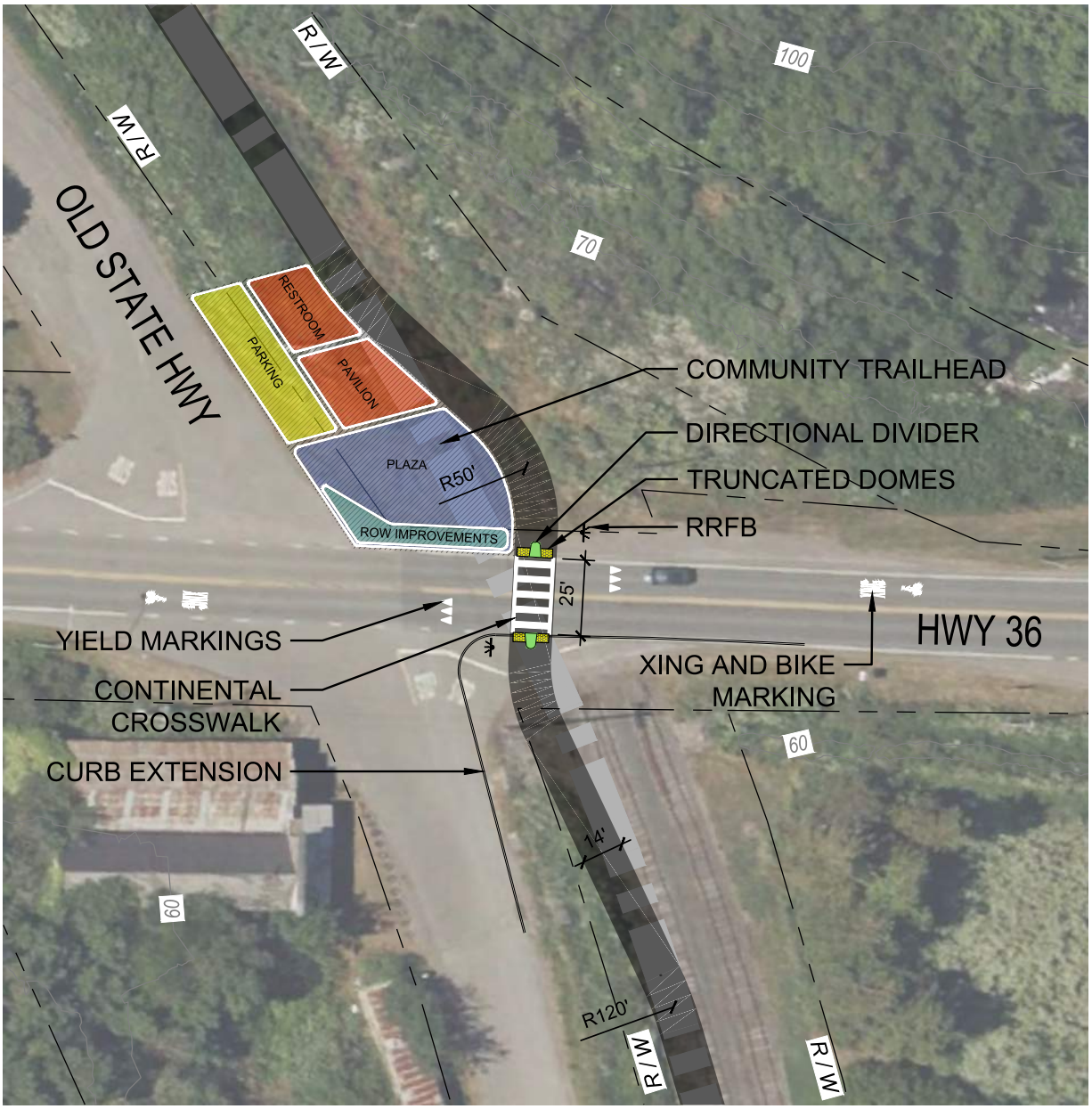
30-1 Alton Crossing and Community Trailhead



LEGEND:

- EXISTING RAIL BED
- GREAT REDWOOD TRAIL, PAVED
- TRAILHEAD AMENITIES
- TRAILHEAD RECREATION SPACES
- TRAILHEAD ACCESS IMPROVEMENTS
- TRAILHEAD PARKING

NOTE: DESIGN INTENT TO REDUCE IMPERVIOUS SURFACES

0 50' 100'

Scale: 1" = 50'

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GREAT REDWOOD TRAIL MASTER PLAN
ALTON

MM 262.4

FIGURE 10

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FORTUNA TO FERNBRIDGE

Segment 31

SEGMENT EXTENTS

Riverwalk Dr, Fortuna to SR 211, Fernbridge

COUNTY

Humboldt County

LENGTH

4.2 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE

Paved Multi-use Trail

PRIORITIZATION

Tier 1

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SEGMENT DETAILS

- Segment Breakpoint
- Design Concept
- GRT Milepost

TRAIL TYPES

- Paved Trail
- Loop

TRAIL STATUS

- Existing Trail
- Planned

TRAIL AMENITIES*

Trailheads

- Community Gateway
- Community Access Point

Potential Opportunity Sites

- Trail-Oriented Development
- Parks / Rest Areas

INFRASTRUCTURE

Roadway Crossings*

- Crossing, Highway
- Crossing, Major Public
- Crossing, Private
- Underpass

Infrastructure Conditions***

- Bridge
- Hazardous Materials

BOUNDARIES

- City/Town/Place
- Parks & Public Lands

OWNERSHIP

- GRTA
- Local
- State
- Federal
- Nonprofit

ENVIRONMENTAL

- Water

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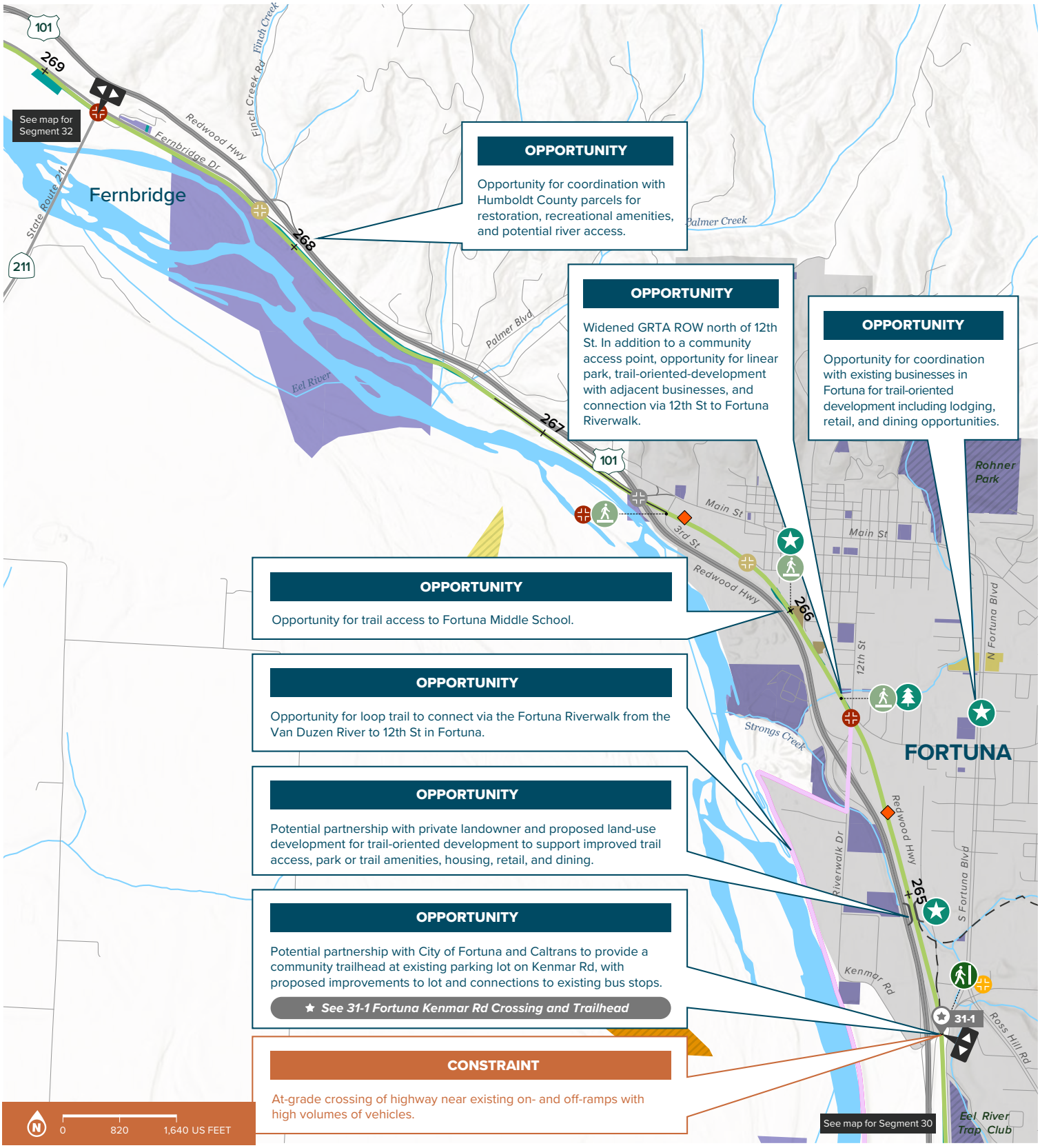
**Private crossings may or may not be licensed.

***Conditions reflect best available data as of 2023. It is understood that conditions are rapidly changing based on 2020 report data. Select points have been updated based on new information.



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31-1 Fortuna Kenmar Rd Crossing and Trailhead

LEGEND:

- EXISTING RAIL BED
- R/W - GRTA RIGHT-OF-WAY
- GREAT REDWOOD TRAIL, PAVED
- TRAILHEAD AMENITIES
- TRAILHEAD RECREATION SPACES
- TRAILHEAD ACCESS IMPROVEMENTS
- TRAILHEAD PARKING

NOTE: DESIGN INTENT TO REDUCE IMPERVIOUS SURFACES

0 100' 200'

Scale: 1" = 100'

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GREAT REDWOOD TRAIL MASTER PLAN
FORTUNA TO FERNBRIDGE

MM 264.5

FIGURE 11

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LOLETA

Segment 32

SEGMENT EXTENTS

SR 211, Fernbridge to Tompkins Hill Rd, College of the Redwoods

COUNTY

Humboldt County

LENGTH

7.7 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE

Paved Multi-use Trail

PRIORITIZATION

Tier 1

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SEGMENT DETAILS

- Segment Breakpoint
- Design Concept
- \+ GRT Milepost

TRAIL TYPES

- Paved Trail
- Connector

TRAIL STATUS

- —— Existing
- – – Planned

TRAIL AMENITIES*

Trailheads

- Community Gateway
- Community Trailhead
- Community Access Point

Potential Opportunity Sites

- Trail-Oriented Development
- Park / Rest Areas

INFRASTRUCTURE

Roadway Crossings**

- Crossing, Major Public
- Crossing, Minor Public
- Underpass

Infrastructure Conditions***

- Geomorphic, Major
- Geomorphic, Minor
- Bridge
- Bridge, Damaged
- Tunnel

BOUNDARIES

- City/Town/Place
- Tribal
- Parks & Public Lands

OWNERSHIP

- GRTA
- Local
- State
- Federal
- Nonprofit
- Tribal

ENVIRONMENTAL

- Water

**All amenities are potential opportunities for planning purposes only.*

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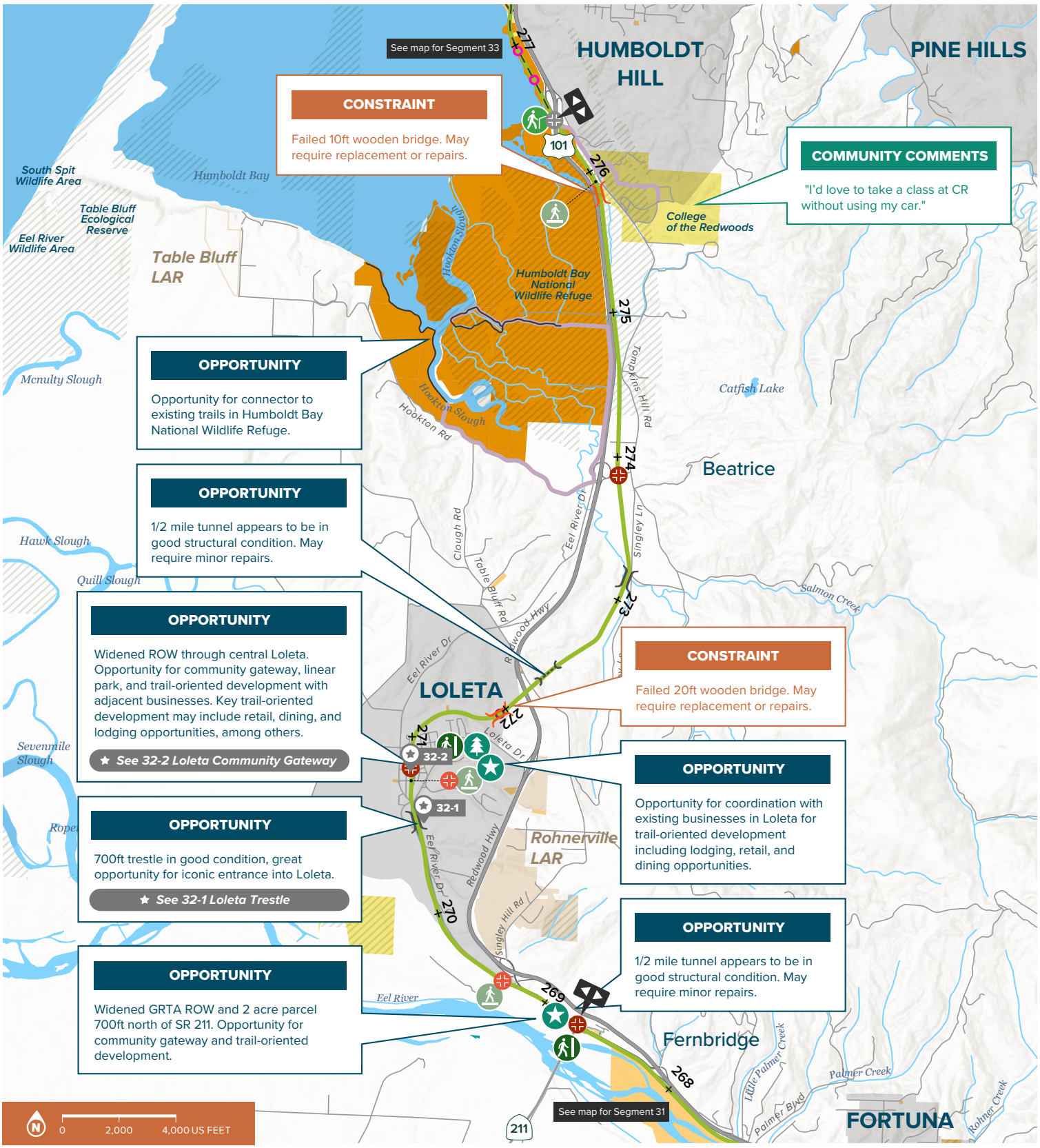

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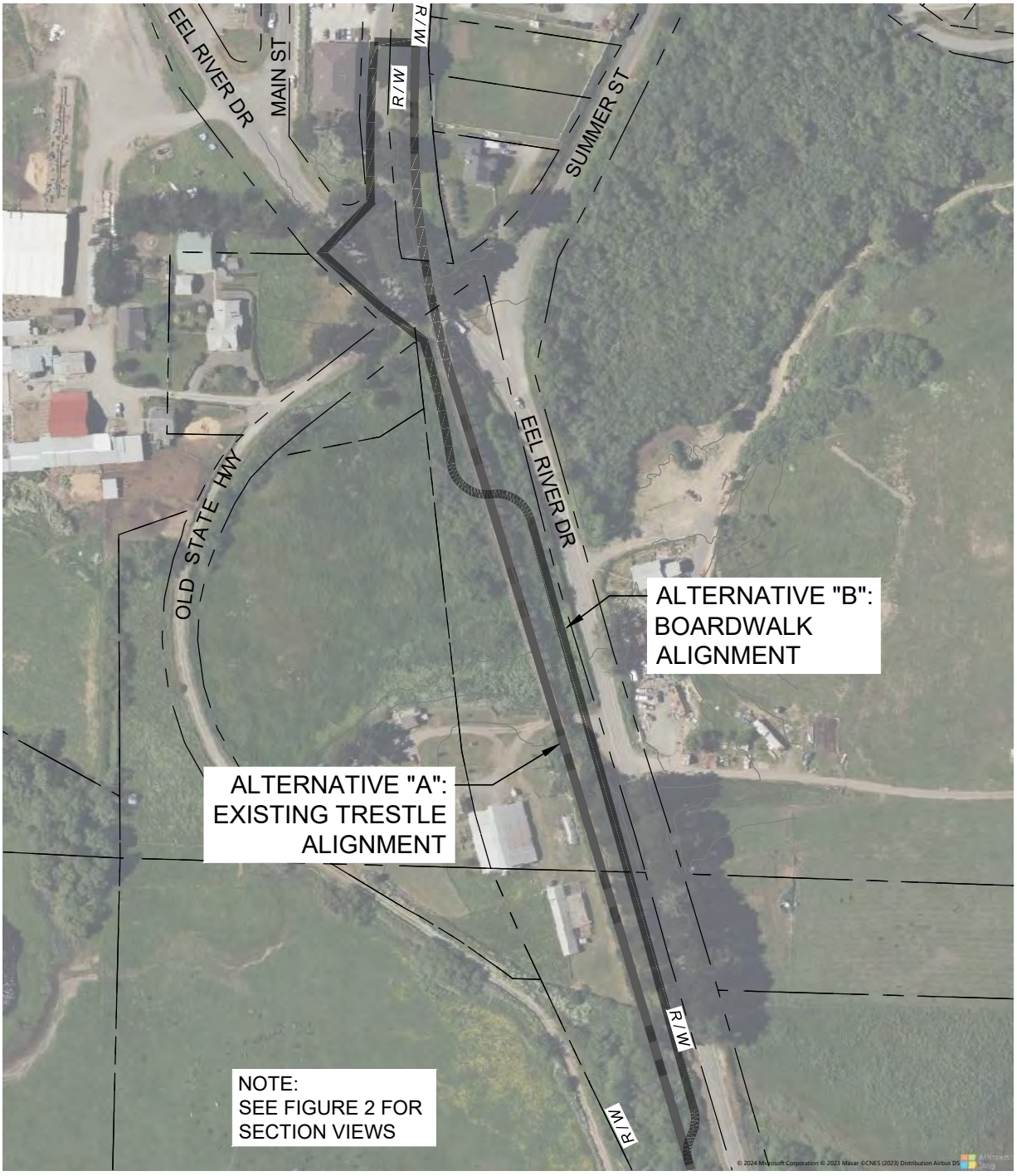
32-1 Loleta Trestle



LEGEND:

EXISTING RAIL BED, APPROX.

GREAT REDWOOD TRAIL, PAVED

0 200' 400'

Scale: 1" = 200'

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GHD
GHD Inc.
718 Third Street
Eureka California 95501 USA
T 1 707 443 8326
F 1 707 444 8330

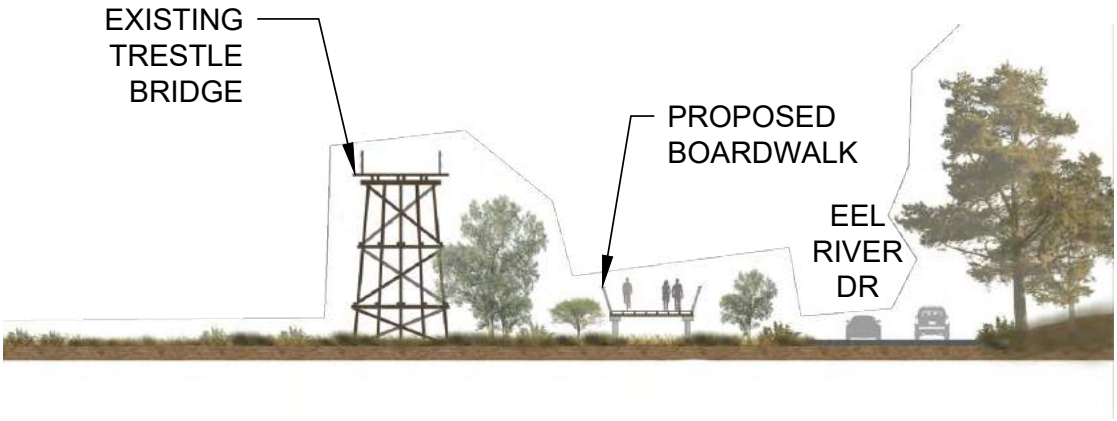
GREAT REDWOOD TRAIL MASTER PLAN
LOLETA ALTERNATIVES A, B, & C

MM 271

FIGURE 1

ALTERNATIVE "A" SECTION

NTS



ALTERNATIVE "B" SECTION

NTS

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GREAT REDWOOD TRAIL MASTER PLAN
LOLETA ALTERNATIVES A, B, & C

MM 271

FIGURE 2

PRELIMINARY DESIGN ALTERNATIVES

A total of five (5) potential trail alignments were considered:

- Alternative “A” – Existing Trestle Alignment
- Alternative “B” – Hybrid Boardwalk/Eel River Dr Alignment
- Eel River Dr Alignment
- Boardwalk Alignment
- Old State Highway Alignment

TRAIL ALIGNMENT ALTERNATIVE “A” - EXISTING TRESTLE BRIDGE

This alternative utilizes the existing railroad trestle bridge (Table 30, Figure 94). Assuming the trestle is in relatively good condition and not in need of significant repair, this would be the preferred alternative.

Table 30: *Evaluation of Existing Trestle Bridge Alignment Alternative “A” - Existing Trestle Bridge*

PROS	PRELIMINARY CHALLENGE/CONS
Utilizes existing trestle bridge	Retrofit of existing trestle bridge

Figure 94: *Alignment Alternative "A" - Existing Trestle Bridge Plan View*

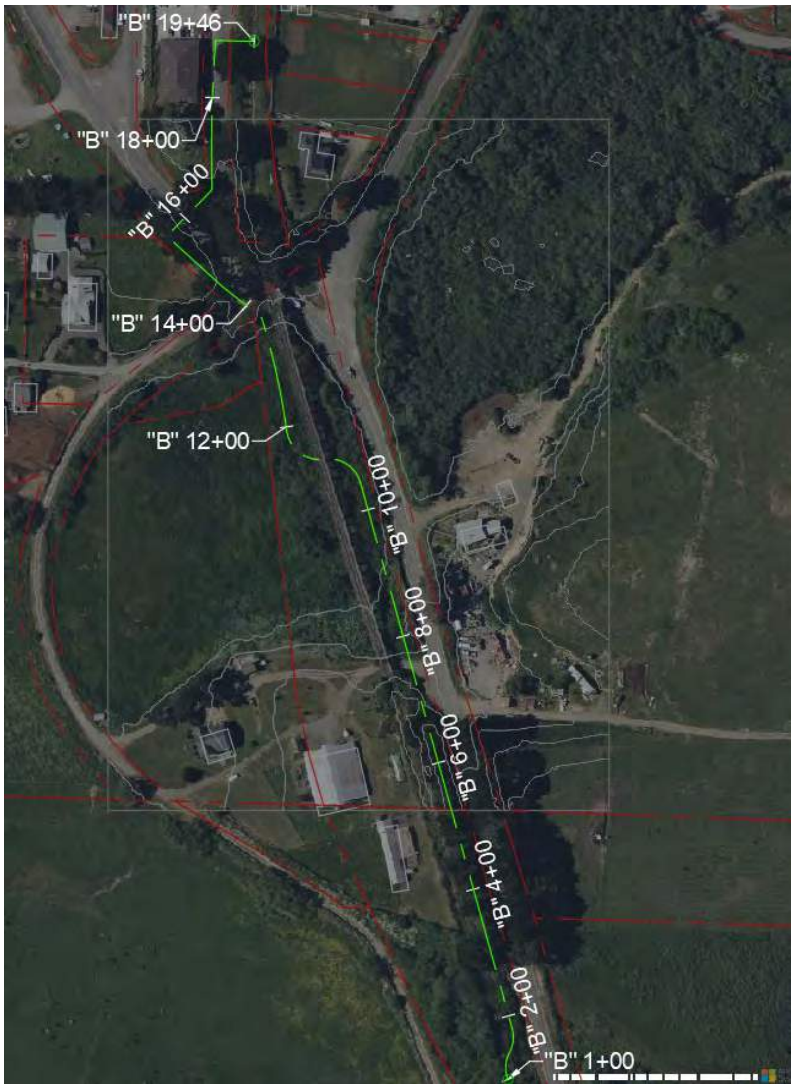
TRAIL ALIGNMENT ALTERNATIVE "B" – HYBRID BOARDWALK/EEL RIVER DRIVE

This alignment alternative would leave the railroad south of the existing trestle bridge, run parallel to Eel River Drive, then cross under the railroad trestle bridge and parallel the existing trestle bridge on the west side via a boardwalk. The path would then cross Eel River Drive to continue on Main Street. From Main St, the trail could then rejoin the railroad (Table 31, Figure 95).

Table 31: *Evaluation of Alignment Alternative "B" – Hybrid Boardwalk/Eel River Drive*

PROS	PRELIMINARY CHALLENGE/CONS
Provides an alternative route if the existing trestle cannot safely be used or repaired	Proximity to Eel River Drive (posted speed limit 40 mph)
	Tree removal and grading
	Roadway crossings
	Costs associated with boardwalk design

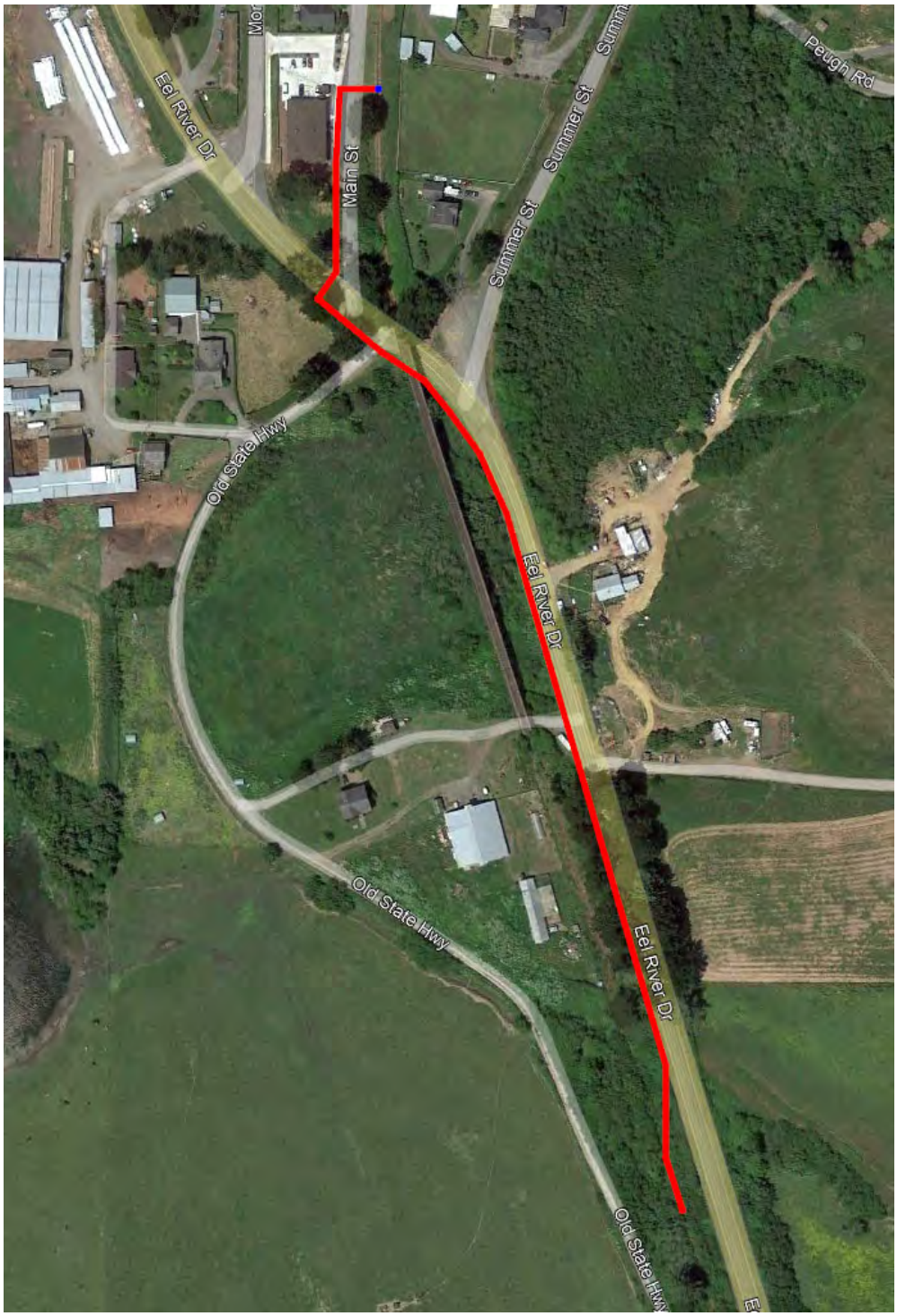
Figure 95: *Alignment Alternative "B" – Hybrid Boardwalk/Eel River Drive Plan View*



EEL RIVER DRIVE ALIGNMENT

This alignment alternative would leave the railroad south of the existing trestle bridge and follow the west side of Eel River Drive. The path would then cross Eel River Drive to continue on Main Street. From Main Street, the trail could then rejoin the GRTA right-of-way (Figure 96). Significant challenges with this alternative include the proximity to Eel River Drive, which has a posted speed limit of 40 mph, shoulder width limitations by the trestle bridge, roadway crossings, and tree removal and grading challenges. This alternative is considered infeasible.

Figure 96: *Eel River Drive Alignment Plan View*



BOARDWALK ALIGNMENT

This alignment alternative would leave the railroad south of the existing trestle bridge and run parallel to the existing trestle via a boardwalk. The path would then cross Eel River Drive to continue on Main Street. From Main Street, the trail could then rejoin the GRTA right-of-way (Figure 97). Significant challenges with this alternative include the proximity to Eel River Drive, which has a posted speed limit of 40 mph, shoulder width limitations by the trestle bridge, roadway crossings, tree removal, and grading challenges. This alternative is considered infeasible.

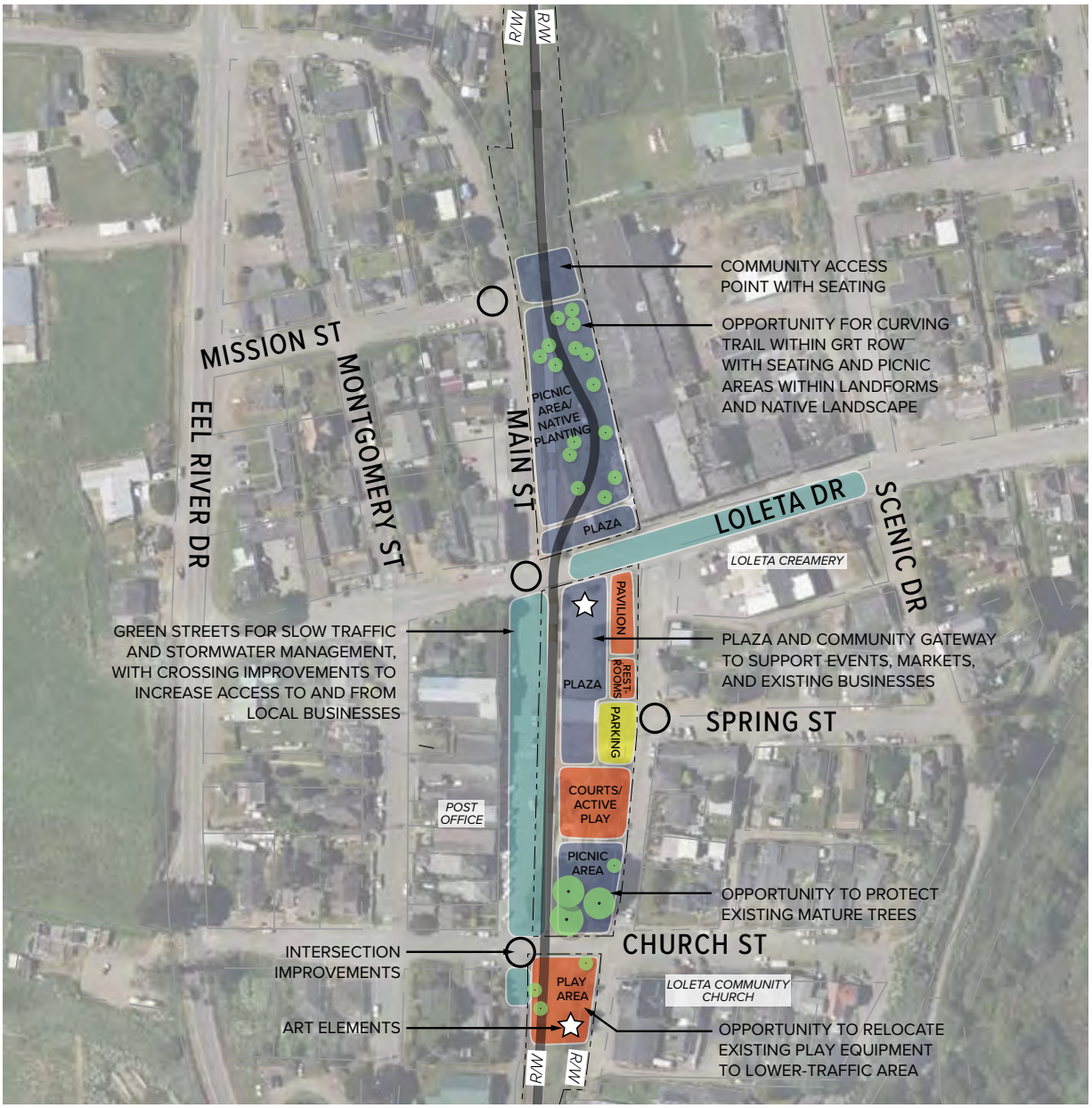
Figure 97: *Boardwalk Alignment Plan View*

OLD STATE HIGHWAY ALIGNMENT

This alignment alternative would leave the railroad south of the existing trestle bridge and follow the Old State Highway. From the Old State Highway, it would then cross Eel River Dr to continue on Main Street. From Main Street, the trail could then rejoin the GRTA right-of-way (Figure 98). Significant challenges with this alternative include crossing into private property, roadway crossings, tree removal, and grading challenges. This alternative is considered infeasible.

Figure 98: *Old State Highway Alignment Plan View*

32-2 Loleta Community Gateway



LEGEND:

- GREAT REDWOOD TRAIL, PAVED
- TRAILHEAD AMENITIES
- TRAILHEAD RECREATION SPACES
- TRAILHEAD ACCESS IMPROVEMENTS
- TRAILHEAD PARKING

NOTE: DESIGN INTENT TO REDUCE IMPERVIOUS SURFACES

0 200' 400'

Scale: 1" = 200'

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GREAT REDWOOD TRAIL MASTER PLAN
LOLETA

MM 271

FIGURE 12

Existing Conditions

Artistic rendering of an updated Main Street with a community plaza

COLLEGE OF THE REDWOODS TO EUREKA

Segment 33

SEGMENT EXTENTS

Tompkins Hill Rd, College of the Redwoods to Tooby Rd, South of Eureka

COUNTY

Humboldt County

LENGTH

3.2 Miles
Planned: 3.2 Miles
Existing: 0.0 Miles

TRAIL TYPE

Paved Multi-use Trail

PRIORITIZATION

Tier 1

The Master Plan trail segments are delineated for prioritization and high-level planning purposes only. They may be used to develop individual projects for advanced planning, environmental review (including CEQA), and design study in the future. However, individual projects might be comprised of an entire Master Plan segment, multiple segments, or portions of segments depending on a variety of factors including partner agencies (i.e., project proponents), funding, permitting, and additional engineering analysis.

SEGMENT DETAILS

- Segment Breakpoint
- \+ GRT Milepost

TRAIL TYPES

- Paved Trail
- Connector

TRAIL STATUS

- Existing
- Planned

TRAIL AMENITIES

Existing amenities

- Restrooms
- River Access

Trailheads

- Community Gateway
- Community Trailhead
- Community Access Point

Potential Opportunity Sites

- Trail-Oriented Development
- River Access
- Parks / Rest Areas

INFRASTRUCTURE

Roadway Crossings**

- Crossing, Major Public
- Crossing, Minor Public
- Crossing, Private
- Underpass

Infrastructure Conditions***

- Geomorphic, Major

BOUNDARIES

- City/Town/Place
- Parks & Public Lands

OWNERSHIP

- GRTA
- Local
- State
- Federal
- Tribal

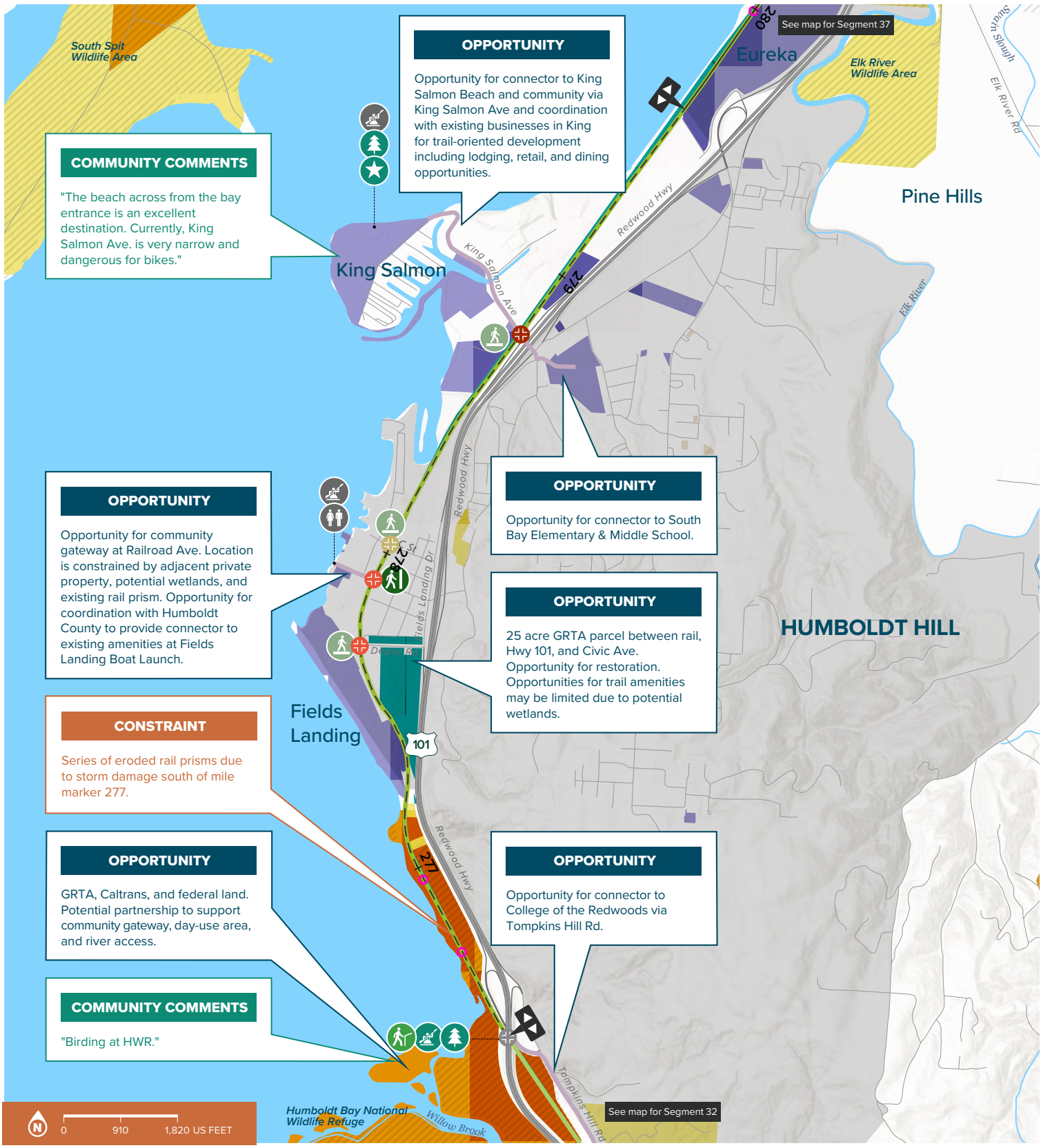
ENVIRONMENTAL

- Water

**All amenities are potential opportunities for planning purposes only.*

***Private crossings may or may not be licensed.*

****Conditions reflect best available data as of 2023. It is understood that conditions are rapidly changing based on 2020 report data. Select points have been updated based on new information.*



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NORTH ARCATA

Segment 37

SEGMENT EXTENTS

Sunset Ave, Arcata to Humboldt Bay Municipal Water District Park 1

COUNTY

Humboldt County

LENGTH

3.3 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE

Paved Multi-use Trail

PRIORITIZATION

Tier 1

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SEGMENT DETAILS

- Segment Breakpoint
- \+ GRT Milepost

TRAIL TYPES

- Paved Trail

TRAIL STATUS

- Existing
- Planned

TRAIL AMENITIES*

Existing amenities

- Community Trailhead
- River Access
- Parks / Rest Areas

Trailheads

- Community Trailhead
- Community Access Point

Potential Opportunity Sites

- Trail-Oriented Development

INFRASTRUCTURE

Roadway Crossings**

- Crossing, Major Public
- Crossing, Minor Public
- Crossing, Private
- Underpass

BOUNDARIES

- City/Town/Place
- Parks & Public Lands

OWNERSHIP

- GRTA
- Local
- State
- Federal
- Nonprofit

ENVIRONMENTAL

- Water

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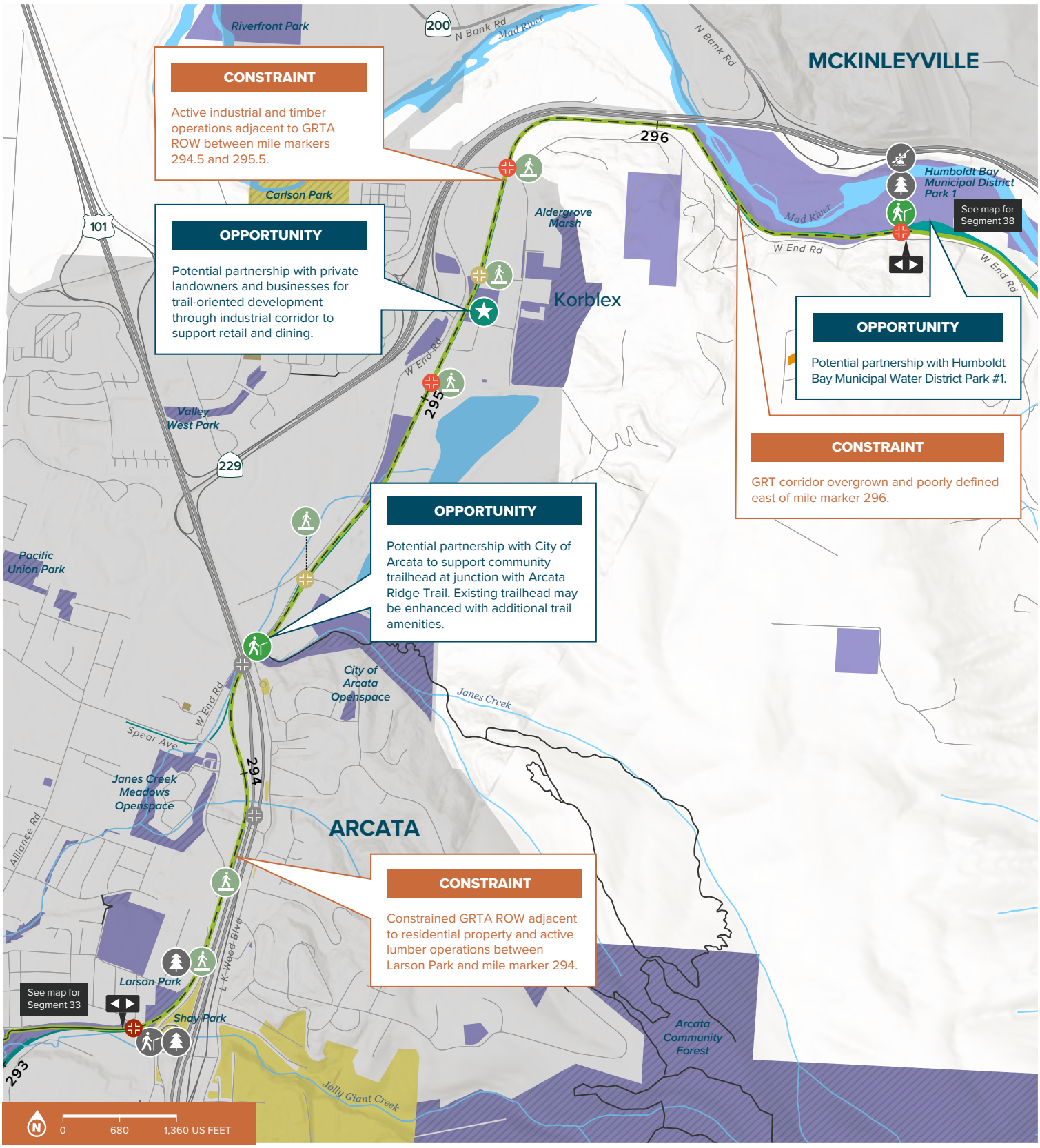

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GLENDALE

Segment 38

SEGMENT EXTENTS

Humboldt Bay Municipal Water District Park 1 to Glendale Dr, Glendale

COUNTY

Humboldt County

LENGTH

1.7 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE

Paved Multi-use Trail

PRIORITIZATION

Tier 2

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SEGMENT DETAILS

- Segment Breakpoint
- \+ GRT Milepost

TRAIL TYPES

- Paved Trail

TRAIL STATUS

- Planned

TRAIL AMENITIES*

Existing Amenities

- River Access
- Parks / Rest Areas

Trailheads

- Community Trailhead
- Community Access Point

Potential Opportunity Sites

- Parks / Rest Areas

INFRASTRUCTURE

Roadway Crossings**

- Crossing, Minor Public
- Underpass

Infrastructure Conditions***

- Bridge, Damaged

BOUNDARIES

- City/Town/Place

OWNERSHIP

- GRTA
- Local

ENVIRONMENTAL

- Water

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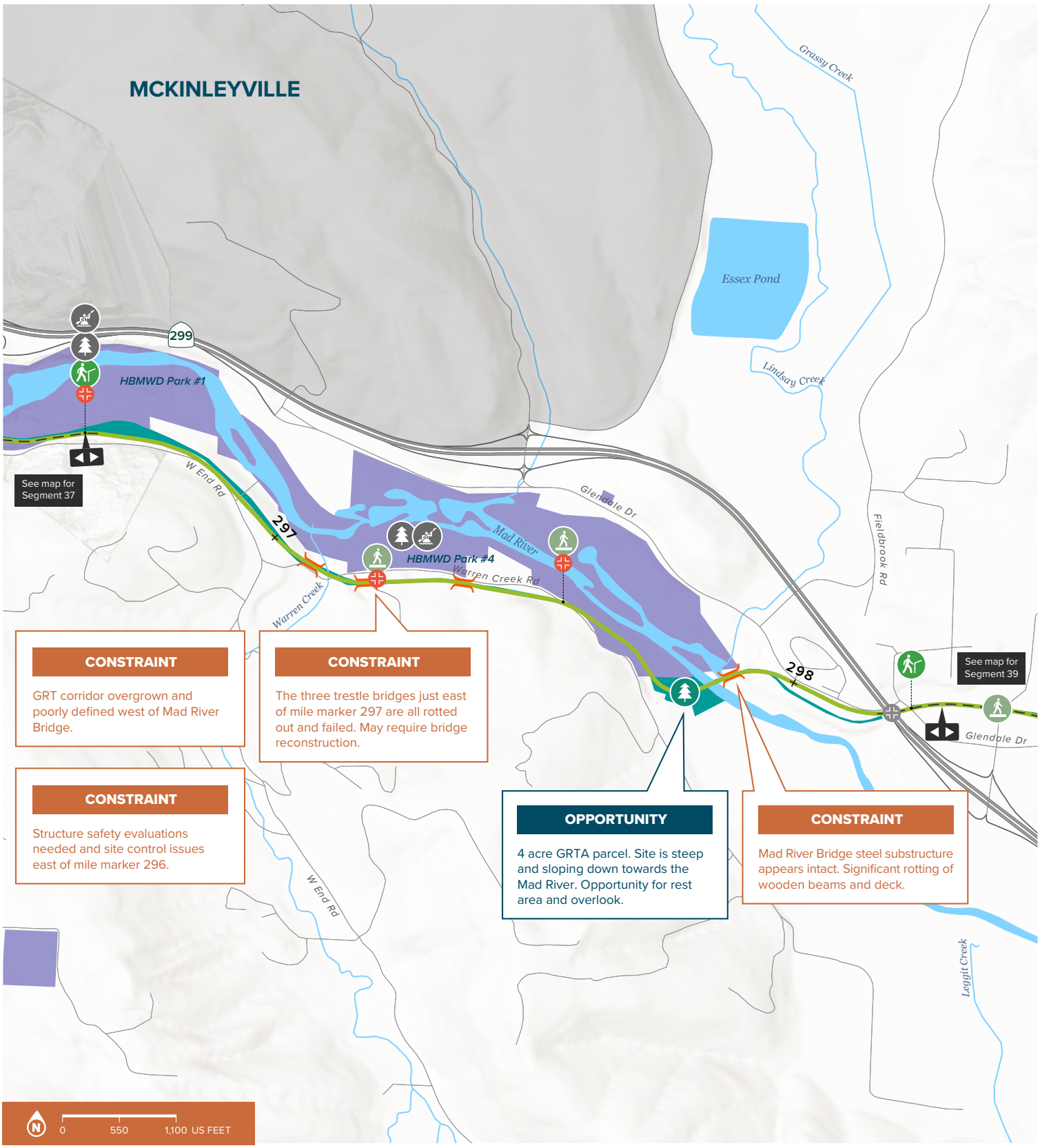
**Private crossings may or may not be licensed.

***Conditions reflect best available data as of 2023. It is understood that conditions are rapidly changing based on 2020 report data. Select points have been updated based on new information.



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BLUE LAKE

Segment 39

SEGMENT EXTENTS

Glendale Dr, Glendale to Mad River Levee, Blue Lake

COUNTY

Humboldt County

LENGTH

3.5 Miles
Planned: 2.16865484488636 Miles
Existing: 0.435132310795455 Miles

TRAIL TYPE

Paved Multi-use Trail

PRIORITIZATION

Tier 1

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SEGMENT DETAILS

- Segment Breakpoint
- End
- \+ GRT Milepost

TRAIL TYPES

- Paved Trail
- Connector
- Parallel Route

TRAIL STATUS

- Existing
- Planned

TRAIL AMENITIES*

Existing amenities

- Community Trailhead

Trailheads

- Community Trailhead
- Community Access Point

Potential Opportunity Sites

- Trail-Oriented Development

INFRASTRUCTURE

Roadway Crossings**

- Crossing, Major Public
- Crossing, Minor Public
- Underpass

Infrastructure Conditions***

- Bridge, Damaged
- Hazardous Materials

BOUNDARIES

- City/Town/Place
- Tribal
- Parks & Public Lands

OWNERSHIP

- GRTA
- Local
- Federal
- Tribal

ENVIRONMENTAL

- Water

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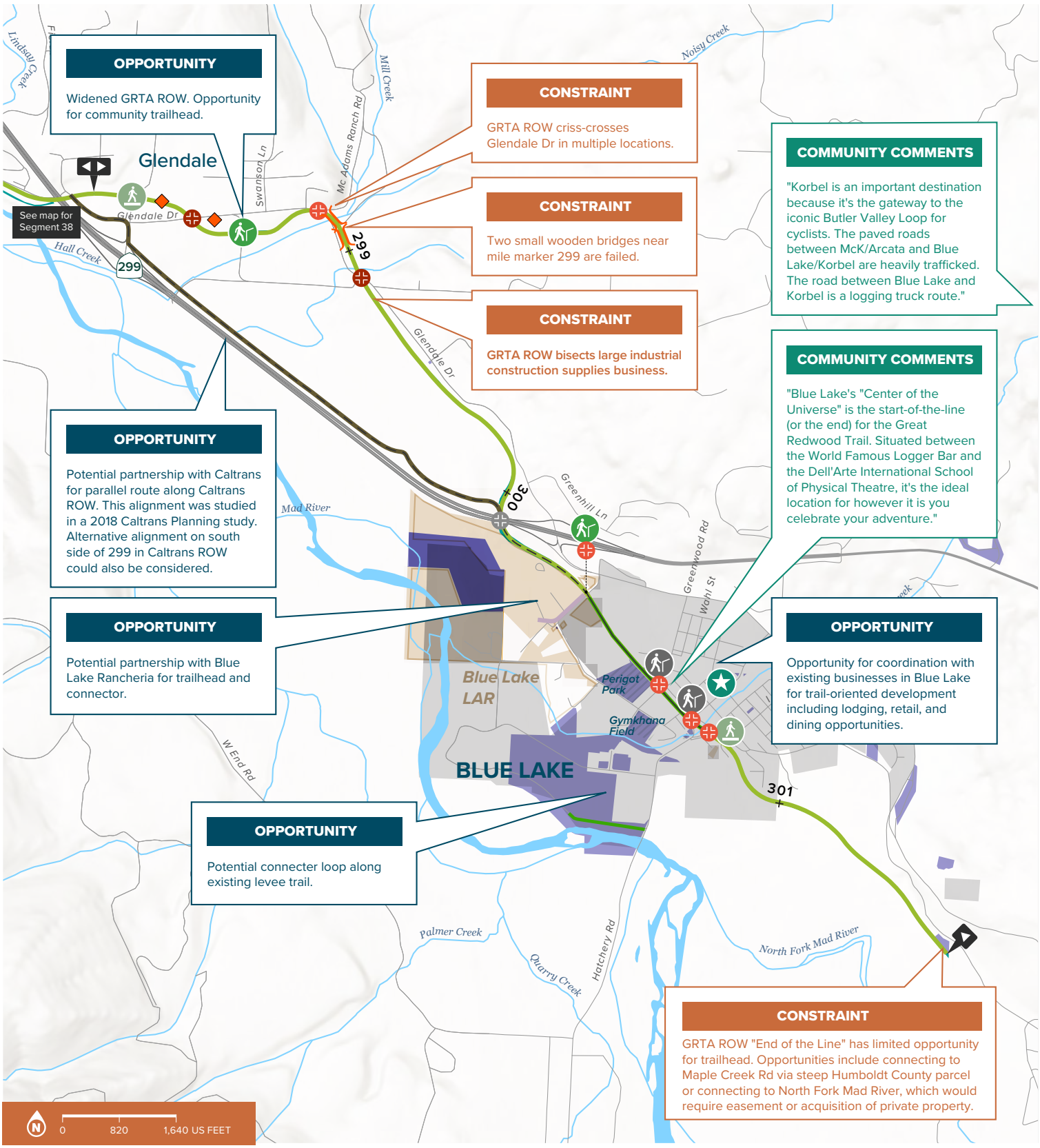

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CARLOTTA PHASE I

Segment 40

SEGMENT EXTENTS
SR 36, Alton to SR 36, Carlotta

COUNTY
Humboldt County

LENGTH
5.0 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE
Crushed Stone Multi-use Trail

PRIORITIZATION
Tier 3

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SEGMENT DETAILS
- Segment Breakpoint
- \+ GRT Milepost

TRAIL TYPES
- Paved Trail
- Crushed Stone Trail
- Backcountry Trail
- Parallel Route

TRAIL STATUS
- Existing

TRAIL AMENITIES*
Trailheads
- Community Gateway
- Community Trailhead
- Community Access Point

Potential Opportunity Sites
- Trail-Oriented Development
- Parks / Rest Areas

INFRASTRUCTURE
Roadway Crossings**
- Crossing, Highway
- Crossing, Minor Public
- Crossing, Private

Infrastructure Conditions***
- Geomorphic, Major
- Bridge
- Bridge, Damaged
- Hazardous Materials

BOUNDARIES
- City/Town/Place
- Tribal
- Parks & Public Lands

OWNERSHIP
- GRTA
- Local
- State
- Federal
- Tribal

ENVIRONMENTAL
- Water

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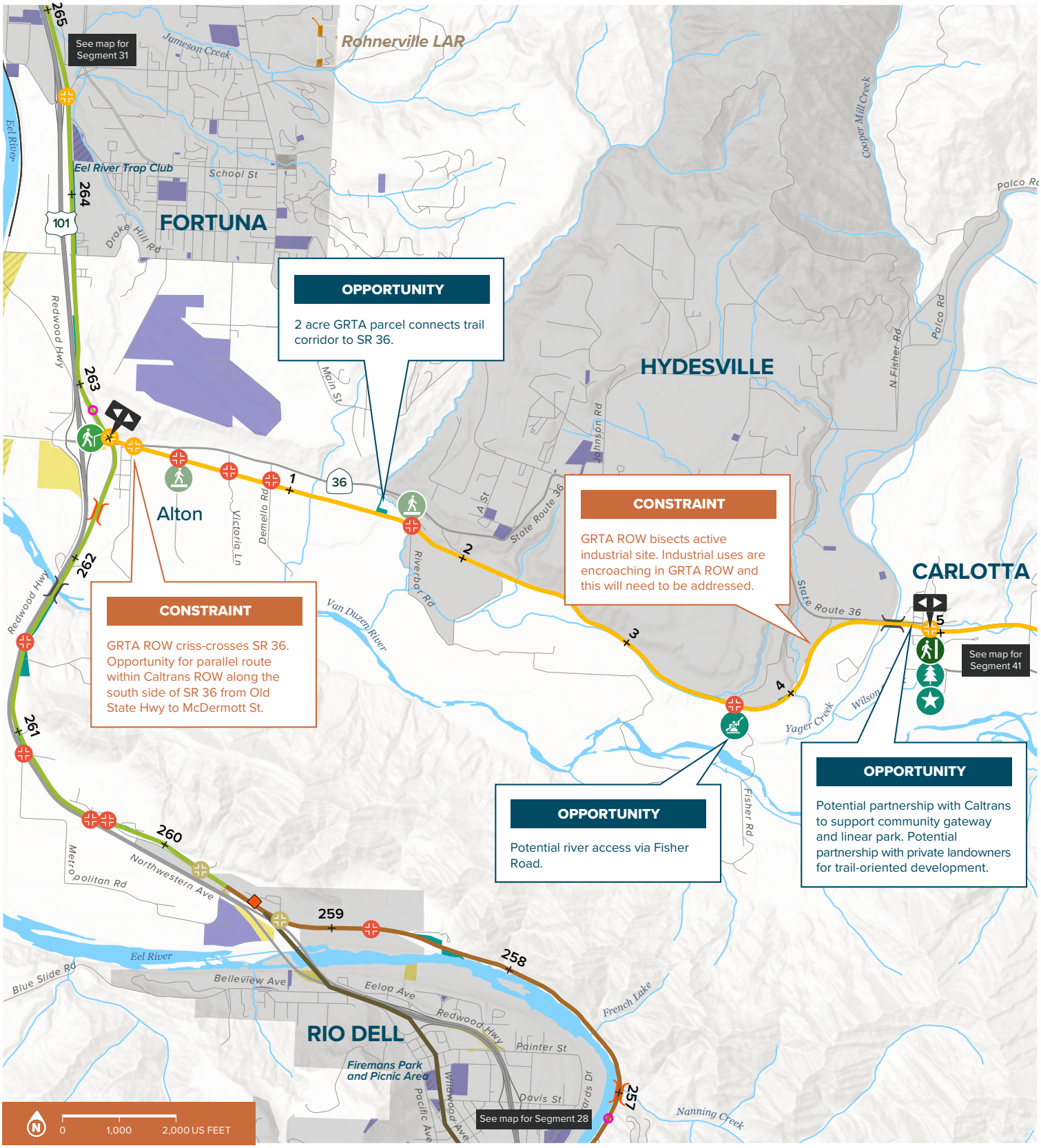

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CARLOTTA PHASE II

Segment 41

SEGMENT EXTENTS

SR 36, Carlotta to End of the Line, Carlotta

COUNTY

Humboldt County

LENGTH

2.2 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE

Crushed Stone Multi-use Trail

PRIORITIZATION

Tier 3

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SEGMENT DETAILS

- Segment Breakpoint
- \+ GRT Milepost

TRAIL TYPES

- Crushed Stone Trail
- Connector

TRAIL AMENITIES*

Trailheads

- Community Gateway
- Community Access Point

INFRASTRUCTURE

Roadway Crossings**

- Crossing, Highway
- Crossing, Minor Public
- Crossing, Private

OWNERSHIP

- GRTA
- State

ENVIRONMENTAL

- Water

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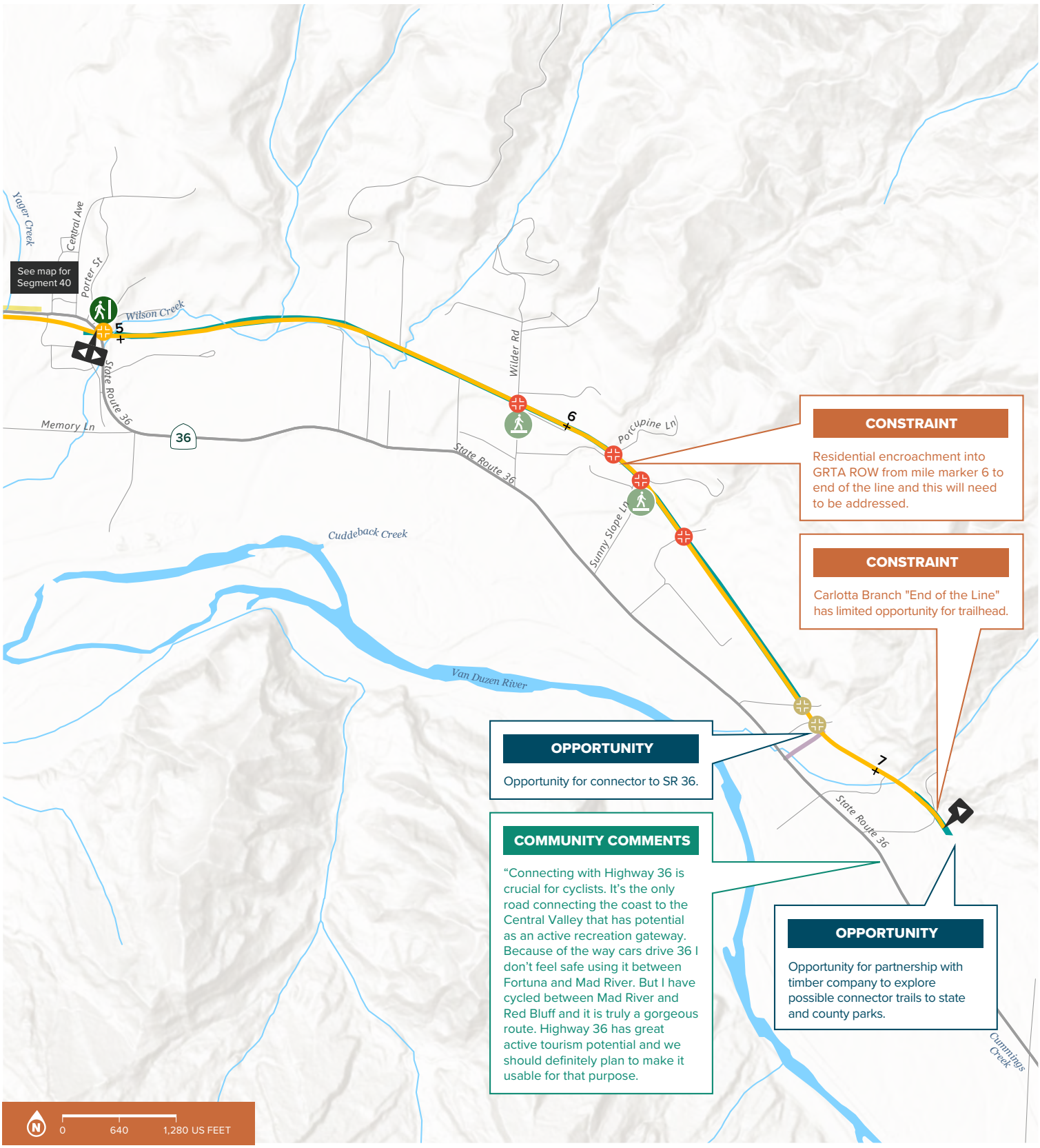

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MANILA

Segment 42

SEGMENT EXTENTS

Alliance Rd, Arcata to Pocket Park, Manila

COUNTY

Humboldt County

LENGTH

5.4 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE

Paved Multi-use Trail

PRIORITIZATION

Tier 2

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SEGMENT DETAILS

- Segment Breakpoint
- \+ GRT Milepost

TRAIL TYPES

- Paved Trail
- Connector

TRAIL STATUS

- Existing
- Planned

TRAIL AMENITIES*

Existing amenities

- Community Trailhead
- Parks / Rest Areas
- Restrooms

Trailheads

- Community Gateway
- Community Trailhead
- Community Access Point

Opportunity Sites

- Trail-Oriented Development
- River Access
- Creek Restoration

INFRASTRUCTURE

Roadway Crossings**

- Crossing, Highway
- Crossing, Major Public
- Crossing, Minor Public
- Crossing, Private

Infrastructure Conditions***

- Bridge
- Bridge, Damaged
- Hazardous Materials

BOUNDARIES

- City/Town/Place
- Parks & Public Lands

OWNERSHIP

- GRTA
- Local
- State
- Federal
- Nonprofit

ENVIRONMENTAL

- Water

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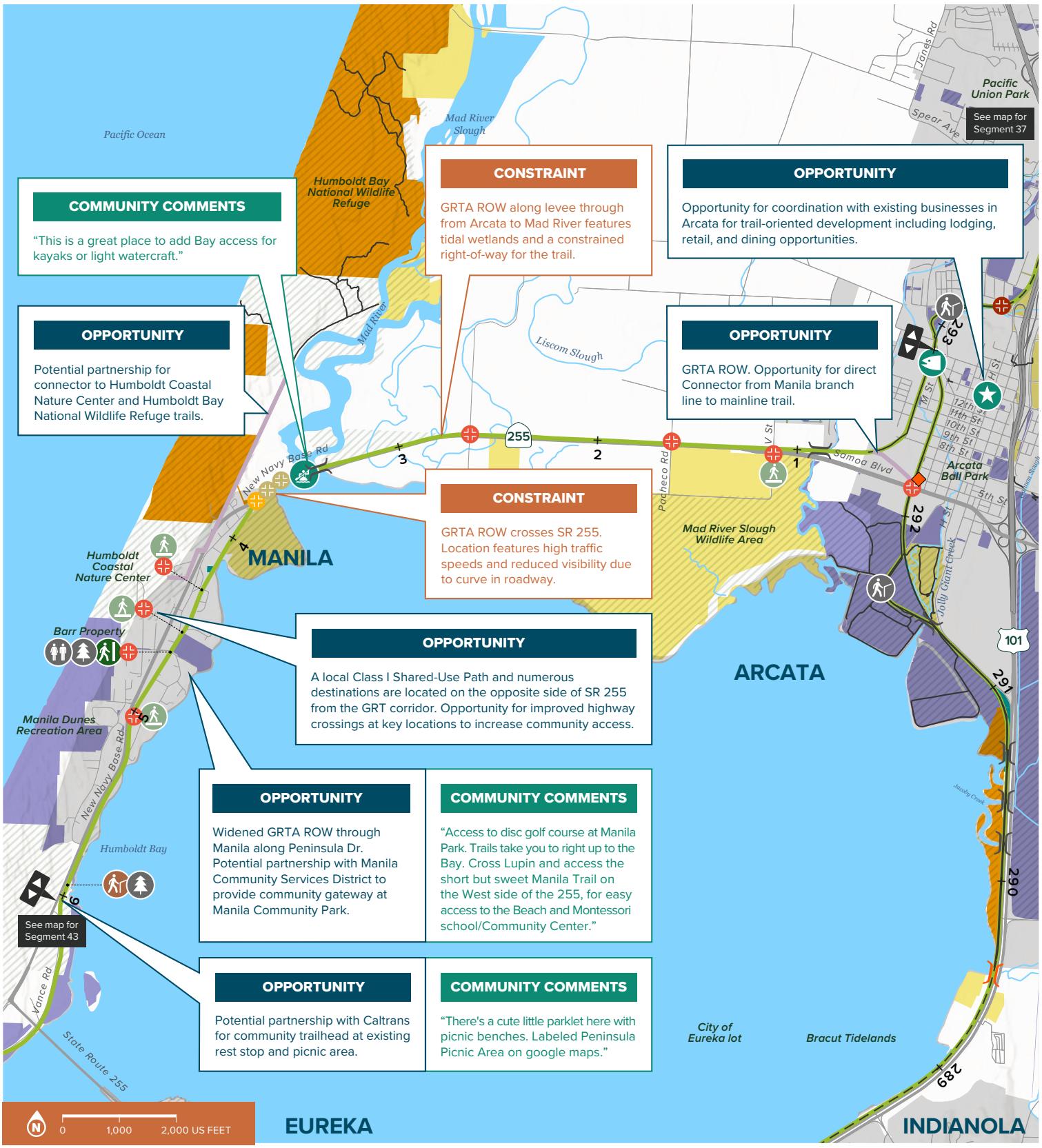

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SAMOA AND FAIRHAVEN

Segment 43

SEGMENT EXTENTS

Pocket Park, Manila to Bendixon St, Fairhaven

COUNTY

Humboldt County

LENGTH

4.5 Miles
Planned: 0.0 Miles
Existing: 0.0 Miles

TRAIL TYPE

Paved Multi-use Trail

PRIORITIZATION

Tier 2

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SEGMENT DETAILS

- Segment Breakpoint
- End
- \+ GRT Milepost

TRAIL TYPES

- Paved Trail

TRAIL STATUS

- Existing

TRAIL AMENITIES*

Existing amenities

- Community Trailhead

Trailheads

- Community Trailhead
- Community Access Point

Potential Opportunity Sites

- Parks / Rest Areas

INFRASTRUCTURE

Roadway Crossings**

- Crossing, Minor Public
- Crossing, Private
- Underpass

Infrastructure Conditions***

- Hazardous Materials

BOUNDARIES

- City/Town/Place
- Parks & Public Lands

OWNERSHIP

- GRTA
- Local
- State
- Federal
- Nonprofit
- Tribal

ENVIRONMENTAL

- Water

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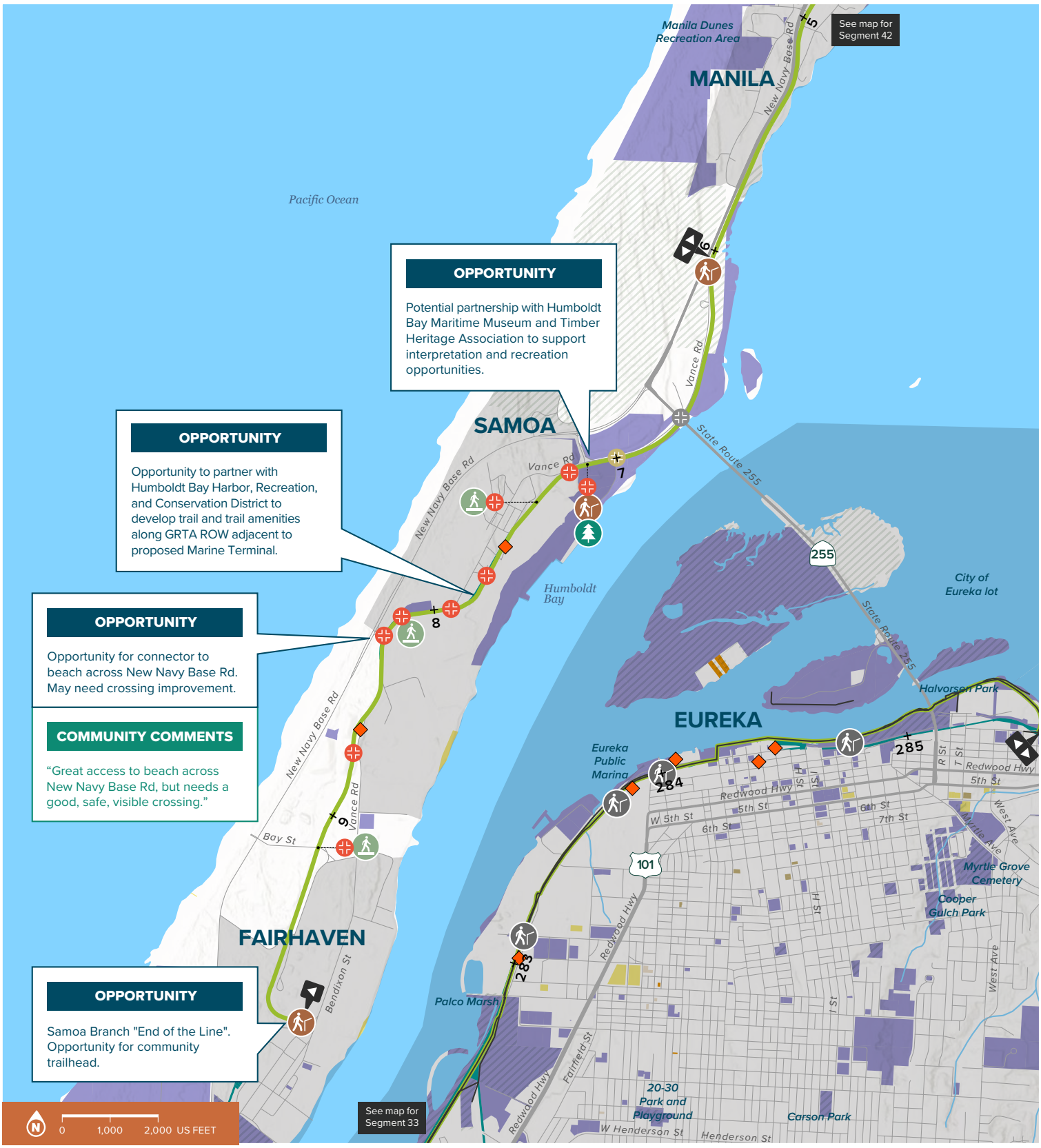

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07

Implementation Strategy

Existing Annie & Mary Trail in Blue Lake

OVERVIEW

This chapter outlines the next steps for the GRTA and its partners to advance the implementation of the Great Redwood Trail. The GRTA and project partner team will have to overcome complex and costly challenges to complete the entire trail and realize the estimated $104 million in annual economic benefits. The GRT corridor has significant challenges to trail planning, construction, and maintenance in certain locations, particularly in remote segments within the Eel River Canyon. These challenges include the following:

- Areas with steep, unstable slopes that destabilize hundreds and occasionally thousands of feet of the corridor
- Existing right-of-way (ROW) obstructions that occasionally fully block the corridor
- Former rail infrastructure (i.e., bridges, trestles, tunnels, and major culverts) that are dilapidated or have been destroyed by years of neglect
- The high cost of developing a public trail
- The need for developing collaborative strategies to protect sensitive cultural, botanical, and wildlife resources within and near the rail line

Existing trestle

With 12 miles complete and another 12 miles in the pipeline for design and construction in the near term, a fully connected and complete GRT could take decades to complete.

The prioritization process (see Chapter 6) can inform where to direct energy and resources; however, GRT segments will also move forward opportunistically in coordination with California Native American tribes, local government, and nonprofit partners. The development of some segments will depend upon the availability of resources and partnership opportunities, as well as the presence of technical challenges. Before construction, the GRTA and its partners will work closely with community members, neighbors, law enforcement and emergency service providers, tribes, and other agencies to develop detailed design plans and policies for ongoing operations and maintenance. Formalizing agreements with responsible parties and securing funding for operations and maintenance is critical to the success of the GRT.

There are three parallel paths for the GRTA and partners to simultaneously pursue, to facilitate the implementation of the GRT Master Plan:

Railbanking

Trail design & permitting

Funding for all stages of trail development, including O&M

RAILBANKING

Railbanking is a method established in the National Trails System Act to preserve an out-of-service rail corridor through interim use as a trail. Railbanking allows a trail to be built as a rail-to-trail, where the trail can be located within or on top of the historic rail alignment and infrastructure. GRTA is mandated to undertake the process of railbanking the former North Coast Railroad Authority rail corridor with the Surface Transportation Board.

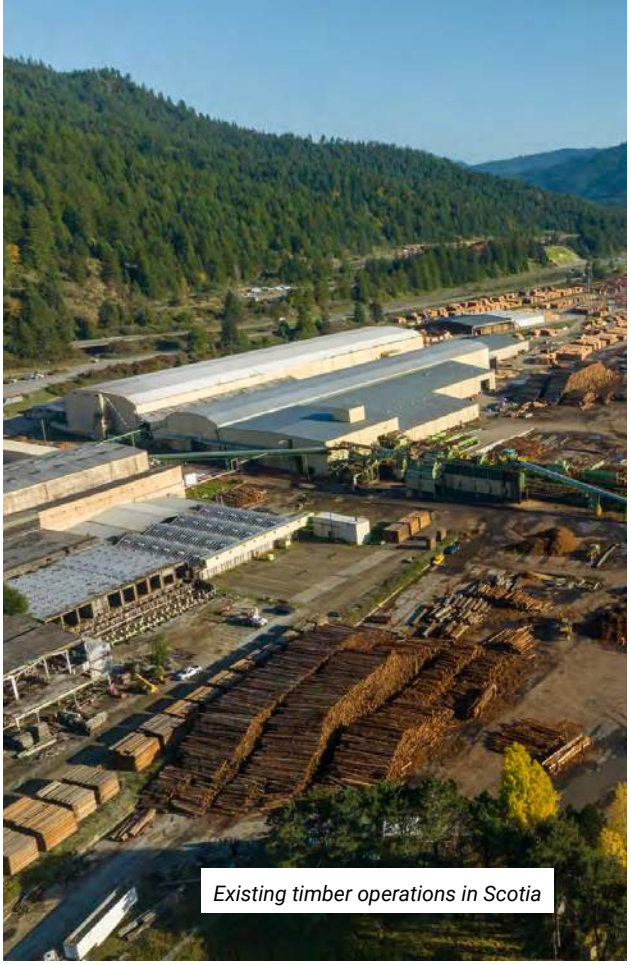
In the fall of 2022, the corridor was railbanked from Willits north to Humboldt Bay. There are current filings with the Surface Transportation Board (STB) to allow for eventual railbanking filings from Sonoma County to Willits. More information and updates on this process can be found on the GRTA website: https://thegreatredwoodtrail.org/railbanking/

Hopland Station

TRAIL DESIGN AND PERMITTING

The Master Plan is intended to be used for planning purposes only. The Master Plan provides comprehensive design guidelines and solutions for typical GRT challenges, but detailed design will be required for each segment before construction. Future designs will be informed by the Master Plan design guidelines and industry best practices and design standards, using detailed survey information and expertise. This design process will incorporate input from California Native American tribes, neighboring property owners, community members, and other relevant agency and nonprofit stakeholders.

Additionally, each GRT segment will require various permits and compliance with relevant federal, state, and local laws. To streamline the California Environmental Quality Act review of individual segments, the GRTA is initiating a program Environmental Impact Report (program EIR) for the corridor in Mendocino, Trinity, and Humboldt counties. A program EIR allows the GRTA to consider cumulative impacts, broad policy alternatives, and program-wide mitigation measures. It also avoids duplicating the same permit process for each segment, reducing paperwork and saving time and money for future GRT-related California Environmental Quality Act permitting requirements. To help the GRTA and local partners understand the range of permitting requirements, this Master Plan includes a GRT environmental permitting matrix (Table 32). The matrix groups GRT trail segments based on location (i.e., county) and trail type (i.e., paved, crushed stone, backcountry) from south to north. Potential relevant federal, state, and local agency permits are included as column headers. Where required permits are anticipated, a (✔) is shown in the appropriate column. This matrix includes footnotes with information about specific methods used to determine permit applicability and other relevant considerations.



Existing timber operations in Scotia

Additional environmental permits may be required for specific trail segments, depending on future trail design, appurtenant structures, and the feasibility of implementing avoidance measures. The section following Table 32 describes these additional permits in more detail, including permit triggers, considerations, additional project-level studies that may be required, and processes. Information about hazardous material processes, Federal and State Endangered Species Act permitting, and the National Pollutant Discharge Elimination System (NPDES) is included in this section.

Table 32 was developed based upon the current understanding of the GRT, which did not include detailed project design. Assumptions about permitting requirements were based on existing conditions in the corridor and information from the Great Redwood Trail Feasibility, Governance, and Railbanking Report.[1] Future detailed project-level analyses will determine which permits will be required at each segment.

1 California State Parks, California Natural Resources Agency, and California State Transportation Agency. 2020. Great Redwood Trail Feasibility, Governance and Railbanking Report. Prepared by: Ascent Environmental, Inc., and Alta Planning + Design. July.

✓ = Required
LR = Likely Required
NL = Not Likely Required

Table 32: *Great Redwood Trail Environmental Permitting Matrix*

County	Trail Type	GRT Master Plan Segment	Tribal Consultation	GRTA Encroachment Permit	CWA or Permit for Dredge and Fill of Waters of the State[2]	CDFW 1600 LSAA2	State Water Board NPDES Permit	Coastal Development Permit[3]	Caltrans Encroachment Permit[4]
Mendocino County	Crushed Stone	1	✓	✓	✓	✓	✓		✓
	Paved	2–6	✓	✓	✓	✓	✓		✓
	Crushed Stone	7–8	✓	✓	✓	✓	✓		✓
	Paved	9–10	✓	✓	LR	LR	✓		✓
	Crushed Stone	11–13	✓	✓	LR	LR	✓		✓
	Backcountry	14-–17	✓	✓	✓	✓	✓		
Trinity County	Backcountry	18	✓	✓	LR	LR	✓		
Humboldt County	Backcountry	19–24	✓	✓	✓	✓	✓		
	Crushed Stone	25–28	✓	✓	✓	✓	✓		✓
	Backcountry	29	✓	✓	LR		✓		✓
	Paved	30–39	✓	✓	✓	✓	✓	✓	✓
	Crushed Stone	40–41	✓	✓	LR	LR	✓		✓
	Paved	42–43	✓	✓	NL	NL	✓	✓	✓

Notes: CDFW = California Department of Fish and Wildlife; CWA = Clean Water Act; GRT = Great Redwood Trail; LSAA = Lake and Streambed Alteration Agreement; NPDES = National Pollutant Discharge Elimination System.

2 The need for Clean Water Act permitting, permitting for dredge and fill of waters of the state, and notification of lake and streambed alteration was determined by reviewing the culvert and bridge data contained in Appendix C of the Great Redwood Trail Feasibility, Governance and Railbanking Report. Where the data in Appendix C indicated that a culvert or bridge would need replacement, it was assumed a permit could be required. Where a segment crosses an aquatic linear feature identified in the US Fish and Wildlife Service's National Wetlands Inventory (accessed October 2023) and no culvert or bridge was identified in Appendix C, it is conservatively assumed that a permit may be required (shown with an [*]) (with the exception of the culverts along segment 42–43, which also cross under Samoa Blvd.) The final need for permitting due to the dredge or fill of waters or impacts to the bed and bank of any stream will need to be determined based on project-level design and completion of an aquatic resources delineation where wetlands may be affected.

3 Generally, any "development" activity in the Coastal Zone requires a Coastal Development Permit from the California Coastal Commission or local government with a certified Local Coastal Program. The Coastal Act defines development broadly (with a few narrow exceptions), to include not only typical land development activities such as construction of buildings, but also changes in the intensity of use of land or water, even where no construction is involved. Coastal Development Permits are required for portions of the GRT that are within the Coastal Zone.

4 Caltrans encroachment permits would be required if the GRT crosses into Caltrans ROW, including under or over a state-maintained highway, per California Department of Transportation Encroachment Permits guidance (accessed November 2023). Most segments that would require a Caltrans encroachment permit cross under US 101; however, segment 11–13 encroaches into the US 101 and State Route (SR) 162 ROWs; segment 40–41 encroaches into the SR 36 ROW; and segment 42–43 encroaches into SR 255 and SR 299 ROWs. Additionally, if construction of trail segments would require the use of a highway shoulder or lane closure, a Caltrans encroachment permit would also be required.

✓ = Required

LR = Likely Required

NL = Not Likely Required

Table 19, continued: *Great Redwood Trail Environmental Permitting Matrix*

County	Trail Type	GRT Master Plan Segment	GRTA Encroachment Permit	County Special Permit[5]	County or City Building Permit[6]	County or City Encroachment Permit[7]	Grading/Air Quality Permit[8]
Mendocino County	Crushed Stone	1	✓		✓	✓	✓
	Paved	2–6	✓		✓	✓	✓
	Crushed Stone	7–8	✓		✓	✓	✓
	Paved	9–10	✓			✓	✓
	Crushed Stone	11–13	✓		✓	✓	✓
	Backcountry	14-–17	✓		✓		✓
Trinity County	Backcountry	18	✓				✓
Humboldt County	Backcountry	19–24	✓	✓	✓	✓	✓
	Crushed Stone	25–28	✓	✓	✓	✓	✓
	Backcountry	29	✓	✓		✓	✓
	Paved	30–39	✓	✓	✓	✓	✓
	Crushed Stone	40–41	✓	✓		✓	✓
	Paved	42–43	✓	✓		✓	✓

5 Humboldt County's special permit applies to many types of projects. For the GRT, a special permit would be required if any part of the trail is in a designated streamside management area (SMA), wetland, or other wet area. SMAs are typically measured to include areas 100 feet from the center of a perennial stream and 50 feet from the center of an intermittent stream. Construction in SMAs according to County Code Title 3, Division 1, Chapter 4, Section 314-61.05 is limited to certain projects, which include public access trails where the length of the trail within the SMA is minimized, when it can be demonstrated that it would not degrade fish and wildlife resources or water quality, vegetative clearing is kept to a minimum. And mitigation measures set by the county are implemented. No other special permits are applicable to the GRT.

6 County and city building permits are required for the construction and replacement of structures. To determine whether a building permit would be required, tunnel, culvert, and bridge data contained in Appendix C of the Great Redwood Trail Feasibility, Governance and Railbanking Report was reviewed. Where the data in Appendix C indicated that a tunnel, culvert, or bridge would need substantial repair or replacement (e.g., partial or total collapse), the need for a building permit is assumed. Building permits would also be required for GRT trail segments that include structures, such as restrooms or shelters. Many jurisdictions have specific exemptions to building permit requirements depending on local agency involvement and type of project.

7 Encroachment permits are required for at-grade crossings of county and city roads. Any type of new infrastructure in the county or city right-of-way—including crosswalks, signs, striping, or road improvements—would require an encroachment permit. Additionally, if the construction of trail segments would require the use of a road shoulder or lane closure, an encroachment permit would be required. For the purposes of this table, it is assumed that GRT segments crossing county- or city-maintained roads would have some type of improvement accompanying the trail. If the trail crosses a county or city roadway and no improvements were made, creating an unprotected and unmarked crossing, then an encroachment permit would not be required.

8 Cities and counties along the GRT have specific requirements for obtaining grading permits, related to the size of grading/ground disturbance. Some jurisdictions have exceptions to grading permits for trail projects that are not proposed in sensitive habitat zones. Mendocino County does not have a grading ordinance; however, the Mendocino County Air Quality Management District does require an Air Quality Permit for large grading projects, per Mendocino County Air Quality Management District Permit Application Form guidance (accessed November 2023). A large grading project is a project that results in 1+ acre of exposed soil. Trail projects that disturb less than 1 acre of soil would be exempt from this permit requirement pursuant to Mendocino County Code Title 18, Chapter 70 Section, 18.70.030. County and city building permits are required for the construction and replacement of structures. To determine whether a building permit would be required, tunnel, culvert, and bridge data contained in Appendix C of the Great Redwood Trail Feasibility, Governance and Railbanking Report was reviewed. Where the data in Appendix C indicated that a tunnel, culvert, or bridge would need substantial repair or replacement (e.g., partial or total collapse), the need for a building permit is assumed. Building permits would also be required for GRT trail segments that include structures, such as restrooms or shelters. Many jurisdictions have specific exemptions to building permit requirements depending on local agency involvement and type of project.

Other Potential Environmental Permits

Additional environmental permits may be required for some GRT trail segments, depending on trail design and feasible avoidance measures. These additional permits are described in detail below, including permit triggers and processes.

HAZARDOUS MATERIALS

The *Great Redwood Trail Feasibility, Governance, and Railbanking Report*[9] identified existing conditions and documented 39 hazardous materials sites within or immediately adjacent to the rail corridor. State Water Resources Control Board records indicated that many sites were in various stages of remediation, and the most common types of hazardous material identified were underground or aboveground storage tanks containing oils, fuels, and contaminated soils from abandoned lumber and rail maintenance yard activities.[10] In addition, residual contamination from railroad ties treated with chemicals (such as creosote) may be found along the corridor. The extent of contamination and required steps to remediate hazardous sites will be determined through additional evaluations (such as Phase I and Phase II environmental site assessments) conducted during project-level analysis. In cases where old railroad stations and rail cars may be removed, they would need to be inspected for common hazardous building materials, such as asbestos, lead paint, polychlorinated biphenyl, and mercury, before demolition.

9 California State Parks, California Natural Resources Agency, and California State Transportation Agency. 2020. Great Redwood Trail Feasibility, Governance and Railbanking Report. Prepared by: Ascent Environmental, Inc., and Alta Planning + Design. July.
10 Same as previous, Appendix C.

Hazardous material may include abandoned train equipment, grease boxes, and waste barrels.

The Department of Toxic Substances Control, a division of the California Environmental Protection Agency (CalEPA), has primary regulatory responsibility over hazardous materials in California and works with the US Environmental Protection Agency to enforce and implement hazardous materials laws and regulations. CalEPA oversees the State's Unified Program, which is intended to protect residents from hazardous wastes and materials by ensuring that local regulatory agencies apply statewide standards when they issue permits, conduct inspections, and engage in enforcement activities. Under the Unified Program, Certified Unified Program Agencies (CUPAs) were established throughout the state and are responsible for carrying out CalEPA's Unified Program responsibilities at the local level. Coordination with the appropriate CUPAs (i.e., Mendocino County Environmental Health, Trinity County CUPA, and Humboldt County Division of Environmental Health) would determine the process for proper handling, storage, and disposal of hazardous materials. The individual CUPAs have separate procedures for handling hazardous materials.

In the case of underground or aboveground storage tank modification or removal, a permit from the appropriate CUPA would be required. The permit application would include information about the size of the tank, tank material, contents, and plan for removal and remediation, along with a fee, dependent on the size of the site.[11,12], Additional mitigation measures for impacts related to hazardous materials and cleanup will be identified in the program EIR and subsequent project-specific California Environmental Quality Act permits.

11 Mendocino County Health and Human Services Agency. 2023. Hazardous Materials. Available: https://www.mendocinocounty.org/departments/public-health/environmental-health/hazardous-materials. Accessed December 18, 2023.

12 Humboldt County Department of Environmental Health. 2023. Hazardous Materials and Hazardous Waste Handling and Disposal. Available: https://humboldtgov.org/729/Hazardous-Materials-Unit. Accessed December 18, 2023.

FEDERAL ENDANGERED SPECIES ACT

The federal Endangered Species Act (ESA) defines "take" of listed species as: "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or to attempt to engage in any such conduct" (Section 16 USC 1542(b)). Projects that result in incidental take (harassment, harm, wound, or kill) of federally listed species must receive take authorization from the US Fish and Wildlife Service (USFWS) through a consultation/permitting process.

Determining whether take would occur under the ESA as a result of GRT implementation should occur at the time of project-level analyses. This analysis would consider if habitat for special-status species is present and would be directly or indirectly affected by the project. If habitat would be directly or indirectly affected by the project, take of the species may be avoided by implementing project-specific avoidance measures. These measures could include conducting construction-related activities outside the season when the species is present, or monitoring for the species, and stopping work if the species is detected.

The Northern Spotted Owl is a threatened species. Photo Credit: Kameron Perensovich, CC BY-SA 2.0 <https://creativecommons.org/licenses/by-sa/2.0>, via Wikimedia Commons

If take cannot be avoided, permitting for take of species listed under the ESA may occur under either Section 7 (for projects with a federal nexus) or Section 10 (for projects without a federal nexus) of the ESA. Permitting under Section 7 of the ESA is triggered when federal funding is granted, or another action by a federal agency, such as when US Army Corps of Engineers issues a Nationwide Permit under the Clean Water Act. Under Section 7, the federal agency conducting the action is required to conduct formal consultation if take of a listed species is possible. [13] For anadromous fishes (e.g., fish that migrate upriver from the sea for spawning, such as steelhead), this consultation would occur between the federal agency and the National Marine Fisheries Service (NMFS). For other listed species (e.g., California red-legged frog, northern spotted owl), consultation would occur with USFWS. The decision to consult or not rests with the agency conducting the action rather than the applicant for the federal permit or funding. Under Section 7, the permitting agency would consider both the potential effects of the project as well as measures implemented to avoid take, to determine if federal consultation is required. During consultation, the regulatory agency (NMFS or USFWS) will issue a Biological Opinion that determines if the project is likely to adversely affect the species. The agency may require mitigation to compensate for loss of habitat or individuals.

Take authorization under Section 10 of the ESA requires consultation with the appropriate regulatory agency if take of listed species is likely to occur, as determined by the applicant. [14] This is a less restrictive threshold than under Section 7 (take only need be possible to require Section 7 consultation). However, preparation and approval of a Habitat Conservation Plan is required under Section 10, which can take many years to develop and can be costly.

13 US Fish and Wildlife Service and National Marine Fisheries Service. 1998. Consultation Handbook, Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act.

14 US Fish and Wildlife Service. 2018. Guidance of trigger for an incidental take permit under section 10 (a)(1) (B) of the Endangered Species Act where occupied habitat or potentially occupied habitat is being modified. Memorandum. US Fish and Wildlife Service, Washington DC. April 26, 2018.

The California red-legged frog is a threatened species. Photo Credit: kqedquest, CC BY-NC 2.0 DEED, <https://www.flickr.com/photos/kqedquest/2459880029>, via Flickr

CALIFORNIA ENDANGERED SPECIES ACT

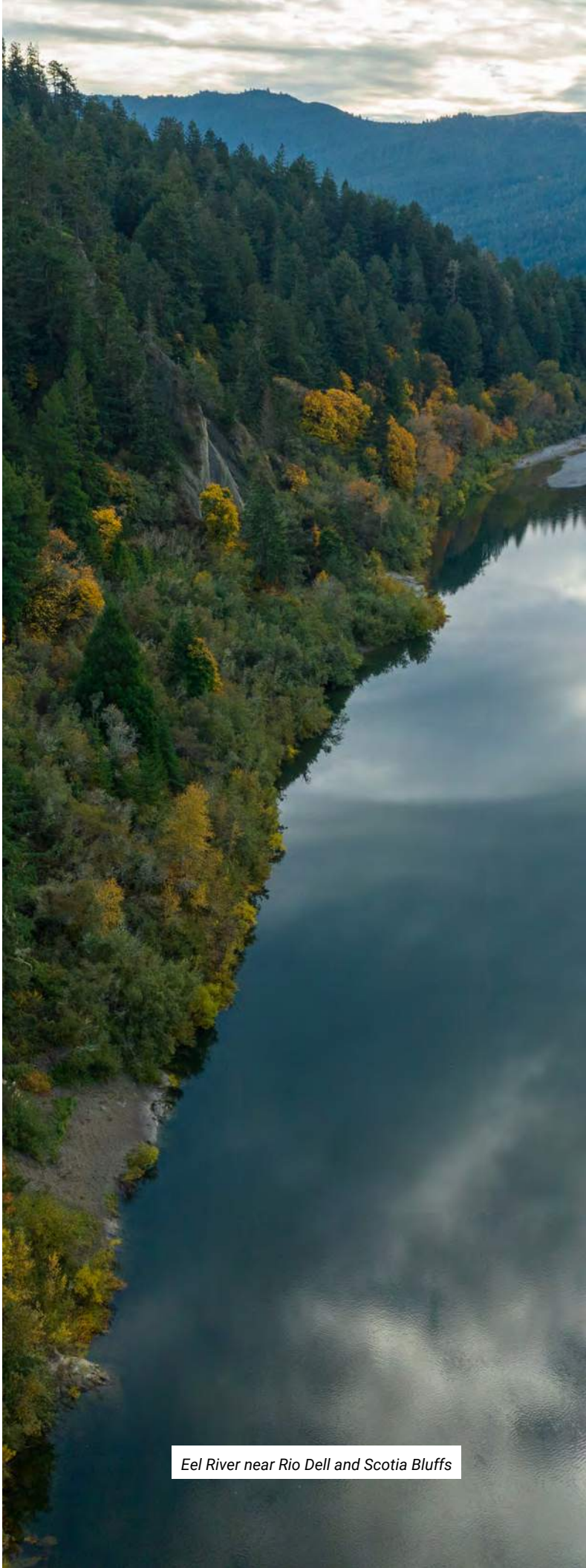
The California Endangered Species Act (CESA) defines "take" of listed species as: "to hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill."

Under CESA, the applicant decides whether take requires an Incidental Take Permit (ITP). However, take of CESA-listed species without an ITP can result in heavy fines. As discussed with the ESA, determining whether take may occur as a result of GRT implementation would happen on a project-level basis, looking at the suitability of habitat for listed species and the measures that could be implemented to reduce likelihood of take. This analysis would be provided to the California Department of Fish and Wildlife (CDFW) during the permitting process, along with further analysis of the likelihood that the incidental take would jeopardize the continued existence of the species, as well as documentation of compliance with the California Environmental Quality Act.

Projects that result in incidental take of CESA-listed species must receive take authorization from CDFW. For species that are listed under CESA and ESA, where a Biological Opinion has been issued, CDFW may issue take authorization through a consistency determination. For species listed under CESA but not the ESA, an ITP is required.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

The NPDES permit program was established by the Clean Water Act to regulate municipal and industrial discharges to surface waters of the US. NPDES permit regulations have been established for broad categories of discharges, including point source waste discharges and nonpoint source stormwater runoff. Each NPDES permit identifies limits on allowable concentrations and mass emissions of pollutants contained in the discharge. Sections 401 and 402 of Clean Water Act contain general requirements regarding NPDES permits. The State Water Resources Control Board adopted the statewide NPDES General Permit in August 1999. The State requires that projects disturbing more than one acre of land during construction file a Notice of Intent with the Regional Water Quality Control Board. Construction activities subject to this General Permit include clearing, grading, stockpiling, and excavation. Dischargers are required to eliminate or reduce non-stormwater discharges to storm sewer systems and other waters. A stormwater pollution prevention plan must be developed and implemented for each site covered by the permit. The stormwater pollution prevention plan must include best management practices designed to prevent construction-related pollutants from contacting stormwater and keep products of erosion from moving off-site into receiving waters of the State throughout the construction and life of the project; the best management practices must address sediment source control and, if necessary, pollutant control. Permitting under the NPDES will likely be required for all GRT segments.



Eel River near Rio Dell and Scotia Bluffs

WILD AND SCENIC RIVERS

The National Wild and Scenic Rivers System was created by Congress in 1968 (Public Law 90-542; 16 USC 1271 et seq.) to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations. Following the passage of the federal Wild and Scenic Rivers Act, California's Legislature passed its own in 1972. Initially, the state's Wild and Scenic Rivers Act protected free-flowing rivers along California's Northern Coast from development. All State-designated wild and scenic rivers were placed under the federal Wild and Scenic Rivers Act protection as well in 1980. Today, California's Act prohibits the construction of dams or diversion facilities, except to serve local needs, on portions of or entire rivers around the state. [15] The national act prohibits federal support for actions such as the construction of dams or other instream activities that would harm a river's free-flowing condition, water quality, or outstanding resource values. However, federal designation neither prohibits development nor gives the federal government control over private property. Recreation, agricultural practices, residential development, and other uses may continue. Any proposed new development must be guided by land use and resource management objectives that are compatible with a river's classification.[16]

15 Water Education Foundation. 2013. California Wastewater. Sacramento, CA.

16 National Wild and Scenic Rivers System. 2020. About the WSR Act. Available: https://www.rivers.gov/wsr-act.php. Accessed March 6, 2020.

Existing trail in Eureka

The Eel River has received both state (1972) and federal (1981) wild and scenic river designation. There are three levels of designation: wild, scenic, and recreation. The Eel River is designated wild for 97 miles, scenic for 28 miles, and recreational for 273 miles. The section of the Eel River adjacent to the GRT corridor is classified as recreational, with outstandingly remarkable values designated as fish.[17] According to the Evaluation Report on the Eligibility of Five California Rivers for Inclusion in the National Wild & Scenic Rivers System, the Eel River system has a remarkable anadromous fishery and ranks first for coho salmon habitat and second for Chinook salmon and steelhead habitat among all California coastal river systems.[18] For these reasons, sections of the river are closed to fishing to protect the juvenile steelhead.

Management of each designated river is administered by either a federal or state agency; the wild and scenic Eel River is managed by the Bureau of Land Management (BLM). For federally administered rivers, the designated boundaries generally average 0.25 miles on either bank to protect river-related values.[19] BLM has developed its own guidance manual for managing wild and scenic rivers, including management guidelines for recreation development on designated rivers.[20] According to Chapter 7, ("Management Guidelines for Activities on Designated Rivers") of these guidelines, recreation development for wild and scenic rivers designated as recreational may be located in close proximity to the river but should be located and designed to harmonize with the natural and cultural settings, protect identified river values including water quality, and be screened from view from the river to the extent possible. Transportation system development for wild and scenic rivers designated as recreational includes bridge crossings and river access, and new trail construction must be compatible with and fully protect identified values. Signs should use the National Wild and Scenic Rivers System logo to identify the river as part of the national system.

17 National Wild and Scenic Rivers System. 2020. Eel River, California. Available: https://www.rivers.gov/rivers/eel.php. Accessed March 6, 2020.
18 US Department of Interior. 1980. The Evaluation Report on the Eligibility of Five California Rivers for Inclusion in the National Wild & Scenic Rivers System. Heritage Conservation & Recreation Service, Pacific Southwest Region.

19 National Wild and Scenic Rivers System. 2020. About the WSR Act. Available: https://www.rivers.gov/wsr-act.php. Accessed March 6, 2020.
20 Bureau of Land Management. 2012. 6400 – Wild and Scenic Rivers – Policy and Program Direction for Identification, Evaluation, Planning, and Management (Public). Release 6-136. July 13, 2012.

FUNDING

The Great Redwood Trail will require funding from many different sources to pay for the trail's design and construction as well as the GRT's ongoing operations and maintenance. While the funding landscape is constantly changing, there are four major categories of potential funding:

1. Federal and California State Budget Appropriation
2. Nonprofit partnerships
3. Grants
4. Nontraditional sources

Dyerville Train Truss Bridge

Federal and California State Budget Appropriation

Each fiscal year, the US Senate and House Committees on Appropriations accept requests from senators and representatives on their local funding priorities. Requests should promote worthy investments in transportation, economic development, education, and other community benefits. Each committee reviews the spending requests, identifying those most appropriate for federal support. Through California's two federal senators' offices and the Second Congressional District Office, the GRTA and local sponsors may submit requests for Congressionally Directed Funding or Community Project Funding. While this process changes each year, instructions for the most recent cycle at time of publication can be found at: https://appropriations.house.gov/fiscal-year-2024-submitted-community-project-funding-requests and https://www.appropriations.senate.gov/fy-2024-appropriations-requests-and-congressionally-directed-spending.

Each year, the Governor of California proposes a budget that is reviewed and revised by the State Legislature before approval. In this process, State funding can be directly appropriated for the Great Redwood Trail. For example, the 2021 budget appropriated $10.3 million to the State Coastal Conservancy to assist the GRTA with the development of the Master Plan, provide interim staff support to the GRTA, and undertake activities necessary to advance the trail. The Governor and State Legislature could appropriate additional funds in the future to staff the GRTA or fund the trail's design, construction, and ongoing operations and maintenance. These funds could be used to leverage other grant funding sources or private donations.

Public art along GRT corridor in Arcata

Nonprofit Partnerships

A nonprofit organization can draw funds from a larger pool than just government agencies; nonprofits can solicit funding from individuals and philanthropic foundations as well as grants. Nonprofit organizations also enjoy more flexibility with program development, advocacy, and communications. A nonprofit typically does not have the authority of an elected body or landowner. They have no dedicated funding source without assistance from local, state, or federal funding mechanisms. Smaller nonprofits may lack the resources needed to manage a regional trail or GRT segment without support from another entity. Organizations like the Humboldt Trails Council, Friends of the Eel River, Great Redwood Trail Friends, and others could collaborate with the GRTA to raise money for trail and river restoration projects, maintenance, or programming activities. Health foundations could also provide funding for the Great Redwood Trail-related programs to promote healthy living. For example, the Humboldt Health Foundation has provided over $4.6 million to support community health efforts through organizational grants and funding partnerships. Other healthcare systems with a presence in the project area include Adventist Health, Trinity Hospital, and Humboldt County Memorial Hospital.

CASE STUDY: DELAWARE & LEHIGH NATIONAL HERITAGE CORRIDOR

For the 140-mile Delaware & Lehigh Trail, the Delaware & Lehigh National Heritage Corridor (D&L) started a partnership in 2013 with St. Luke's University Health Network to create the Get Your Tail on the Trail program. Linking St. Luke's healthy lifestyle expertise with the recreational and heritage leadership of D&L allows members of the community to participate in ongoing challenges by entering exercise miles in an online trail tracker and attending special community events. All challenges and special events are free to participate in, and incentives can be earned along the way to motivate community members to maintain healthy lifestyle habits with exercise and nutrition.

Example health partnership program:
https://tailonthetrail.org/

Grants

The Great Redwood Trail Agency and local partners are eligible for competitive grant funding from federal, state, and regional sources. The following grant sources should be evaluated regularly for alignment with GRT project needs.

Existing Annie & Mary Trail in Blue Lake

FEDERAL AND STATE GRANTS (ALPHABETICAL ORDER)

ACTIVE TRANSPORTATION INFRASTRUCTURE INVESTMENT PROGRAM

The Active Transportation Infrastructure Investment Program (ATIIP) is a new competitive grant program administered by the Federal Highway Administration to plan, design, and construct projects to provide safe and connected active transportation facilities associated with existing active transportation networks or spines. Active transportation networks are facilities that connect active transportation trails and destinations within a community or metropolitan region, including schools, workplaces, residences, businesses, recreation areas, medical facilities, and other community areas. Active transportation spines are facilities that connect communities, metropolitan regions, or states.

ATIIP awards two types of grants: Planning and Design grants and Construction grants. Projects seeking Planning and Design grants must have planning and design costs of at least $100,000, and projects seeking Construction grants must have total costs of at least $15 million to be eligible. Funding for the program is expected to be around $200 million in FY 2024.

Funds are administered by the Federal Highway Administration.

https://www.fhwa.dot.gov/environment/bicycle_pedestrian/atiip/

AFFORDABLE HOUSING AND SUSTAINABLE COMMUNITIES PROGRAM

The Affordable Housing and Sustainable Communities program funds land use, housing, transportation, and land preservation projects that support infill and compact development that reduces greenhouse gas emissions. Projects must fall within one of three project area types: transit-oriented development, integrated connectivity projects, or rural innovation projects. Fundable activities include affordable housing developments, sustainable transportation infrastructure, transportation-related amenities, and program costs. Trail construction would have to accompany affordable housing development or housing-related infrastructure.

Funds are administered by the Strategic Growth Council and implemented by the Department of Housing and Community Development.

http://www.sgc.ca.gov/programs/ahsc/

CALIFORNIA ACTIVE TRANSPORTATION PROGRAM

California's California Active Transportation Program funds infrastructure and programmatic projects that support its goals of shifting trips to walking and bicycling, reducing greenhouse gas emissions, and improving public health. Competitive application cycles occur every one to two years, typically in the spring or early summer. Eligible projects include construction of bicycling and walking facilities, new or expanded programmatic activities, or projects that include a combination of infrastructure and non-infrastructure components. Match is typically not required, though extra points are awarded to applicants who identify matching funds.

Funds are administered by the California Transportation Commission.

https://dot.ca.gov/programs/local-assistance/fed-and-state-programs/active-transportation-program

CANABIS RESTORATION GRANT PROGRAM

The Cannabis Restoration Grant Program funds partnerships to clean-up, remediate, and restore watersheds affected by cannabis cultivation, and related activities.

Funds are administered by the California Department of Fish and Wildlife.

https://wildlife.ca.gov/Conservation/Watersheds/Cannabis-Restoration-Grant

COASTAL CONSERVANCY GRANTS

The Coastal Conservancy funds a wide variety of projects along the California coast, in the San Francisco Bay, and in coastal watersheds to increase availability of beaches, parks, and trails for the public, protect and restore natural lands and wildlife habitat, preserve working lands, and increase community resilience to the impacts of climate change. The Great Redwood Trail is a North Coast Project Priority for the Conservancy. The Conservancy will fund most stages of a GRT project including pre-project feasibility studies, property acquisition, project planning and community involvement, design, environmental review, permitting, construction, and project-related monitoring. However, the Coastal Conservancy does not fund operations and maintenance activities. The Coastal Conservancy accepts grant requests on a rolling basis, and typical awards range from $200,000 to $5,000,000.

Funds are administered by the California Coastal Conservancy.

https://scc.ca.gov/grants/

Existing mural near GRT corridor in Eureka

CREATIVE CALIFORNIA COMMUNITIES

Creative California Communities supports meaningful, collaborative, creative placemaking projects that animate, activate, and celebrate communities. Funded projects support community goals and encourage increased engagement in arts and cultural activities with community members. The applicant must be a California-based nonprofit arts organization or arts-based unit of government. Funding is available for up to $150,000.

Funds are administered by the California Arts Council.

https://arts.ca.gov/grant_program/creative-california-communities-2/

FISHERIES RESTORATION GRANT PROGRAM

Established in 1981 in response to declining salmon and steelhead trout populations in California, the Fisheries Restoration Grant Program (FRGP) administers a competitive grant program supporting various coastal projects with contributions from California Native American tribes, federal and local governments, nonprofits, and private landowners. The program aims to recover and conserve salmon and steelhead trout populations through ecosystem restoration. Eligible applicants include California Native American tribes, government agencies, and nonprofits, with FRGP providing unique environmental coverages for funded projects, detailed in the Guidelines on the FRGP Solicitation Notice page or by contacting the FRGP Regulatory Coordinator. Awards range from $60,000 to over $2 million with the average project funded at $500,000.

Funds are administered by the California Department of Fish and Wildlife.

https://wildlife.ca.gov/Grants/FRGP

GRANTS FOR ARTS PROJECTS

Grants for Arts Projects is the National Endowment for the Arts' principal grant program. Through project-based funding, the program supports public engagement with and access to art across the nation, including the integration of the arts into the fabric of community life. Awards range from $10,000 to $100,000, not to exceed 50% of the total project cost.

Funds are administered by the National Endowment for the Arts.

https://www.arts.gov/grants/grants-for-arts-projects

HIGHWAY SAFETY IMPROVEMENT PROGRAM

Caltrans offers Highway Safety Improvement Program (HSIP) grants every one to two years. Eligible projects must be associated with a publicly owned road or active transportation facility including bicycle and pedestrian improvements. HSIP focuses on projects that explicitly address documented safety challenges through proven countermeasures, are implementation-ready, and demonstrate cost-effectiveness.

Funds are administered by Caltrans.

https://dot.ca.gov/programs/local-assistance/fed-and-state-programs/highway-safety-improvement-program

LAND AND WATER CONSERVATION FUND

The Land and Water Conservation Fund Act authorizes 50/50 matching grants to states and territories (and through states to local units of government) to plan, acquire, and develop public lands for outdoor recreation to improve the quality of life and the health and vitality of present and future generations.

Funds are administered by the National Park Service and the California Department of Parks and Recreation.

https://www.nps.gov/subjects/lwcf/stateside.htm

https://www.parks.ca.gov/?page_id=21360

NATIONAL FISH AND WILDLIFE FOUNDATION "ACRES FOR AMERICA" GRANT PROGRAM

The Acres for America grant program works to conserve fish and wildlife habitat, protect public lands, provide access to outdoor recreation, and ensure the future of local economies that depend on outdoor recreation, forestry, or ranching. The program supports bicycle and pedestrian trail projects.

https://www.nfwf.org/programs/acres-america

NATIONALLY SIGNIFICANT FEDERAL LANDS AND TRIBAL PROJECTS PROGRAM

The Nationally Significant Federal Lands and Tribal Projects program provides funding for the construction, reconstruction, and rehabilitation of nationally significant projects within, adjacent to, or accessing federal and tribal lands. Eligible projects include the construction of shared-use trails and paths, among others. Projects must have estimated construction costs of at least $12.5 million, and $55 million is available each fiscal year.

Funds are administered by the Federal Highway Administration.

https://highways.dot.gov/federal-lands/programs/significant

OUR TOWN

Our Town is the National Endowment for the Arts' creative placemaking grants program, which requires a partnership between a local government entity and a nonprofit organization. Funded projects integrate arts, culture, and design activities into efforts that strengthen communities by advancing local economic, physical, or social outcomes. Project types that may be relevant to the Great Redwood Trail include public art (temporary and permanent), community co-creation of art, public art planning, and public space design. Grants are awarded between $25,000 and $150,000 and cannot exceed 50% of the total project cost.

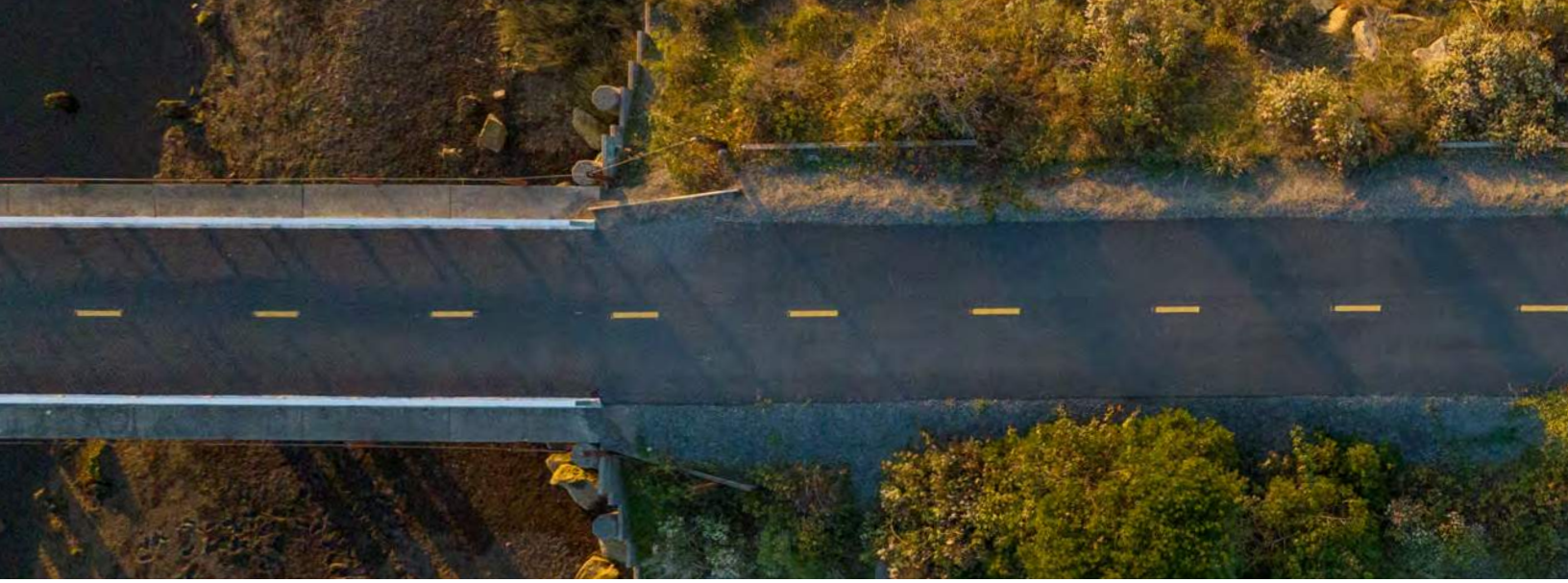
Funds are administered by National Endowment for the Arts.

https://www.arts.gov/grants/our-town/program-description

PEOPLE FOR BIKES COMMUNITY GRANTS

The PeopleForBikes Community Grant program is funded by members of the bicycle industry who want to make it easier and safer for people of all ages and abilities to ride. This program supports bicycle infrastructure projects including bike paths, lanes, trails, and bridges, as well as bike parks and pump tracks. Also included are end-of-trip bike facilities such as racks, parking, repair stations, and storage. Funding can be used for engineering and design work, construction costs (including materials, labor, and equipment rental), and reasonable volunteer support costs. The grant provides up to $10,000, and while it does not require a match, the grant should be no more than 50% of the project's overall budget.

https://www.peopleforbikes.org/grants



REBUILDING AMERICAN INFRASTRUCTURE WITH SUSTAINABILITY AND EQUITY GRANTS (RAISE)

Previously known as BUILD and TIGER Discretionary Grants, the Rebuilding American Infrastructure with Sustainability and Equity (RAISE) program enables the US Department of Transportation (USDOT) to invest in road, rail, transit, and port projects that have a significant local or regional impact. Eligible projects include recreational trails, road "diets," separated bike lanes, shared-use paths, sidewalks, signal improvements, signed pedestrian or bicycle routes, traffic calming, trailside and trailhead facilities, bicycle parking, racks, repair stations, storage, and bike share programs. For capital grants, the minimum RAISE grant award is $5 million in urban areas and $1 million in rural areas. There is no minimum award amount for planning grants. The maximum grant award for capital and planning grants is $25 million. From 2009 to 2023, the average grant award was $19 million.

Funds are administered by the USDOT.

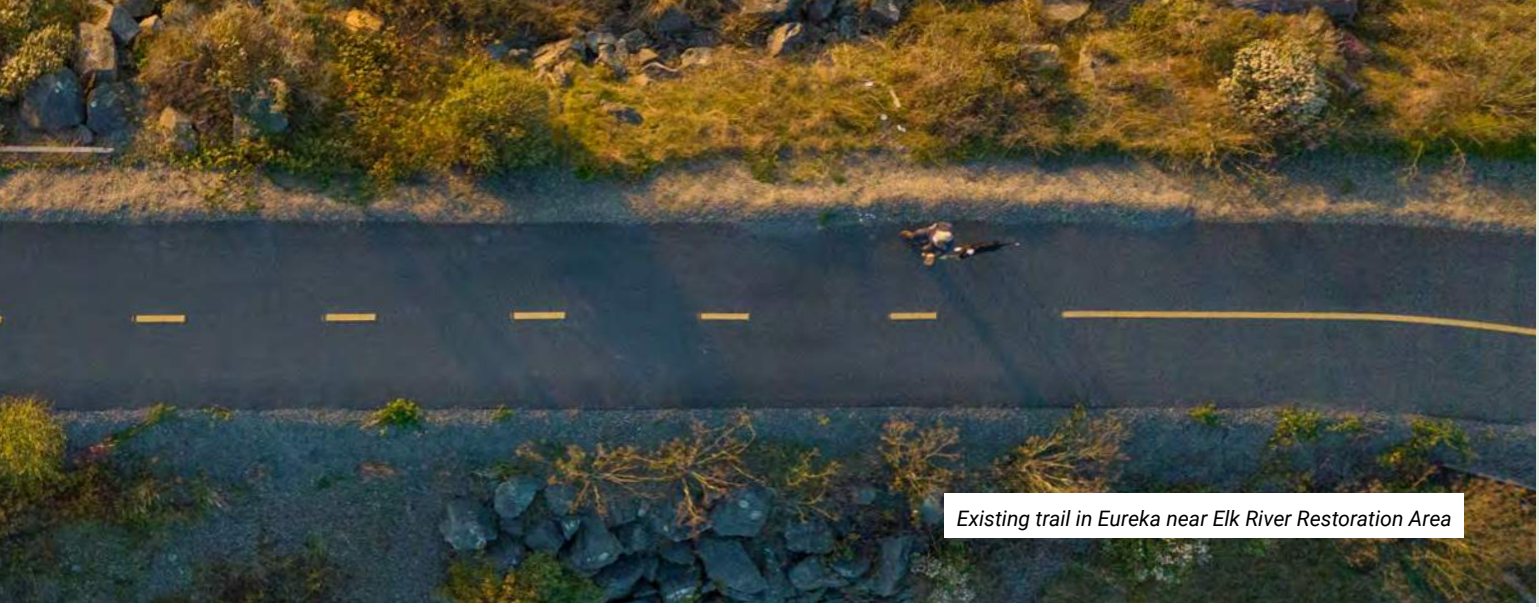
https://www.transportation.gov/RAISEgrants

RECONNECTING COMMUNITIES AND NEIGHBORHOODS GRANT PROGRAM

Funded by the federal Bipartisan Infrastructure Law, this joint grant program aims to improve transportation access to daily destinations, including jobs, education, healthcare, food, and recreation. Projects should prioritize fostering equitable development and restoration in disadvantaged communities. Competitive projects for this grant source reconnect communities by removing, retrofitting, or mitigating highways or other transportation facilities that create barriers to community connectivity, including to mobility, access, or economic development. This program can fund planning or construction. In its first year, the USDOT awarded 6 capital projects that averaged $23 million each and 39 planning grants that averaged $1.1 million each. The Bipartisan Infrastructure Law specifies that the maximum Community Planning Grant award funded with RCP funds is $2 million. There is no maximum award amount for a Community Planning Grant award funded with NAE funds. In FY 2023, USDOT may award up to $148 million of RCP funds and $2.57 billion of NAE funds for eligible construction activities.

Funds are administered by the USDOT.

https://www.transportation.gov/grants/rcnprogram



Existing trail in Eureka near Elk River Restoration Area

RECREATIONAL TRAILS PROGRAM

The Recreational Trails Program helps provide recreational trails for both motorized and nonmotorized trail use. Eligible projects include trail maintenance and restoration, trailside and trailhead facilities, equipment for maintenance, new trail construction, and more. The maximum grant amount is $2,000,000, and the match requirement is 12% of the total project cost. The average grant amount in 2023 was $668,571.00.

Funds are administered by the California Department of Parks and Recreation.

https://www.parks.ca.gov/?page_id=24324

RIVERS, TRAILS, AND CONSERVATION ASSISTANCE PROGRAM

The Rivers, Trails, and Conservation Assistance (RTCA) program is the community assistance arm of the National Park Service. The technical assistance that RTCA provides is for engaging public participation, developing plans, and identifying other sources of funding for conservation and outdoor recreation projects. Though this program does not offer monetary grants, National Park Service-RTCA staff collaborate with project partners by pairing their professional planning, design, and technical expertise with your team and knowledge experts from the community. Technical assistance could be used to support education, such as interpretive signs and programming, or stakeholder engagement for ROW acquisition and future planning phases.

Funds are administered by the National Park Service.

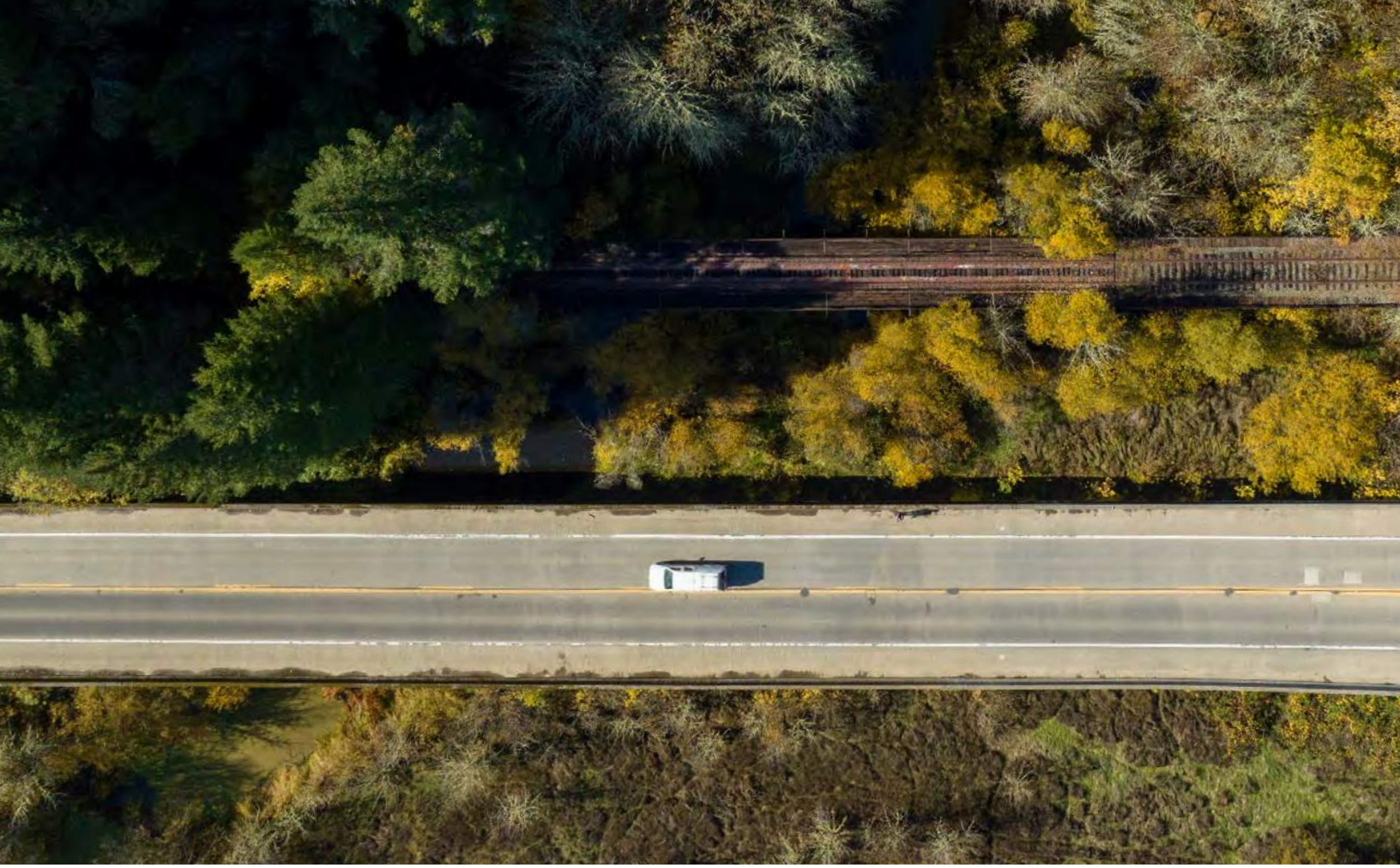
https://www.nps.gov/orgs/rtca/index.htm

RURAL BUSINESS DEVELOPMENT GRANTS

Rural Business Development Grants are designed to support rural communities to develop or expand small and emerging private business with fewer than 50 employees and less than $1 million in gross revenues. Grants generally range from $10,000 to $500,000 and may be used for community economic development, feasibility studies and business plans, rural business incubators, and long-term business strategic planning. Several projects featured in the Rural Prosperity Through the Arts & Creative Sector report published by the National Governor's Association have received funding through this grant program. Funds could be used to support business growth along the Great Redwood Trail.

Funds are administered by the US Department of Agriculture.

https://www.rd.usda.gov/programs-services/business-programs/rural-business-development-grants/ca



TRANSPORTATION DEVELOPMENT ACT

The Transportation Development Act (TDA) was enacted to improve existing public transportation services and encourage regional transportation coordination. It provides funding for transit and non-transit-related purposes that comply with regional transportation plans. TDA established two funding sources: the Local Transportation Fund (LTF) and the State Transit Assistance (STA) fund. LTF is derived from a one-quarter cent of the general sales tax collected statewide, which is returned to counties based on the amount of tax collected. The funds are then distributed to local cities and counties, based on population. Mendocino Council of Governments and Humboldt County Association of Governments each control approximately $100,000 in TDA Article 3 funds for bicycle and pedestrian plans and capital projects.

Funds are administered by Caltrans.

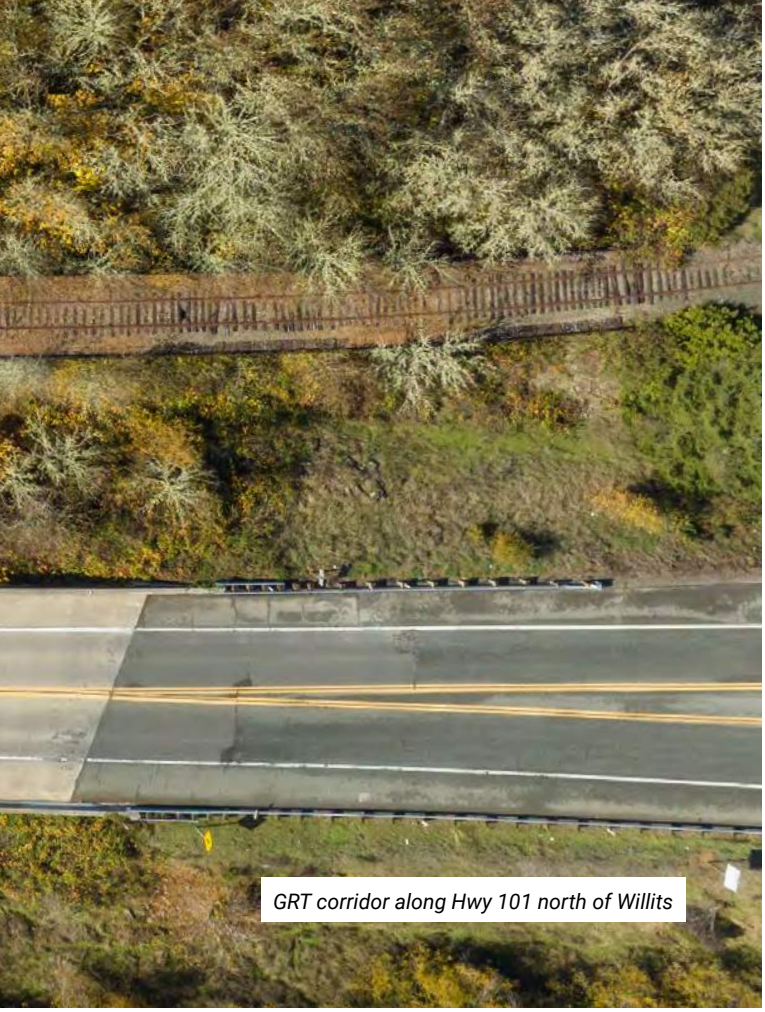
https://dot.ca.gov/programs/rail-and-mass-transportation/transportation-development-act

URBAN GREENING GRANTS

Urban Greening Grants support development of green infrastructure projects that reduce greenhouse gas emissions and provide multiple benefits. Competitive projects combine green infrastructure with projects that reduce commute vehicle miles traveled by constructing bicycle paths, bicycle lanes, or pedestrian facilities that provide safe routes for travel between residences, workplaces, commercial centers, and schools. Eligible projects include green streets and alleyways and nonmotorized urban trails that provide safe routes for travel between residences, workplaces, commercial centers, and schools. There is no minimum or maximum grant amount, and in FY 2022/2023, $23.7 million was available.

Funds are administered by the California Natural Resources Agency.

http://resources.ca.gov/grants/urban-greening/



GRT corridor along Hwy 101 north of Willits

WILDLIFE CONSERVATION BOARD PUBLIC ACCESS PROGRAM

This grant program is focused on creating wildlife-oriented recreation and conservation experiences in California. The program supports the construction and rehabilitation of public access facilities including fishing piers, parking, restrooms, boat ramps, trails, boardwalks, and interpretive facilities that promote activities such as bird watching, kayaking, hiking, hunting, and fishing. For stand-alone restoration, enhancement, and public access projects, a general rule of thumb is a maximum limit of $250,000. Larger restoration projects can be proposed and considered.

Funds are administered by the California Wildlife Conservation Board.

https://wcb.ca.gov/Programs/Public-Access

LOCAL AND REGIONAL

FUND FOR TRAILS AND OPEN SPACE (COMMUNITY FOUNDATION OF MENDOCINO COUNTY)

Established in 2016, this fund supports the acquisition, preservation, and restoration of parks, trails, and open space areas that are free and open to the public for low-impact recreational uses in Mendocino County. Projects may include equipment for preservation and restoration projects; improvements to existing facilities or construction of new facilities, including but not limited to, trails, trailheads, restrooms, parking areas, informational/interpretive kiosks, and directional signage; or planning for development or acquisition of new parks, trails, or other public open spaces. Grant amounts range from $1,000 to $7,500.

Funds are administered by the Community Foundation of Mendocino County.

https://communityfound.org/grant/fund-for-trails-and-open-space/

GREAT REDWOOD TRAIL AGENCY LICENSE/ LEASE AND OTHER RIGHT-OF-WAY AGREEMENTS

GRTA inherited hundreds of license and lease agreements for use of the former railroad right-of-way from its predecessor agency, NCRA. Collection of fees associated with existing agreements, as well as development of new agreements that are consistent with the GRT and approved by the GRTA Board, will be a steady source of income for the GRTA over time.

GREAT REDWOOD TRAIL ALLIANCE FUND

This fund supports charitable work to promote, support, and implement the development and use of the Great Redwood Trail along the north coast counties of Marin, Sonoma, Mendocino, and Humboldt. This fund is early in its formation at the time of publication, and no grants have been awarded.

The fund is administered by the Humboldt Area Foundation.

https://hafoundation.org/our-funds/great-redwood-trail-alliance-fund/

HUMBOLDT BAY TRAIL FUND

The Humboldt Bay Trail Fund supports the maintenance and development of the Humboldt Bay Trail, a component of the Great Redwood Trail. The fund was established at the Humboldt Area Foundation to provide a mechanism for private donations to assist in the continued development of the Humboldt Bay Trail by focusing on the critical need for trail maintenance funds. The fund supports trail-related needs including maintenance and rehabilitation, with an emphasis on projects involving community volunteers, emergency repair projects, trail amenities, and cost-share to state or federal grant funds for project development. The fund is governed by the Humboldt Bay Trail Committee, composed of four community members at-large, and three public agency representatives from the City of Arcata, City of Eureka, and the Humboldt County Public Works Department. The Humboldt Area Foundation manages donated funds in conjunction with other foundation assets, and allocates funds based on recommendations by the Humboldt Bay Trail Fund Committee. This endowed fund will grow and maintain a sizable fund balance that is able to generate a stream of income through investment earnings that can be expended to carry out the fund purpose. The average grant award is $4,000.

Funds are administered by the Humboldt Area Foundation and grants selected by the Humboldt Bay Trail Fund Committee.

https://hafoundation.org/our-funds/humboldt-bay-trail-fund/

https://www.hcaog.net/committees/bay-trail-fund-committee

Nontraditional Funding Sources

The GRTA and local partners may also consider leveraging resources and fundraising through nontraditional and private sector strategies listed below. These sources may require partnerships with nonprofit organizations.

GRT corridor in Loleta

ADOPT-A-MILE OR ADOPT-A-VISTA

Many trails offer the opportunity for personal or corporate sponsorship of trail sections or vista points. The Tahoe Rim Trail allows individuals, families, or organizations to adopt a mile for $10,000 or adopt a vista for $5,000. CV Link in the Coachella Valley has an "Adopt-a-Link" program, which allows individuals, private organizations, or businesses to commit private funds or volunteer hours in exchange for recognition. Other sponsored features could include trees, benches, pavers, light poles, and water fountains.

Example fundraising programs:

https://tahoerimtrail.org/adopt-vista-adopt-mile/

https://coachellavalleylink.com/get-involved/adopt-a-link/

CALIFORNIA CONSERVATION CORPS

The California Conservation Corps provides labor for trail construction and annual maintenance. Project sites must be on public land or publicly accessible. The organization may also be written into grant applications as a project partner.

https://ccc.ca.gov/what-we-do/funding-opportunities/active-transportation-program/

CHECKOUT OR POINT-OF-SALE DONATIONS

Friends of groups or non-profit organizations affiliated with the GRT could partner with local businesses and restaurants that benefit from the Great Redwood Trail by soliciting donations when customers pay for their goods or services. These donations can be solicited at checkout or on the restaurant bill. According to a 2023 Accelerist study, 59% of survey respondents reported donating at an in-store or online checkout over the past 12 months. The study reports Point-of-Sale fundraising collected $749 million in 2022.[21]

21 Accelerist. 2023. Checkout for Change: Exploring Point of Sale Giving Trends. https://www.accelerist.com/checkout-for-change-2023/. Accessed on January 24, 2024.

CASE STUDY: THE TAHOE FUND

Founded in 2010, the Tahoe Fund was created to be a major source of private funding for environmental projects around the Lake Tahoe Basin with an emphasis on forest health, lake clarity, sustainable recreation, transportation, and stewardship. The Tahoe Fund created the "$1 for Tahoe" program using the "checkout charity" fundraising model starting in 2015. Local businesses collect one dollar from their guests from purchases of lift tickets, hotel accommodations, and other items at participating resorts and businesses in the Tahoe and Truckee region. As an "opt-out" program, guests may choose not to participate, and the contribution will be removed from their bill. "Since its inception, the $1 for Tahoe program has proven to be a win-win for businesses and their guests. The program creates a simple way for those who love this area to help make it even better," said Amy Berry, Tahoe Fund CEO. "Over the years, $1 for Tahoe contributions have helped make trail projects, watershed restoration, and stewardship programs and so much more possible. We're grateful for all of our partners, including the Tahoe Restaurant Collection, who recognize the value of these efforts and are committed to helping us move these projects forward."

Example fundraising program:

https://www.tahoefund.org/ways-to-give/green-bucks/

CONCESSION FEES

The GRTA could create food kiosks or bike rental stations along the trail and charge concessionaires license fees to operate.

CORPORATE DONATIONS

Corporate donations are often received in the form of liquid investments (i.e., cash, stock, or bonds) or in land or real estate. Employers recognize that creating places to bike and walk is a way to build community and attract a quality workforce. Bicycling and outdoor recreation businesses often support local projects and programs. Municipalities can create funds that facilitate and simplify transactions involving a corporation's donation to a municipality. Donations are commonly received when a widely supported capital improvement program is implemented.

FUNDRAISING EVENTS

Races and walks, such as bicycle races, half-marathons, and 5K runs and walks, are opportunities to raise money for Great Redwood Trail operations through registration fees and donations. Races are also an opportunity to establish trail-related events, which can attract visitors from outside the area.

LOANS

California Infrastructure State Revolving Fund
The Infrastructure State Revolving Fund (ISRF) Program provides below-market rate loans to public agencies and nonprofit corporations (sponsored by public agencies) for a wide variety of infrastructure and economic development projects (excluding housing). ISRF Program funding is available in amounts ranging from $50,000 to $25 million, with loan terms ranging from the useful life of the project to a maximum of 30 years. Eligible projects include county highways, public transit, and parks and recreation facilities and can be used for ROW acquisition, planning, design, and construction. Financing can support individual projects or be used to leverage other funding sources.

Funds are administered by the California Infrastructure and Economic Development Bank (IBank).

https://www.ibank.ca.gov/loans/infrastructure-loans/

MEMBERSHIP DUES

Annual membership dues can contribute to ongoing maintenance. For example, the Friends of the Katy Trail in Dallas, Texas, is a nonprofit organization that fundraises for trail maintenance and capital expansion. Annual membership dues range from $50 to $2,500 and fund utilities, maintenance, and safety programs. Based on membership level, donors receive a variety of perks including local business discounts, invitations to events, website recognition, and t-shirts. Donations can also be accepted in place of or in addition to membership.

Example membership dues example:

https://katytraildallas.org/membership/

Downtown Loleta

MEMORIAL FUNDS

A memorial fund is often created to honor a deceased community member. These crowdsourced funds can be used in a variety of ways to honor the spirit and character of the deceased. Common examples include a scholarship fund or a physical memorial, such as a bench.

MERCHANDISE SALES

Sales of Great Redwood Trail-branded items such as t-shirts, sweatshirts, bicycle jerseys, mugs, and more could provide additional funding for the trail. Branded merchandise can often be purchased in bulk at lower rates. This could be an opportunity to partner with a nonprofit organization or a local outdoor recreation business.

ON-TRAIL DONATION STATIONS

Donation stations along the trail (once constructed) could allow trail users to donate directly to trail maintenance. The Yampa Valley Community Foundation in Steamboat Springs, Colorado, set up repurposed parking meters to accept credit card donations from trail users. Prior to construction, GRTA could place donation stations at regional park facilities along the GRT and at stakeholder locations. Information about the trail could accompany the donation station.

Example vendors include Karma Payments:

https://karmapayments.com/ and DipJar: https://www.dipjar.com/.

PERCENT-FOR-ART ORDINANCE/LEGISLATION

Passing percent-for-art legislation encumbers an annual percentage (usually 0.5 to 2) of publicly funded capital improvement projects (CIP) for the commissioning of public artworks, located in, on, or adjacent to the building or project being constructed. Percent-for-art ordinances guarantee a funding stream for public art projects, regardless of county budgets or arts funding. The policy also guarantees that public art projects will be planned each year, as long as CIPs are underway and municipal construction continues.

Example policies for this program and other funding sources for public art projects can be found in the link below to the Americans for the Arts website.

https://www.americansforthearts.org/by-topic/funding-resources

STRATEGIC LAND USE AGREEMENTS

GRTA is a large landowner and steward of the public right-of-way. Entering strategic revenue generating agreements for the short- and long-term use of its land could be considered. Short term uses like farmer's markets, races and festivals promote trail usage and provide economic opportunities for communities. Agreements for longer term uses such as the operation of a campground or other trail-oriented development could be considered. Usage of the right of way for road crossings or public utility connections, such as electricity and broadband, could generate revenue for GRTA while helping rural communities access needed services.

Table 33: *Funding Sources and Eligible Project Expenses*

	Planning & Design	Acquisition	Construction	Operations & Maintenance	Public Art
FEDERAL AND STATE					
Active Transportation Infrastructure Investment Program	✓	✓	✓		
Affordable Housing and Sustainable Communities Program		✓	✓		
California Active Transportation Program	✓		✓		
Cannabis Restoration Grant Program			✓		
Coastal Conservancy Grants	✓	✓	✓		
Creative California Communities					✓
Fisheries Restoration Grant Program			✓		
Grants for Arts Projects					✓
Habitat Conservation Fund			✓		
Highway Safety Improvement Program	✓	✓	✓		
Land and Water Conservation Fund		✓	✓		
The National Fish and Wildlife Foundation Acres for America Grant Program		✓	✓		
Nationally Significant Federal Lands and Tribal Projects Program			✓		
Our Town					✓
People for Bikes Community Grants			✓		
Rebuilding American Infrastructure with Sustainability and Equity Grants	✓		✓		
Reconnecting Communities and Neighborhoods Grant Program	✓	✓	✓		
Recreational Trails Program	✓	✓	✓	✓	

Table 33, continued: *Funding Sources and Eligible Project Expenses*

	Planning & Design	Acquisition	Construction	Operations & Maintenance	Public Art
Rivers, Trails, And Conservation Assistance Program	✓				
Rural Business Development Grants	✓	✓	✓		
Transportation Development Act	✓		✓		
Urban Greening Grants		✓	✓		
Wildlife Conservation Board Public Access Program	✓		✓		
LOCAL AND REGIONAL					
Fund for Trails and Open Space			✓		
Great Redwood Trail Alliance Fund	✓	✓	✓	✓	
Humboldt Bay Trail Fund			✓	✓	
NON-TRADITIONAL					
Adopt-a-Mile Or Adopt-a-Vista	✓	✓	✓	✓	✓
Checkout or Point-of-Sale Donations	✓	✓	✓	✓	✓
Concession Fees	✓	✓	✓	✓	✓
Corporate Donations	✓	✓	✓	✓	✓
Fundraising Events	✓	✓	✓	✓	✓
Foundations	✓	✓	✓	✓	✓
Loans	✓	✓	✓	✓	✓
Membership Dues	✓	✓	✓	✓	✓
Merchandise Sales	✓	✓	✓	✓	✓
On-trail Donation Stations	✓	✓	✓	✓	✓
Strategic Land Use Agreements	✓	✓	✓	✓	✓

08

Appendices

Humboldt Redwoods State Park

Appendices will be uploaded to the project website and linked in this document.

A. Economic Benefits Report

E. Project Mapbook

B. Project Plan Table

F. Restoration and Habitat Enhancement Technical Memo

C. Trail Use & Design

G. Creek Restoration Concepts

D. Branding Guidelines & Wayfinding Concepts

A

Economic Benefits Assessment

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From

RAIL

to

TRAIL

The Great Redwood Trail is envisioned as a 307-mile rail-trail project connecting California's San Francisco and Humboldt Bays. Once completed, it will be the longest rail-trail in the United States and will traverse scenic landscapes including old-growth redwood forests, oak woodlands and vineyards, and the dramatic Eel River Canyon. The Great Redwood Trail will connect the many vibrant communities of Marin, Sonoma, Mendocino, Trinity, and Humboldt counties, creating a transformational economic engine and boosting healthy recreation for all in the North Coast region.

This Economic Benefits Assessment report and the Great Redwood Trail Master Plan address the 231 miles of trail within Mendocino, Trinity, and Humboldt counties. The Great Redwood Trail in Sonoma and Marin counties will be planned and constructed by Sonoma-Marin Area Rail Transit (SMART) and is outside the scope of this assessment.

THE TRAIL EXTENT OF THIS MASTER PLAN CONNECTS:

- **231 miles**
- **3 counties**
- **29 cities, towns, and census-designated communities**
- **180,000 people living within three miles of the trail**

Photo Credit: The Wildlands Conservancy

TABLE OF CONTENTS

To learn more about the project and Great Redwood Trail Agency (GRTA), please visit TheGreatRedwoodTrail.org.

BENEFITS SUMMARY

Total Annual Benefits:

$102,568,000[1]

The Great Redwood Trail will be a transformational economic engine in Northern California. The immense scale and scenic beauty of the completed trail will create new recreational experiences that will become destinations for the entire state and beyond. The benefits of the trail will expand into "trail towns"—cities, towns, and communities along the corridor that support trail users with services, promote the trail to their citizens and regions, and embrace the trail as a resource to be protected and celebrated. The mutual relationship between the Great Redwood Trail and the trail towns along the way can create sustained economic benefits for generations.

This report contains an economic benefits assessment of the proposed Great Redwood Trail in Mendocino, Trinity, and Humboldt counties.

The potential economic benefits of the Great Redwood Trail include both **money spent** on goods and services and **money saved** on transportation and health-care costs. The economic benefits assessment estimates the number of trips anticipated to take place on the proposed trail, and assesses the potential recreation, tourism, retail, transportation, and health benefits that may accrue once the proposed 231 miles of trail in Mendocino, Trinity, and Humboldt counties are constructed.

For the purpose of this report, the proposed Great Redwood Trail connects 231 miles from the Sonoma-Mendocino County border to Humboldt Bay. In total, the completed trail and associated impacts are estimated to generate **$102,568,000** in annual benefits and **$5,490,000** in annual tax revenue increase.

[1] All monetary benefits associated with the Great Redwood Trail in this assessment are order-of-magnitude estimates that are rounded to the nearest thousand. All economic benefits identified in this report are estimates reported as 2023 dollars.

$61,693,000

RECREATION, TOURISM, AND RETAIL BENEFITS

$38,455,000

HEALTH BENEFITS

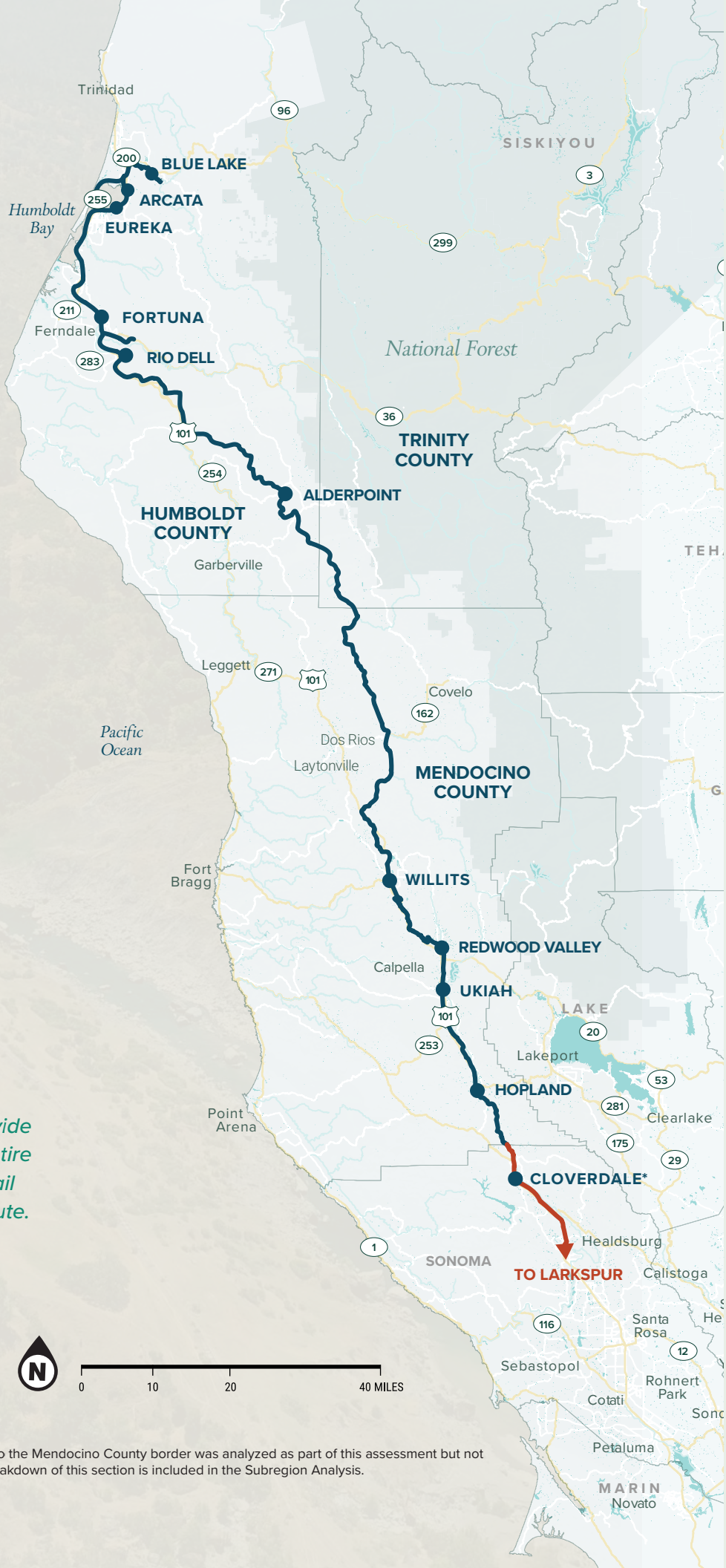
$2,420,000

TRANSPORTATION BENEFITS

$5,490,000

TAX REVENUE INCREASE

The Great Redwood Trail follows the former North Coast Railroad Authority (NCRA) right-of-way. The transformation of this route into a multiuse trail will provide economic benefits to the entire region and the individual trail towns that are along the route.



***NOTE:** The 4 mile section from Cloverdale to the Mendocino County border was analyzed as part of this assessment but not included in the overall results. A detailed breakdown of this section is included in the Subregion Analysis.

DEMAND

Total Estimated Annual Walking and Biking Trips

6.2 to 9.2 million trips

5.3 to 7.9 million

ANNUAL PEDESTRIAN TRIPS

0.9 to 1.3 million

ANNUAL BIKE TRIPS

67%

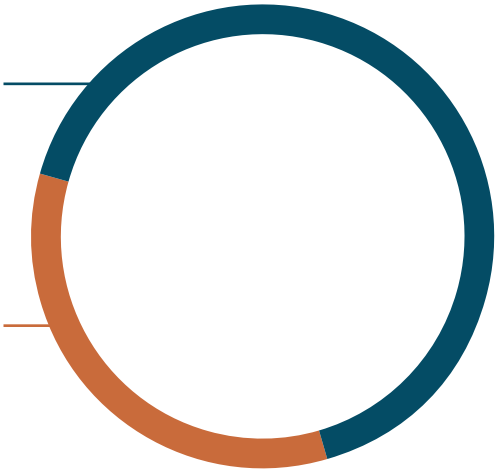
4.1 to 6.1 million

ANNUAL LOCAL USE

33%

2.1 to 3.1 million

ANNUAL VISITOR (NON-LOCAL) USE



METHODOLOGY[1]

The economic benefits assessment is driven by the quantity of trail trips each year—**more people using the trail equates to more benefit** . This is calculated as demand, which estimates the daily and annual number of trips that will be taken on the Great Redwood Trail. The demand calculation takes into account local population, mode of travel, data from comparable trails, land-use context, and potential destinations. For clarity, **demand calculates unique trips, not unique users**. To calculate the potential demand for the proposed trail system, analysis of existing walking and biking activity in the project area was supplemented with data from comparable trails across the United States. Similar to the Great Redwood Trail, these comparable trails are regional multiuse trails that connect cities and towns with rural areas and recreational destinations.

Given the broad geographic reach of the Great Redwood Trail, the demand analysis is context-sensitive to account for the variety of unique conditions along the trail. Each mile of the Great Redwood Trail and each of the comparable trails were categorized into rural, suburban, or urban based on the predominant land use surrounding the trail. This data was then cross-referenced to inform the demand for mile-long segments of the Great Redwood Trail.

Counts data from the following comparable trails was used in this analysis:

- Great Allegheny Passage, MD and PA
- Connecticut Trail Census, CT
- Erie Canalway Trail, NY

[1] Demand model is proprietary to Alta Planning + Design. For a complete breakdown of the demand and economic benefits assessment methodology, reference Appendix A: Methodology.

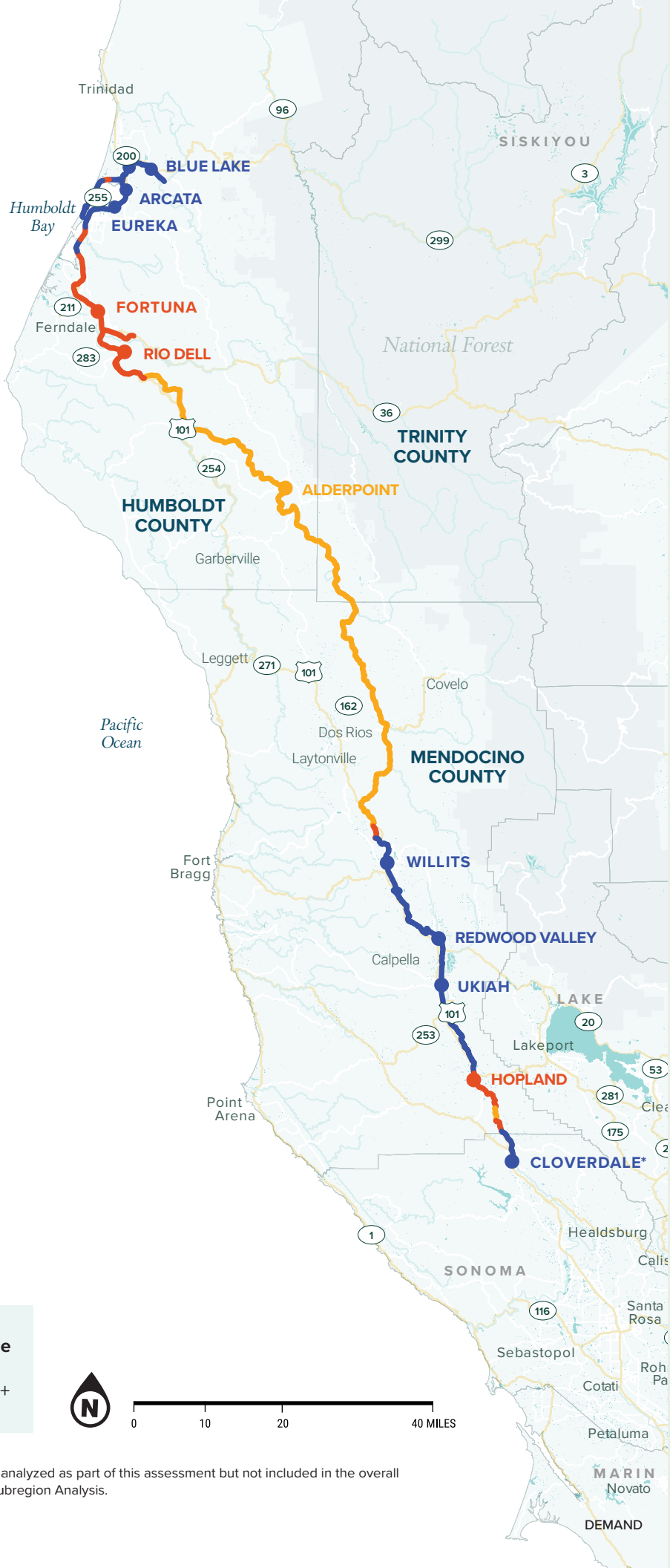
RESULTS

For the total 231 miles of Great Redwood Trail in Mendocino, Trinity, and Humboldt counties, **6.2 to 9.2 million** annual trips are estimated, including trips taken by pedestrians, cyclists, equestrians, backpackers, kayakers, and others. This includes an estimated **2,500 to 3,600 bicyclists per day** and an estimated **14,500 to 22,000 pedestrians[1] per day**. These daily estimates are averages over an entire year, and it is expected that trip demand would have peaks and valleys based on seasonality and day of the week. One-third of the trips are anticipated to be from visitors,[2] which presents significant economic opportunity for the region.

LIMITATIONS AND ASSUMPTIONS

The primary purpose of this analysis is to facilitate a more informed discussion on the economic benefits of the proposed Great Redwood Trail. Even with extensive primary and secondary research incorporated into the demand and economic benefits assessment models, it is challenging to accurately predict the exact impacts of various factors. For this reason, all estimated benefits are rounded and should be interpreted as order of magnitude estimates as opposed to exact numbers. Monetary estimates are reported as 2023 dollars. All estimates in this report assume that the 231 miles of the Great Redwood Trail in Mendocino, Trinity, and Humboldt counties have been constructed and have had multiple years to establish.

[1] Pedestrian counts include all non-cycling modes, including backpacking, equestrian, and people with mobility devices.
[2] For the purposes of this assessment, a visitor (non-local) trip is taken by a person who does not live within a zip code along the Great Redwood Trail alignment.



Daily Estimated Walk and Bike Trips per Mile

1 - 75 | 75 - 150 | 150+

***NOTE:** The 4 mile section in Sonoma County to Cloverdale was analyzed as part of this assessment but not included in the overall results. A detailed breakdown of this section is included in the Subregion Analysis.

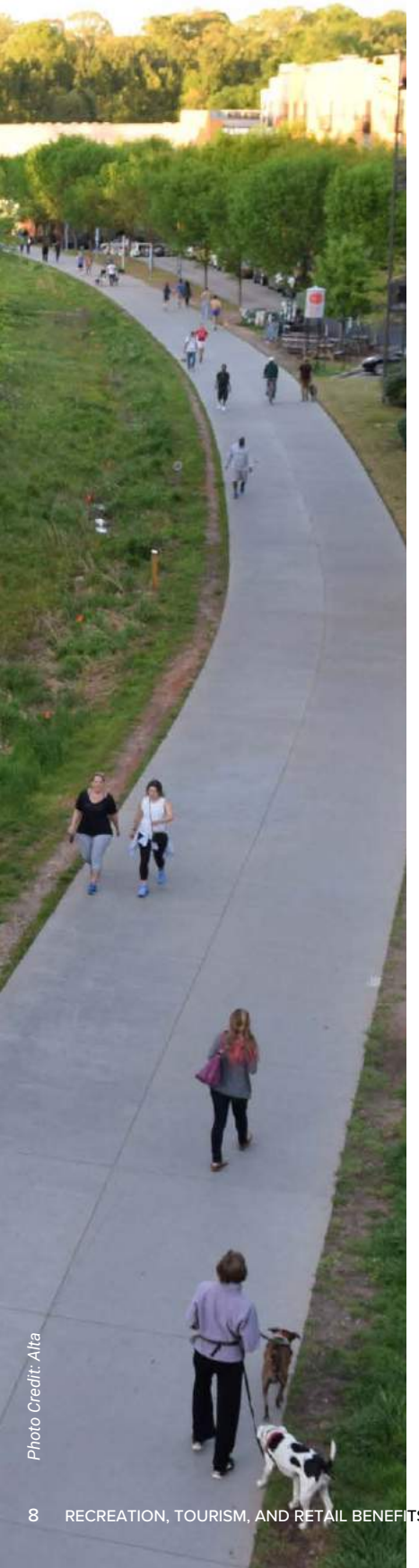


Photo Credit: Alta

RECREATION, TOURISM, AND RETAIL BENEFITS[1]

Each trip taken by groups of non-local trail users on the Great Redwood Trail is expected to generate the following revenue:[2]

$64
FOR FOOD/MEALS

$60
FOR RETAIL ESTABLISHMENTS

$31
FOR ENTERTAINMENT

$52
FOR BICYCLE RENTALS

$93
FOR LODGING[3]

The primary economic benefit for the Great Redwood Trail is **money spent on goods and services** related to recreation, tourism, and retail, which accounts for 60% of the total economic benefits. The increase in money spent within the region is primarily due to new non-local visitors **who will bring money from outside the region and spend it locally**. While a majority of Great Redwood Trail trips will be by local residents, one-third or an estimated **2.1 to 3.1 million** of trips each year will be non-local. For the purposes of this assessment, a person who is non-local is somebody who does not live within a zip code along the Great Redwood Trail alignment.

Non-local trips are estimated to generate **$61,693,000** per year for the region. The majority of this revenue (87%) will come from money spent on lodging such as hotels and campgrounds and on food and beverages. The remaining revenue (13%) will come from retail establishments, entertainment, and equipment rentals. While the emphasis of the money spent will be on goods and services that cater to recreation and tourism, non-local trips will increase money spent at most local businesses including grocery stores, farmers markets, and gas stations, among others. With this influx of economic demand, trail towns will be able to support increased economic development near and along the trail, such as expanded or new lodging, restaurants, rentals, and retail. These benefits will result in an increase of **$5,490,000** in annual tax revenue for local, regional, and state jurisdictions from sales and transient occupancy tax.

[1] For a complete breakdown of the recreation, tourism, and retail assessment methodology, reference Appendix A: Methodology.
[2] Averages based on typical group size of four people.
[3] Typical lodging expenditure is an average per group of non-local users based on the assumption that 42% of non-local trail users stay overnight in lodging of some kind.

The estimates for these benefits assume the availability of such goods and services. For the full benefit to be realized, the supply of goods and services needs to support the demand. There are also indirect economic benefits that were not included as part of this assessment, as trail-related spending from non-local users is expected to circulate through the economy and provide a multiplier effect.

Case Study: Hipcamp

Hipcamp is a California-based company that partners with landowners to create new places for outdoor recreation.

- During an average visit, campers who book through Hipcamp spend $300 at local businesses.[1]
- In Mendocino County alone, over 11,000 visitors use Hipcamp annually. These visitors spend a total of $1.6 million within the county.[2] This supports 15.25 jobs with a salary of $29,800. Additionally, the average camp host earned 7,500 in supplemental income.

[1] Hipcamp's mission is simple: Get more people outside (2022).

[2] Earth Economics (2021). Economic and environmental benefits of Hipcamp Properties, Mendocino County [Fact Sheet]. https://www.eartheconomics.org/all-publications/2022/hipcamp

Completing the Great Redwood Trail will result in direct annual benefits from money spent by non-local trail users, particularly benefiting those in the tourism and service industries.

Annual Recreation, Tourism, and Retail Benefits:

$61,693,000

$23,519,000
FOOD/MEALS

$5,972,000
RETAIL ESTABLISHMENTS

$1,899,000
ENTERTAINMENT

$398,000
BICYCLE RENTALS

$29,905,000
LODGING

$5,490,000
TAX REVENUE INCREASE

Communities can support economic development by encouraging rentals, retail, and restaurants along the trail.

HEALTH BENEFITS[1]

Health benefits and reduced burden on the regional health-care system through:

$7.08

HEALTH-CARE COST SAVINGS FOR EACH NEW WALKING TRIP CREATED BY THE GREAT REDWOOD TRAIL

$6.31

HEALTH-CARE COST SAVINGS FOR EACH NEW BIKING TRIP CREATED BY THE GREAT REDWOOD TRAIL

Health benefits are the primary form of cost savings for the Great Redwood Trail, and account for 37% of the total economic benefits. The economic benefits related to health are **reduced health-care costs** as a result of increased physical activity. The Great Redwood Trail will create **new opportunities for physical activity and exercise** for local residents and visitors across the 231-mile portion of the Great Redwood Trail corridor. Building a desirable and accessible trail will expand opportunities for trail recreation, increase access to park facilities, and encourage people to walk and bike more as a means of transportation.

Rural communities in Northern California experience significantly higher rates of stroke, heart disease, vehicular collisions, and death than the rest of the state.[2] In Mendocino County, top community health priorities include addressing childhood obesity, family wellness, and mental health.[3] More people walking and biking as a result of the Great Redwood Trail will have a region-wide impact on community health, including increased physical activity levels, increased cardiovascular health, fewer vehicular collisions, and improved mental health and well-being. These benefits will reduce health-care costs for individuals and reduce the existing burden on the regional health-care system.

Health benefits are calculated as reduced mortality benefits, which include health-care cost savings from people experiencing fewer chronic illnesses and living longer. Based on national research and local demographics, the associated average cost savings for each new walking trip will be $7.08, and each new biking trip will be $6.31. The analysis estimates that the 6.2 to 9.2 million total annual walking and biking trips on the trail system will provide **$38,455,000** in health, or reduced mortality, benefits.

[1] For a complete breakdown of the Health Analysis methodology, reference Appendix A: Methodology.

[2] 2018 Humboldt County Community Health Assessment (2018), <https://humboldtgov.org/DocumentCenter/View/71701/2018-Community-Health-Assessment-PDF>

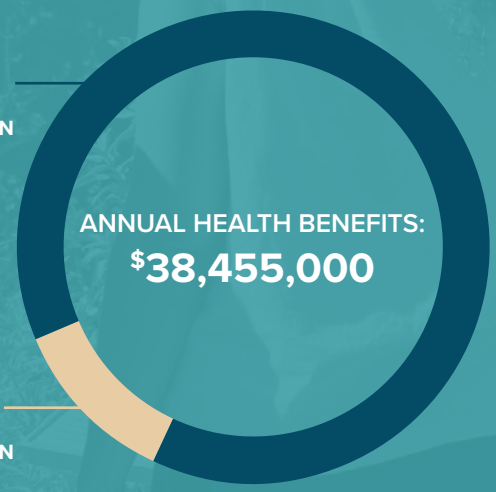
[3] 2019 Mendocino County Community Health Needs Assessment (2019), <https://www.healthymendocino.org/content/sites/mendocino/chna_images/1_2019_CHNA_Key_Findings_Summary__Report.pdf>

Photo Credit: Alta

Completing the Great Redwood Trail will result in more people walking and biking, reducing health-care costs for the region.

$33,991,000
MORTALITY REDUCTION BENEFITS FROM WALKING

$4,464,000
MORTALITY REDUCTION BENEFITS FROM CYCLING



Annual Health Benefits:

$38,455,000

TRANSPORTATION BENEFITS[1]

Transportation benefits and reduction of carbon footprint through:

7.9 million

ANNUAL WALKING TRIPS

1.3 million

ANNUAL BIKING TRIPS

3 million

REDUCTION IN ANNUAL MOTOR VEHICLE MILES

1,230 metric tons

REDUCTION IN ANNUAL CO2 EMISSIONS

The Great Redwood Trail will create new opportunities for local residents and visitors to walk and bike more frequently as a means of transportation throughout the 231-mile portion of the Great Redwood Trail corridor. Particularly in cities and towns, the trail will provide a high-quality and direct route to and from destinations, allowing people to replace short trips (under 4 miles) previously taken by car with walking or biking. These short trips may include everyday activities such as going to the park, running errands, or getting to and from work and school, among others.

The economic benefits related to transportation are **cost savings as a result of fewer trips taken by car**. Compared to trips taken by cars, walking and biking cost significantly less for each individual user and reduce costly byproducts of driving such as congestion, crashes, emissions, and roadway maintenance. The analysis estimates that the 6.2 to 9.2 million total annual walking and biking trips on the trail system would reduce vehicle-miles traveled by 3 million miles each year, which would provide **$2,420,000** in annual transportation benefits.

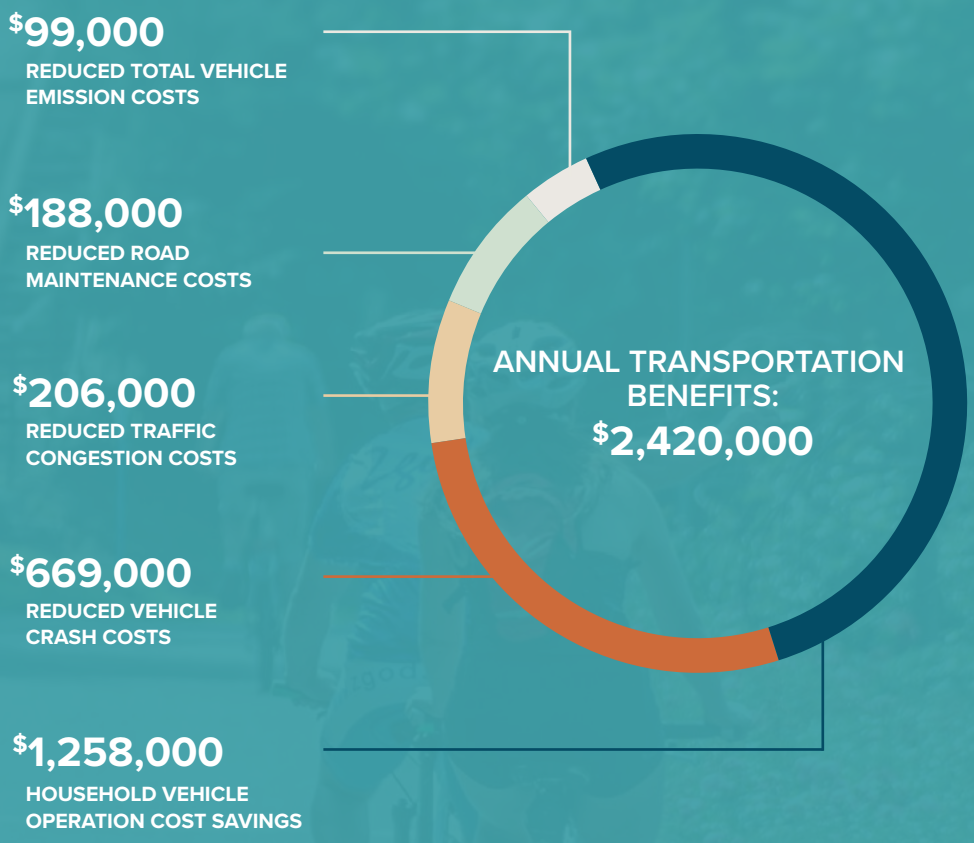
In addition to cost savings, reduced emissions[3] as a result of fewer vehicle-miles traveled will have lasting impacts on the health and well-being of residents in the region. These impacts may include increased air quality, mitigation of climate change impacts through reduced fossil fuels, and improved respiratory health for residents.

For reference, 3 million motor vehicle-miles is the same as driving from Cloverdale to Arcata 15,500 times.

1,230 metric tons are equivalent to the CO_2 removed from the atmosphere by 1,456 acres of U.S. forests in one year.[4]

[1] For a complete breakdown of the transportation assessment methodology, reference Appendix A: Methodology.
[2] Trip replacement refers to the percentage of car trips that are estimated to be replaced by biking or walking, based on industry research.
[3] Includes carbon dioxide, nitrous oxides, sulfur oxides, particulate matter, and volatile organic compounds.
[4] EPA (2022). https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

Completing the Great Redwood Trail will reduce motor vehicle trips and greenhouse gas emissions by replacing vehicle trips with lower cost and lower impact walking and biking trips.



Annual Transportation Benefits:

$2,420,000

Real savings can be estimated from the reduction of vehicle miles traveled. These benefits include direct savings for households as well as reduced costs from maintenance and emissions.

Photo Credit: Alta

BENEFITS BY COUNTY

This section displays the estimated annual economic benefits of the Great Redwood Trail by county. The benefits were allocated to each county based on the proportion of estimated trips within each county. Tax revenue is included for reference on the County benefits tables on the following pages.

HUMBOLDT COUNTY 118 miles

TRANSPORTATION BENEFITS	$1,294,000
HEALTH BENEFITS	$17,968,000
RECREATION, TOURISM, & RETAIL BENEFITS	$28,837,000
TOTAL BENEFITS:	**$48,099,000**

MENDOCINO COUNTY 101 miles

TRANSPORTATION BENEFITS	$1,034,000
HEALTH BENEFITS	$18,485,000
RECREATION, TOURISM, & RETAIL BENEFITS	$29,662,000
TOTAL BENEFITS:	**$49,181,000**

TRINITY COUNTY 12 miles

TRANSPORTATION BENEFITS	$3,800
HEALTH BENEFITS	$38,000
RECREATION, TOURISM, & RETAIL BENEFITS	$61,400
TOTAL BENEFITS:	**$103,000**

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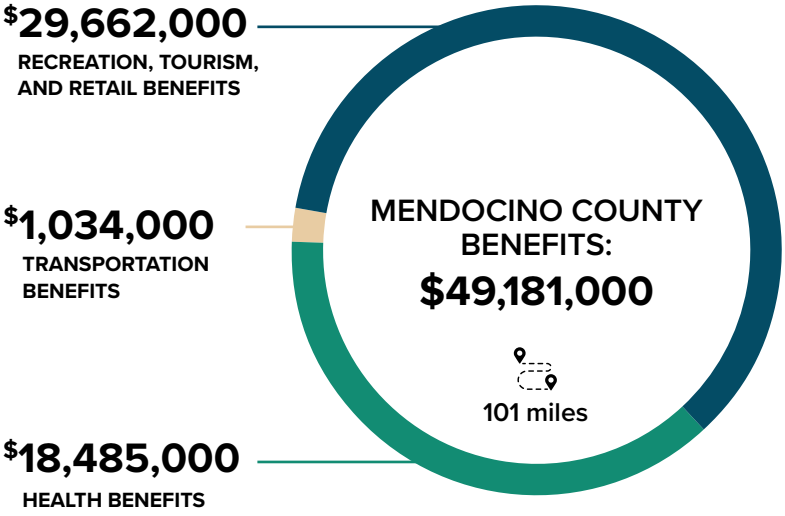
To learn more about the project and Great Redwood Trail Agency (GRTA), please visit TheGreatRedwoodTrail.org.

MENDOCINO COUNTY

Includes incorporated and unincorporated Mendocino County.



TOTAL TAX REVENUE INCREASE	$2,646,000
Sales Tax	$1,215,000
Transient Occupancy (Lodging) Tax	$1,431,000

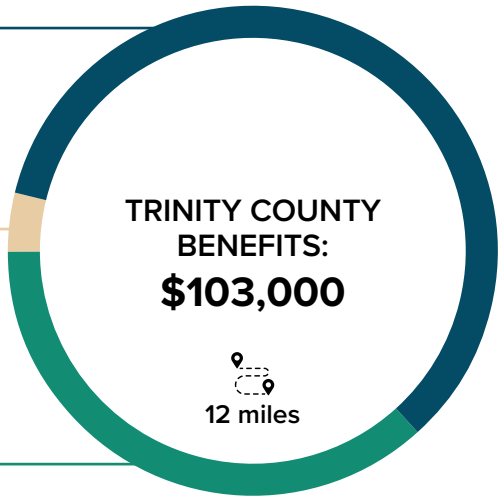
RECREATION, TOURISM, AND RETAIL BENEFITS	$29,662,000
Food/Meals	$11,308,000
Retail	$2,872,000
Entertainment	$913,000
Bicycle Rental	$191,000
Lodging	$14,378,000
TRANSPORTATION BENEFITS	**$1,034,000**
Reduced Traffic Congestion Costs	$88,000
Reduced Vehicle Crash Costs	$286,000
Reduced Road Maintenance Costs	$80,000
Household Vehicle Operation Cost Savings	$538,000
Total Vehicle Emission Costs Reduced	$42,000
HEALTH BENEFITS	**$18,485,000**
Mortality Reduction Benefits from Walking	$16,319,000
Mortality Reduction Benefits from Cycling	$2,166,000
TOTAL BENEFITS	**$49,181,000**

TRINITY COUNTY

$61,400
RECREATION, TOURISM, AND RETAIL BENEFITS

$3,800
TRANSPORTATION BENEFITS

$38,000
HEALTH BENEFITS



TOTAL TAX REVENUE INCREASE	$9,000
Sales Tax	$3,000
Transient Occupancy (Lodging) Tax	$6,000

RECREATION, TOURISM, AND RETAIL BENEFITS	$61,400
Food/Meals	$23,000
Retail	$6,000
Entertainment	$2,000
Bicycle Rental	$400
Lodging	$30,000
TRANSPORTATION BENEFITS	**$3,800**
Reduced Traffic Congestion Costs	$300
Reduced Vehicle Crash Costs	$1,000
Reduced Road Maintenance Costs	$300
Household Vehicle Operation Cost Savings	$2,000
Total Vehicle Emission Costs Reduced	$200
HEALTH BENEFITS	**$38,000**
Mortality Reduction Benefits from Walking	$33,000
Mortality Reduction Benefits from Cycling	$5,000
TOTAL BENEFITS	**$103,000**

BENEFITS BY SUBREGION

This section displays the estimated annual economic benefits of the Great Redwood Trail by subregion, as shown in the map. The benefits were allocated based on the proportion of estimated trips within each jurisdiction. Tax revenue is included for reference on the subregion benefits tables on the following pages.

Photo Credit: Alta

***NOTE:** Extents of the Great Redwood Trail are color coded by Subregion.

CITY OF BLUE LAKE 1 mile

TRANSPORTATION BENEFITS	$41,000
HEALTH BENEFITS	$466,000
RECREATION, TOURISM, & RETAIL BENEFITS	$749,000
TOTAL BENEFITS:	**$1,256,000**

CITY OF ARCATA 7 miles

TRANSPORTATION BENEFITS	$412,000
HEALTH BENEFITS	$3,363,000
RECREATION, TOURISM, & RETAIL BENEFITS	$5,361,000
TOTAL BENEFITS:	**$9,136,000**

CITY OF EUREKA 11 miles

TRANSPORTATION BENEFITS	$286,000
HEALTH BENEFITS	$2,377,000
RECREATION, TOURISM, & RETAIL BENEFITS	$3,825,000
TOTAL BENEFITS:	**$6,488,000**

CITY OF FORTUNA 3 miles

TRANSPORTATION BENEFITS	$64,000
HEALTH BENEFITS	$637,000
RECREATION, TOURISM, & RETAIL BENEFITS	$1,030,000
TOTAL BENEFITS:	**$1,731,000**

CITY OF RIO DELL 4 miles

TRANSPORTATION BENEFITS	$58,000
HEALTH BENEFITS	$910,000
RECREATION, TOURISM, & RETAIL BENEFITS	$1,461,000
TOTAL BENEFITS:	**$2,429,000**

CITY OF WILLITS 2 miles

TRANSPORTATION BENEFITS	$78,000
HEALTH BENEFITS	$997,000
RECREATION, TOURISM, & RETAIL BENEFITS	$1,600,000
TOTAL BENEFITS:	**$2,675,000**

CITY OF UKIAH 4 miles

TRANSPORTATION BENEFITS	$170,000
HEALTH BENEFITS	$1,686,000
RECREATION, TOURISM, & RETAIL BENEFITS	$2,726,000
TOTAL BENEFITS:	**$4,582,000**

CITY OF CLOVERDALE 4 miles[1]

TRANSPORTATION BENEFITS	$128,000
HEALTH BENEFITS	$2,207,000
RECREATION, TOURISM, & RETAIL BENEFITS	$3,540,000
TOTAL BENEFITS:	**$5,875,000**

UNINCORPORATED HUMBOLDT COUNTY 86 miles

TRANSPORTATION BENEFITS	$802,000
HEALTH BENEFITS	$10,579,000
RECREATION, TOURISM, & RETAIL BENEFITS	$16,974,000
TOTAL BENEFITS:	**$28,355,000**

UNINCORPORATED MENDOCINO COUNTY 71 miles

TRANSPORTATION BENEFITS	$819,000
HEALTH BENEFITS	$15,521,000
RECREATION, TOURISM, & RETAIL BENEFITS	$24,887,000
TOTAL BENEFITS:	**$41,222,000**

EEL RIVER CANYON 42 miles

TRANSPORTATION BENEFITS	$12,000
HEALTH BENEFITS	$217,000
RECREATION, TOURISM, & RETAIL BENEFITS	$348,000
TOTAL BENEFITS:	**$577,000**

[1] 4 miles from Cloverdale to the Mendocino County border

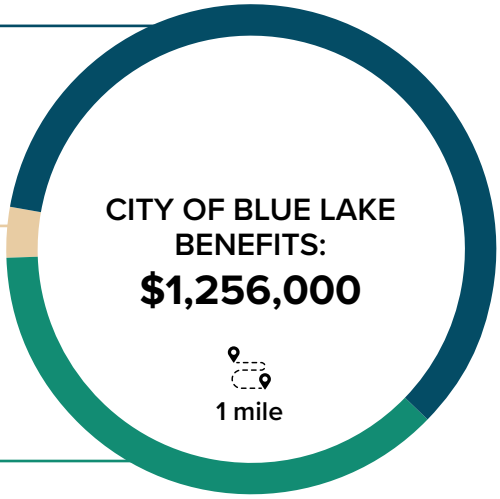
CITY OF BLUE LAKE

HUMBOLDT COUNTY

$749,000
RECREATION, TOURISM, AND RETAIL BENEFITS

$41,000
TRANSPORTATION BENEFITS

$466,000
HEALTH BENEFITS



TOTAL TAX REVENUE INCREASE	$70,000
Sales Tax	$30,000
Transient Occupancy (Lodging) Tax	$40,000

RECREATION, TOURISM, AND RETAIL BENEFITS	$749,000
Food/Meals	$285,000
Retail	$72,000
Entertainment	$23,000
Bicycle Rental	$5,000
Lodging	$363,000
TRANSPORTATION BENEFITS	**$41,000**
Reduced Traffic Congestion Costs	$4,000
Reduced Vehicle Crash Costs	$11,00
Reduced Road Maintenance Costs	$3,000
Household Vehicle Operation Cost Savings	$21,000
Total Vehicle Emission Costs Reduced	$2,000
HEALTH BENEFITS	**$466,000**
Mortality Reduction Benefits from Walking	$411,000
Mortality Reduction Benefits from Cycling	$55,000
TOTAL BENEFITS	**$1,256,000**

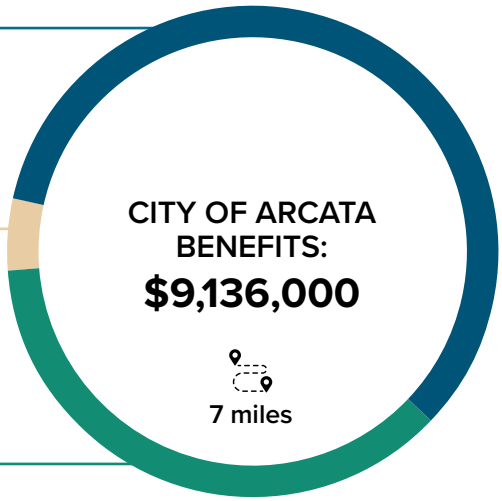
CITY OF ARCATA

HUMBOLDT COUNTY

$5,361,000
RECREATION, TOURISM, AND RETAIL BENEFITS

$412,000
TRANSPORTATION BENEFITS

$3,363,000
HEALTH BENEFITS



TOTAL TAX REVENUE INCREASE	$490,000
Sales Tax	$230,000
Transient Occupancy (Lodging) Tax	$260,000

RECREATION, TOURISM, AND RETAIL BENEFITS	$5,361,000
Food/Meals	$2,044,000
Retail	$518,000
Entertainment	$165,000
Bicycle Rental	$35,000
Lodging	$2,599,000
TRANSPORTATION BENEFITS	**$412,000**
Reduced Traffic Congestion Costs	$35,000
Reduced Vehicle Crash Costs	$114,000
Reduced Road Maintenance Costs	$32,000
Household Vehicle Operation Cost Savings	$214,000
Total Vehicle Emission Costs Reduced	$17,000
HEALTH BENEFITS	**$3,363,000**
Mortality Reduction Benefits from Walking	$3,048,000
Mortality Reduction Benefits from Cycling	$315,000
TOTAL BENEFITS	**$9,136,000**

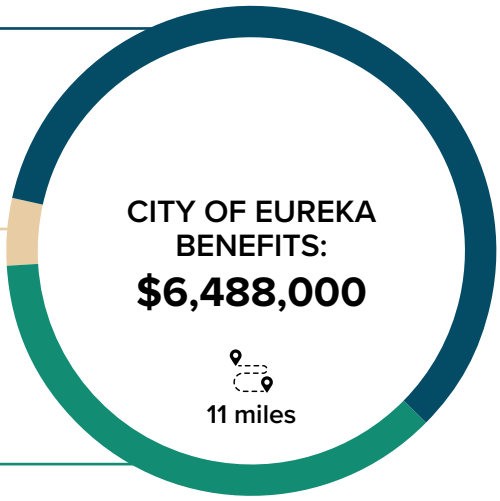
CITY OF EUREKA

HUMBOLDT COUNTY

$3,825,000
RECREATION, TOURISM, AND RETAIL BENEFITS

$286,000
TRANSPORTATION BENEFITS

$2,377,000
HEALTH BENEFITS



TOTAL TAX REVENUE INCREASE	$370,000
Sales Tax	$180,000
Transient Occupancy (Lodging) Tax	$190,000

RECREATION, TOURISM, AND RETAIL BENEFITS	$3,825,000
Food/Meals	$1,458,000
Retail	$370,000
Entertainment	$118,000
Bicycle Rental	$25,000
Lodging	$1,854,000
TRANSPORTATION BENEFITS	**$286,000**
Reduced Traffic Congestion Costs	$24,000
Reduced Vehicle Crash Costs	$79,000
Reduced Road Maintenance Costs	$22,000
Household Vehicle Operation Cost Savings	$149,000
Total Vehicle Emission Costs Reduced	$12,000
HEALTH BENEFITS	**$2,377,000**
Mortality Reduction Benefits from Walking	$2,075,000
Mortality Reduction Benefits from Cycling	$302,000
TOTAL BENEFITS	**$6,488,000**

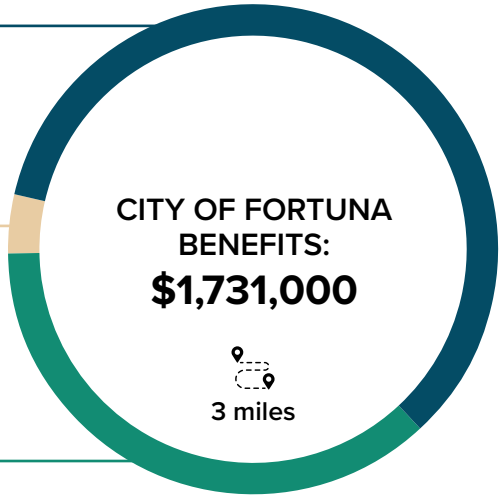
CITY OF FORTUNA

HUMBOLDT COUNTY

$1,030,000
RECREATION, TOURISM, AND RETAIL BENEFITS

$64,000
TRANSPORTATION BENEFITS

$637,000
HEALTH BENEFITS



TOTAL TAX REVENUE INCREASE	$100,000
Sales Tax	$50,000
Transient Occupancy (Lodging) Tax	$50,000

RECREATION, TOURISM, AND RETAIL BENEFITS	$1,030,000
Food/Meals	$392,000
Retail	$100,000
Entertainment	$32,000
Bicycle Rental	$7,00
Lodging	$499,000
TRANSPORTATION BENEFITS	**$64,000**
Reduced Traffic Congestion Costs	$5,000
Reduced Vehicle Crash Costs	$18,000
Reduced Road Maintenance Costs	$5,000
Household Vehicle Operation Cost Savings	$34,000
Total Vehicle Emission Costs Reduced	$2,000
HEALTH BENEFITS	**$637,000**
Mortality Reduction Benefits from Walking	$548,000
Mortality Reduction Benefits from Cycling	$89,000
TOTAL BENEFITS	**$1,731,000**

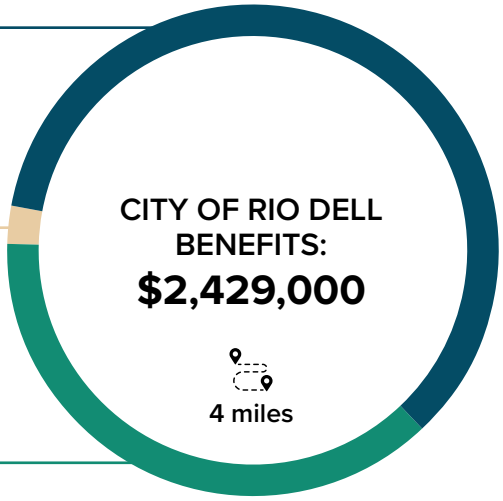
CITY OF RIO DELL

HUMBOLDT COUNTY

$1,461,000
RECREATION, TOURISM, AND RETAIL BENEFITS

$58,000
TRANSPORTATION BENEFITS

$910,000
HEALTH BENEFITS



TOTAL TAX REVENUE INCREASE	$130,000
Sales Tax	$70,000
Transient Occupancy (Lodging) Tax	$60,000

RECREATION, TOURISM, AND RETAIL BENEFITS	$1,461,000
Food/Meals	$557,000
Retail	$142,000
Entertainment	$45,000
Bicycle Rental	$9,000
Lodging	$708,000
TRANSPORTATION BENEFITS	**$58,000**
Reduced Traffic Congestion Costs	$5,000
Reduced Vehicle Crash Costs	$16,000
Reduced Road Maintenance Costs	$5,000
Household Vehicle Operation Cost Savings	$30,000
Total Vehicle Emission Costs Reduced	$2,000
HEALTH BENEFITS	**$910,000**
Mortality Reduction Benefits from Walking	$802,000
Mortality Reduction Benefits from Cycling	$108,000
TOTAL BENEFITS	**$2,429,000**

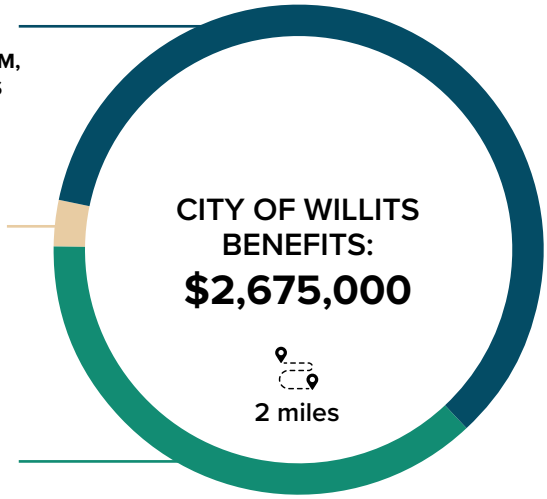
CITY OF WILLITS

MENDOCINO COUNTY

$1,600,000
RECREATION, TOURISM, AND RETAIL BENEFITS

$78,000
TRANSPORTATION BENEFITS

$997,000
HEALTH BENEFITS



TOTAL TAX REVENUE INCREASE	$160,000
Sales Tax	$80,000
Transient Occupancy (Lodging) Tax	$80,000

RECREATION, TOURISM, AND RETAIL BENEFITS	$1,600,000
Food/Meals	$610,000
Retail	$155,000
Entertainment	$49,000
Bicycle Rental	$10,000
Lodging	$776,000
TRANSPORTATION BENEFITS	**$78,000**
Reduced Traffic Congestion Costs	$7,000
Reduced Vehicle Crash Costs	$21,000
Reduced Road Maintenance Costs	$6,000
Household Vehicle Operation Cost Savings	$41,000
Total Vehicle Emission Costs Reduced	$3,000
HEALTH BENEFITS	**$997,000**
Mortality Reduction Benefits from Walking	$870,000
Mortality Reduction Benefits from Cycling	$127,000
TOTAL BENEFITS	**$2,675,000**

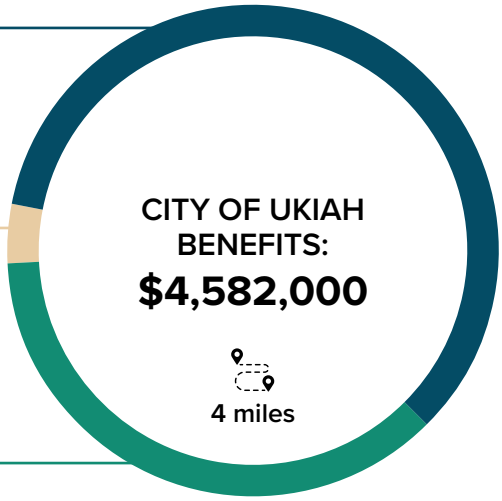
CITY OF UKIAH

MENDOCINO COUNTY

$2,726,000
RECREATION, TOURISM, AND RETAIL BENEFITS

$170,000
TRANSPORTATION BENEFITS

$1,686,000
HEALTH BENEFITS



TOTAL TAX REVENUE INCREASE	$250,000
Sales Tax	$120,000
Transient Occupancy (Lodging) Tax	$130,000

RECREATION, TOURISM, AND RETAIL BENEFITS	$2,726,000
Food/Meals	$1,039,000
Retail	$264,000
Entertainment	$84,000
Bicycle Rental	$18,000
Lodging	$1,321,000
TRANSPORTATION BENEFITS	**$170,000**
Reduced Traffic Congestion Costs	$14,000
Reduced Vehicle Crash Costs	$47,000
Reduced Road Maintenance Costs	$13,000
Household Vehicle Operation Cost Savings	$89,000
Total Vehicle Emission Costs Reduced	$7,000
HEALTH BENEFITS	**$1,686,000**
Mortality Reduction Benefits from Walking	$1,442,000
Mortality Reduction Benefits from Cycling	$244,000
TOTAL BENEFITS	**$4,582,000**

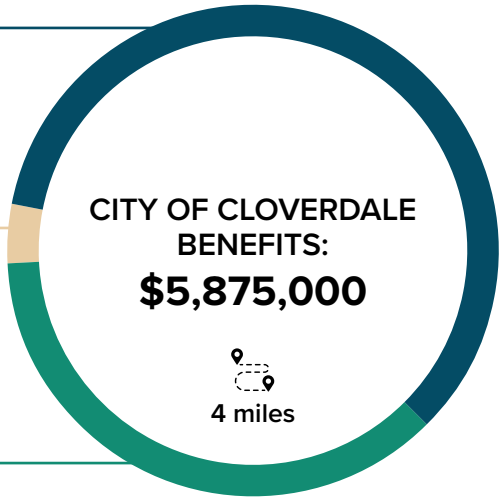
CITY OF CLOVERDALE

SONOMA COUNTY

$3,540,000
RECREATION, TOURISM, AND RETAIL BENEFITS

$128,000
TRANSPORTATION BENEFITS

$2,207,000
HEALTH BENEFITS

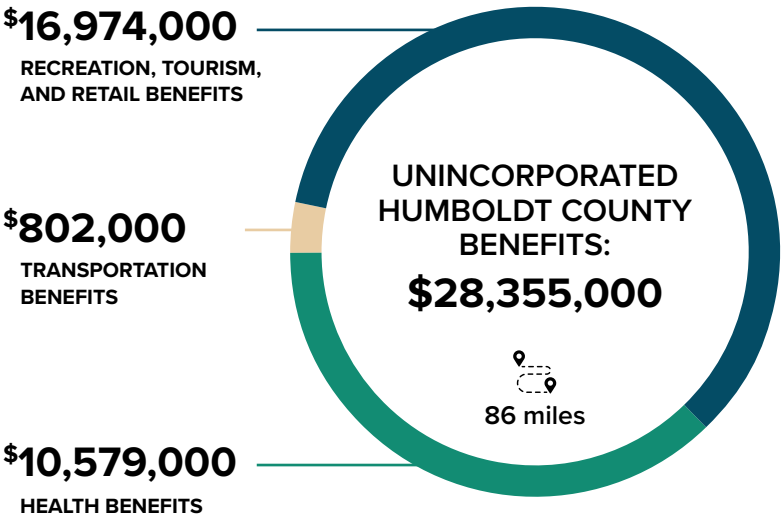


TOTAL TAX REVENUE INCREASE	$330,000
Sales Tax	$160,000
Transient Occupancy (Lodging) Tax	$170,000

RECREATION, TOURISM, AND RETAIL BENEFITS	$3,540,000
Food/Meals	$1,349,000
Retail	$343,000
Entertainment	$109,000
Bicycle Rental	$23,000
Lodging	$1,716,000
TRANSPORTATION BENEFITS	**$128,000**
Reduced Traffic Congestion Costs	$11,000
Reduced Vehicle Crash Costs	$35,000
Reduced Road Maintenance Costs	$10,000
Household Vehicle Operation Cost Savings	$67,000
Total Vehicle Emission Costs Reduced	$5,000
HEALTH BENEFITS	**$2,207,000**
Mortality Reduction Benefits from Walking	$1,952,000
Mortality Reduction Benefits from Cycling	$255,000
TOTAL BENEFITS	**$5,875,000**

UNINCORPORATED HUMBOLDT COUNTY

Includes unincorporated Humboldt County north of Alderpoint.



TOTAL TAX REVENUE INCREASE	$1,670,000
Sales Tax	$680,000
Transient Occupancy (Lodging) Tax	$990,000

RECREATION, TOURISM, AND RETAIL BENEFITS	$16,974,000
Food/Meals	$6,472,000
Retail	$1,643,000
Entertainment	$522,000
Bicycle Rental	$109,000
Lodging	$8,228,000
TRANSPORTATION BENEFITS	**$802,000**
Reduced Traffic Congestion Costs	$68,000
Reduced Vehicle Crash Costs	$222,000
Reduced Road Maintenance Costs	$62,000
Household Vehicle Operation Cost Savings	$417,000
Total Vehicle Emission Costs Reduced	$33,000
HEALTH BENEFITS	**$10,579,000**
Mortality Reduction Benefits from Walking	$9,342,000
Mortality Reduction Benefits from Cycling	$1,237,000
TOTAL BENEFITS	**$28,355,000**

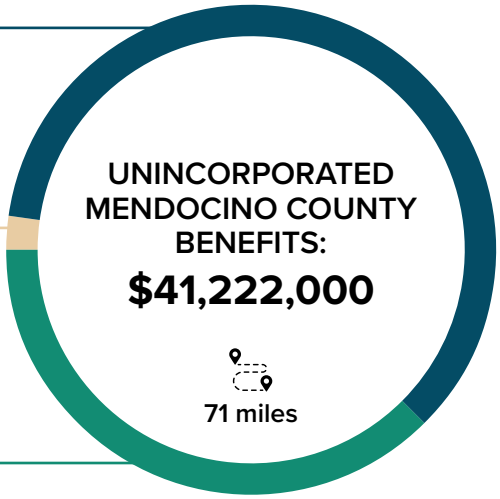
UNINCORPORATED MENDOCINO COUNTY

Includes unincorporated Mendocino County south of the Middle Fork of the Eel River.

$24,887,000
RECREATION, TOURISM, AND RETAIL BENEFITS

$814,000
TRANSPORTATION BENEFITS

$15,521,000
HEALTH BENEFITS



TOTAL TAX REVENUE INCREASE	$2,220,000
Sales Tax	$1,010,000
Transient Occupancy (Lodging) Tax	$1,210,000

RECREATION, TOURISM, AND RETAIL BENEFITS	$24,887,000
Food/Meals	$9,488,000
Retail	$2,408,000
Entertainment	$766,000
Bicycle Rental	$161,000
Lodging	$12,064,000
TRANSPORTATION BENEFITS	**$814,000**
Reduced Traffic Congestion Costs	$69,000
Reduced Vehicle Crash Costs	$225,000
Reduced Road Maintenance Costs	$63,000
Household Vehicle Operation Cost Savings	$424,000
Total Vehicle Emission Costs Reduced	$33,000
HEALTH BENEFITS	**$15,521,000**
Mortality Reduction Benefits from Walking	$13,745,000
Mortality Reduction Benefits from Cycling	$1,776,000
TOTAL BENEFITS	**$41,222,000**

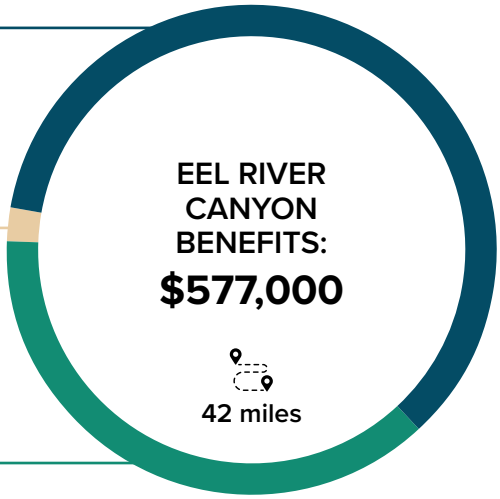
EEL RIVER CANYON

Includes portions of unincorporated Mendocino, Trinity, and Humboldt County from the Middle Fork of the Eel River to Alderpoint.

$348,000
RECREATION, TOURISM, AND RETAIL BENEFITS

$12,000
TRANSPORTATION BENEFITS

$217,000
HEALTH BENEFITS



TOTAL TAX REVENUE INCREASE	$30,000
Sales Tax	$10,000
Transient Occupancy (Lodging) Tax	$20,000

RECREATION, TOURISM, AND RETAIL BENEFITS	$348,000
Food/Meals	$133,000
Retail	$34,000
Entertainment	$11,000
Bicycle Rental	$2,000
Lodging	$168,000
TRANSPORTATION BENEFITS	**$12,000**
Reduced Traffic Congestion Costs	$1,000
Reduced Vehicle Crash Costs	$3,000
Reduced Road Maintenance Costs	$1,000
Household Vehicle Operation Cost Savings	$6,500
Total Vehicle Emission Costs Reduced	$500
HEALTH BENEFITS	**$217,000**
Mortality Reduction Benefits from Walking	$191,000
Mortality Reduction Benefits from Cycling	$26,000
TOTAL BENEFITS	**$577,000**

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ECONOMIC BENEFITS ASSESSMENT

APPENDIX

THE GREAT REDWOOD TRAIL

Coastal Conservancy

Photo Credit: The Wildlands Conservancy

APPENDIX A: METHODOLOGY

Executive Summary

This technical memorandum details the methodology used for the economic benefits assessment of a 231-mile segment of the proposed Great Redwood Trail (GRT), an envisioned 307-mile rail-trail project connecting California's Humboldt and San Francisco Bays. The segment that this analysis covers runs through the counties of Mendocino, Trinity, and Humboldt. For the purposes of this memo, the "proposed GRT alignment" or "proposed trail system" refers to the current best estimate of a conceptual GRT trail alignment, based on existing segments of trail, existing plans, and several potential spur trails.

The analysis estimated the number of bicycle and pedestrian trips that might take place on the proposed trail system; approximated the corresponding reduction in vehicle trips and vehicle-miles traveled (VMT); and assessed the potential benefits that might accrue if the entire proposed trail system was constructed. In total, it is estimated that the proposed trail system could generate $102,568,000 in annual benefits, organized around the following categories:

Recreation, Tourism, and Retail Benefits: Includes estimated spending from non-local visitors to the trail on goods, services, and lodging.

Health Benefits: Includes increased physical activity levels, increased cardiovascular health, and other positive outcomes for users, leading to reductions in health care costs.

Transportation Benefits: Includes reduction in vehicle miles traveled and the associated reduction in congestion, collisions, roadway maintenance costs, emissions (CO_2, NO_X, SO_X, and $PM_{2.5}$), and climate change impacts.

Table 1 displays the annual estimated benefits for each category. Subtotals for each category are shown in bold. The following sections provide an explanation of how each benefit was calculated.

Table 1. *Total Annual Benefits*

CATEGORY	VALUE OF BENEFIT[1]
RECREATION, TOURISM, AND RETAIL BENEFITS	**$61,693,000**
Food/Meals	$23,519,000
Retail	$5,972,000
Entertainment	$1,899,000
Bicycle Rental	$398,000
Lodging	$29,905,000
HEALTH BENEFITS	**$38,455,000**
Mortality Reduction Benefits from Walking	$33,991,000
Mortality Reduction Benefits from Cycling	$4,464,000
TRANSPORTATION BENEFITS	**$2,420,000**
Reduced Traffic Congestion Costs	$206,000
Reduced Vehicle Crash Costs	$669,000
Reduced Road Maintenance Costs	$188,000
Household Vehicle Operation Cost Savings	$1,258,000
CO2 Emissions Reduced (metric tons)	1,230
Other Vehicle Emissions Reduced (metric tons)[2]	5.78
Total Vehicle Emission Costs Reduced	$99,000
TOTAL BENEFITS	**$102,568,000**

**Numbers are rounded to three digits in the table.*

Demand

The economic benefits assessment is driven by the quantity of trail trips each year—more people using the trail equates to more benefits. This is calculated as demand, which estimates the daily and annual number of trips that will be taken on the GRT. This methodology is proprietary to Alta Planning + Design.

EXISTING WALKING AND BIKING ACTIVITY

This analysis first examined the current levels of walking and biking within the project area. **Table 2** displays the existing commute-to-work mode share for people within walking and biking distance of the proposed trail.

Table 2. *Means of Transportation to Work of People Living Near the Proposed Trail Network (2019 American Community Survey)*

GRT CORRIDOR	POPULATION	DROVE ALONE	CARPOOL	PUBLIC TRANSIT	BICYCLED	WALKED	OTHER
Walkshed (within half-mile)	135,654	71.2%	11.2%	1.4%	1.3%	7.0%	0.7%
Bikeshed (within 3 miles)	183,904	72.2%	11.1%	1.3%	1.2%	6.1%	0.7%

COMPARABLE TRAILS, COUNTS, AND URBAN/RURAL SPLITS

Next, the analysis estimated the expected number of biking and walking trips that are expected to occur on the proposed trail system. To understand the potential demand for the proposed trail system, count data at similar trail counter locations in Connecticut, New York, Pennsylvania, and Maryland were analyzed (**Table 3**).

Table 3. *Trail Counts at Similar Facilities*

TRAIL (LOCATION)	URBAN COUNTERS	RURAL COUNTERS	AVERAGE ESTIMATED DAILY COUNTS URBAN	AVERAGE ESTIMATED DAILY COUNTS RURAL	SOURCE
Great Allegheny Passage (Cumberland, MD, Pittsburgh, PA)	0	7	N/A	131	Herr, Dr. Andrew R. Analysis of 2021 Trail Usage Patterns along the Great Allegheny Passage (2022).
Connecticut Trail Census (CT)	1 (New Britain, CT)	5	119	125	University of Connecticut, Connecticut Trail Census. https://cttrailcensus.uconn.edu/ (2019).
Erie Canalway Trail (NY)	1 (Brockport, NY)	4	159	89	Parks & Trails New York. Who's on the Trail, Erie Canalway Trail, 2021 Trail User Count. New York State Canal Corporation (2022).

Each of the comparable trails was categorized into rural or urban, based on the predominant land use surrounding the trail (**Table 3**). The proposed GRT alignment was divided into the same land use classifications using Bureau of Transportation Statistics Local Area Transportation Characteristics for Households Data (LATCH) land use classifications.[3] **Table 4** displays the average number of bicycles and pedestrians per mile by land use, as well as the breakdown of the proposed GRT alignment.

Creating context-sensitive estimates of demand based on existing counts often requires extrapolating based on other datasets to understand how demand changes throughout a corridor. Powerful proxy metrics for demand and mode-shift potential include looking at the rates of Active Trip Potential (ATP) trips, or vehicle trips shorter than three miles. Using the average daily volumes from the comparable trails in Table 3, bicycle and pedestrian trip counts were scaled and applied to mile-long segments of the proposed trail by leveraging ATP trips to create adjustment factors. Replica Places"[1] activity-based model outputs for a typical Thursday in 2019 were used to collect information on ATP trips. Details of Replica's modeling approach are articulated in Appendix A. ATP trips evaluated included those that terminate within a one-mile buffer of the proposed trail segment relative to the baseline number of ATP trips occurring within a similar one-mile buffer area around the existing trail segment. These estimated counts were then split into bicycle and pedestrian trips, by multiplying the estimated count by the percentage of trips attributable to each mode and land designation. For both urban and rural trips, **Figure 1** shows how this percentage was calculated, and Table 4 shows the results:

Figure 1: Count Split Percentage Equation

$$Walk\ Trips = (Walk\ Trips)/(Walk\ Trips + Bike\ Trips)$$

$$Bike\ Trips = (Bike\ Trips)/(Walk\ Trips + Bike\ Trips)$$

Table 4. *Bicycle and Pedestrian Percentage Breakdown per American Community Survey Mode Split*

LAND USE	AVERAGE DAILY BICYCLE TRIPS (%)	AVERAGE DAILY PEDESTRIAN TRIPS (%)	GRT ALIGNMENT (MILES)
Urban	17.5	82.5	93
Rural	14.7	85.3	138

[1] Replica Places (2022). https://replicahq.com/places/

Photo Credit: Alta

RECREATIONAL DEMAND DECAY

As the GRT will traverse through old-growth redwood forests and other geographic attractions, the analysis sought to take rural recreational demand into consideration regarding the final estimated count numbers. As a result, the analysis included a recreational rural demand decay process to properly account for the influence of outdoor and rural attractions users would be inclined to visit. At its core, the demand decay functions on the logic that the farther away a trail user is from an attraction, the less pull it has on bringing trail users to that specific area.

The demand decay process was accomplished by creating bands of decay impacted by the number of attractions within a one-mile buffer of trail within one mile of an access point. Each additional attraction creates additional demand, at a decreasing rate per attraction. **Table 5** displays the relative bands of decay that were calculated from 2009 National Household Travel Survey data surrounding trip purpose and trip length, while **Table 6** displays the attraction subgroup influences on the demand decay rates. The specific list of attractions can be found in **Table 7**.

Table 5. *Demand Decay Bands*

BANDS OF DECAY ADJUSTED		
DISTANCE	PEDESTRIAN DEMAND	BICYCLE DEMAND
1 Mile	1	1
1-2 Miles	0.183	0.427
2-3 Miles	0.067	0.031
3-4 Miles	0.021	0.158
4-10 Miles	0.083	0.151
10-20 Miles	0.001	0.004

Table 6. *Attraction Subgroup Table and Rates*

ATTRACTION SUBGROUPS	
ATTRACTION NUMBER (PER ONE MILE BUFFER OF TRAIL WITHIN ONE MILE OF A COUNTER)[4]	RELATIVE IMPACT ON DEMAND DECAY RATE
1 Attraction	100%
3 Attractions	75%
5 Attractions	50%
5+ Attractions	25%

Table 7. *Attractions for Demand Decay Methodology*

SOURCE	ATTRACTION	SOURCE	ATTRACTION
OpenStreetMap (OSM)	Restaurant	OpenStreetMap (OSM)	Community Centre
OpenStreetMap (OSM)	Café	OpenStreetMap (OSM)	ATM
OpenStreetMap (OSM)	Library	OpenStreetMap (OSM)	Arts Centre
OpenStreetMap (OSM)	Bar	OpenStreetMap (OSM)	Bicycle Rental
OpenStreetMap (OSM)	Graveyard	OpenStreetMap (OSM)	Fountain
OpenStreetMap (OSM)	School	OpenStreetMap (OSM)	Camp Site
OpenStreetMap (OSM)	Boat Storage	OpenStreetMap (OSM)	Hotel
OpenStreetMap (OSM)	University	OpenStreetMap (OSM)	Motel
OpenStreetMap (OSM)	Bench	OpenStreetMap (OSM)	Museum
OpenStreetMap (OSM)	Marketplace	OpenStreetMap (OSM)	Attraction
OpenStreetMap (OSM)	Pub	OpenStreetMap (OSM)	Camp Pitch
OpenStreetMap (OSM)	Theatre	OpenStreetMap (OSM)	Picnic Site
OpenStreetMap (OSM)	College	OpenStreetMap (OSM)	Viewpoint
OpenStreetMap (OSM)	Barbecue	OpenStreetMap (OSM)	Caravan Site
OpenStreetMap (OSM)	Shelter	Internal Data	Bridges
OpenStreetMap (OSM)	Bicycle Parking	Internal Data	Tunnels

This demand decay rate was then applied to a segment in question through the process outlined in **Figure 2**:

Figure 2: Count Split Percentage Equation

$$\textit{Decayed Walk Trips} = \textit{Walk Trips} - (\textit{Walk Trip} \times \textit{Combined Demand Decay Rate})$$

The estimated counts from the demand decay process were then added to the pre-existing estimated counts. The result of this operation was then summed up for all segments along the proposed trail and divided by the average bicycle and pedestrian trip length from the 2017 National Household Travel Survey to account for unique trips (2.38 miles and 0.86 miles, respectively). In a sentence, the analysis computes the person-miles traveled based on the estimated counts on these "synthetic counters," add in recreational demand that has undergone a demand decay process, and then divides these person-miles traveled by the average trip distances to get an estimate of unique user trips.

TRIP TYPE

The daily estimates (4,000 bicycle users and 24,000 pedestrian users) were extrapolated to annual trip volumes and broken into different trip types (i.e., commute, recreation, school, college, and utilitarian) using the existing travel patterns (**Table 2**) and data from the National Household Transportation Survey (**Table 8**). The annual extrapolations account for the expected number of trips per week by trip type (i.e., commute, school, and college trips are expected to be five out of seven days a week, and other trip types are expected to occur seven days a week).

Table 8. *Trip Purpose Multiplier*[5]

	BIKE	WALK
Utilitarian Trip Multiplier	5.33	8.77
Social/Recreational Trip Multiplier	1.68	2.18

DEMAND RESULTS

This impact analysis includes the total 231 miles of the proposed trail. **Table 9** displays the average daily estimated number of bicycles and pedestrians per mile, along each segment of the proposed GRT alignment. The list of comparable facilities include data collected multiple years post-construction, and as such, it is expected that it may take multiple years for the proposed trail to reach these per day estimates. On an annual basis, it is expected there will be an estimated 6.2 to 9.2 million bicycle and pedestrian trips. The range is due to different statistical methods for aggregating the demand decay results along the full corridor (proportional allocation versus arithmetic means). **This report uses the latter method and demand results (9.2 million trips per year) for calculating benefits**

Table 9. *Trail Use by Primary Land Use*

LAND USE	AVERAGE DAILY BICYCLE TRIPS (TOTAL)	AVERAGE DAILY PEDESTRIAN TRIPS (TOTAL)	GRT ALIGNMENT (MILES)
Urban	1,515	8,747	93
Rural	2,470	14,922	138

TRIP REPLACEMENT AND VEHICLE-MILE REDUCTION

Many of the estimated 9.2 million annual bicycle and pedestrian trips are expected to replace motor vehicle trips. Calibrated to modal shift factors reported in literature[6], a univariate regression model estimates the motor vehicle trip replacement factor based on the percentage of trips that terminate in census block groups within ¼-mile of the proposed facility that are less than 4 miles. Trip distance data is provided by Replica for a typical travel Thursday in Fall 2019.[7] The motor vehicle trip replacement factor for all active mode trips is 22.2%.

To estimate the number of vehicle-miles that might be replaced by bicycling and walking trips, **Table 10** shows the average trip distance of bicycling and walking trips by trip purpose. The number of vehicle-miles reduced due to bicycle and pedestrian trips was calculated by multiplying the number of biking or walking trips by the trip replacement and trip distance factors. The analysis estimates that the 9.2 million walking and biking trips on the proposed trail system will reduce VMT by 3 million miles.

Table 10. *Trip Distance (miles)*

	BIKE	WALK
Commute Trips[8]	2.47	0.72
College Trips[9]	1.31	0.43
K–12 School Trips[10]	1.36	0.69
Utilitarian Trips[11]	2.28	0.83
Social/Recreational Trips[12]	2.73	1.12

Recreation, Tourism, and Retail Benefits

After implementation, visitors to the GRT are likely to spend money on food, retail, entertainment, and lodging.

NON-LOCAL TRIPS

The average percentage of trail users that were not from the area surrounding the trail was 33% among trails comparable to the proposed GRT (**Table 11**). If there are 9.2 million annual trips on the proposed trail, and it experiences the same percentage of non-local trail users as the comparable trails, then an estimated 3.1 million non-local trail trips will occur on the proposed trail each year.

Table 11. *Trip Point of Origin and Length of Stay*

	TRIP POINT OF ORIGIN (PERCENT OF SURVEYED USERS, NUMBER OF RESPONSES)			
LOCATION	LOCAL	NON-LOCAL	SURVEYED USERS	SOURCE
Brevard Greenway, Average of Years 1 and 2 (Brevard, NC)	64%	36%,	500	Evaluating the Economic Impact of Shared Use Paths in North Carolina, Technical Memorandum: Brevard Greenway Year Two. North Carolina Department of Transportation (2016).
American Tobacco Trail, Average of Years 1 and 2 (Triangle Region, NC)	65%	35%	3,989	Evaluating the Economic Impact of Shared Use Paths in North Carolina, Technical Memorandum: American Tobacco Trail Year Two. North Carolina Department of Transportation (2016).
Washington & Old Dominion Railroad (Arlington, VA to Leesburg, VA)	95%	5%	1,462	The Washington & Old Dominion Trail: An Assessment of User Demographics, Preferences, and Economics; Virginia Dept. of Conservation, 2004.
Great Allegheny Passage (Pittsburgh, PA to Cumberland, MD)	69%	31%	1,272	Trail Town Economic Impact Study (Phase II: Trail User Survey), Progress Fund and Laurel Highlands Visitor Bureau; 2009.
Katy Trail (St. Louis Region, MO)	33%	67%	N/A	Katy Trail Economic Impact Report: Visitors and MGM2 Economic Impact Analysis (2012).
Erie Canalway Trail (Buffalo to Albany, NY)	77%	23%	562	The Economic Impact of the Erie Canalway Trail: AN ASSESSMENT AND USER PROFILE OF NEW YORK'S LONGEST MULTI-USE TRAIL (2014).
Average	67%	33%		

AVERAGE EXPENDITURES PER NON-LOCAL TRIP

The average expenditures of groups of trail users on comparable trails was $64 for food/meals, $60 at retail establishments, $31 for entertainment, $52 for bicycle rental, and $93 for lodging[13] (**Table 12**).

Table 12. *Average Expenditures*

LOCATION	AVERAGE EXPENDITURES (PERCENTAGE OF SURVEYED USERS, NUMBER OF RESPONSES, AVERAGE EXPENSES)					SOURCE
	FOOD/MEALS					
	RESTAURANT	GROCERY	RETAIL	ENTERTAINMENT	BICYCLE RENTAL	
Duck Trail, Year 2 (Duck, NC)	31%, 510, $40	16%, 509, $70	12%, 510, $68	2%, 510, $73	3%, 510, $63	Evaluating the Economic Impact of Shared Use Paths in North Carolina, Technical Memorandum: Duck Trail Year Two. North Carolina Department of Transportation (2016).
Brevard Greenway, Year 2 (Brevard, NC)	21%, 239, $25	15%, 238, $28	8%, 239, $37	<1%, 239, $6	2%, 239, N/A	Evaluating the Economic Impact of Shared Use Paths in North Carolina, Technical Memorandum: Brevard Greenway Year Two. North Carolina Department of Transportation (2016).
Brevard Greenway, Year 1 (Brevard, NC)	37%, 217, $20	19%, 216, $32	7%, 216, $47	<1%, 217, $10	2%, 217, $70	Evaluating the Economic Impact of Shared Use Paths in North Carolina, Technical Memorandum: Brevard Greenway Year One. North Carolina Department of Transportation (2016).
American Tobacco Trail, Year 2 (Triangle Region, NC)	19%, 1,833, $15	8%, 1,834, $31	3%, 1,835, $73	1%, 1,835, $22	0%, 1,835, $25	Evaluating the Economic Impact of Shared Use Paths in North Carolina, Technical Memorandum: American Tobacco Trail Year Two. North Carolina Department of Transportation (2016).
American Tobacco Trail, Year 1 (Triangle Region, NC)	20%, 1,927, $21	13%, 1,920, $28	5%, 1,923, $73	1%, 1,924, $36	0%, 1,925, $48	Evaluating the Economic Impact of Shared Use Paths in North Carolina, Technical Memorandum: American Tobacco Trail Year One. North Carolina Department of Transportation (2016).
Huntsville/ Madison County	88%, 150, $76		42%, 150, $61	45%, 150, $36	N/A	Spring Intercept Survey Results. Huntsville/Madison County Convention & Visitors Bureau (2017). Alabama Tourism Industry 2019 Economic Impact.
Average	48%, $64		13%, $60	8%, $31	1%, $52	

RECREATION, TOURISM, AND RETAIL RESULTS

While locals will benefit the trail, the vast majority of the money for recreation, tourism and retail will come from outside of the region. If the estimated non-local trail users purchase goods at the same rate as the comparable trails and there are an average of four people per group,[14] then the proposed trail system will contribute an estimated $23,519,000 in annual food/meal spending, $5,972,000 in annual retail spending, $1,899,000 in annual entertainment spending, $398,000 in annual bicycle rental spending, and $29,905,000 in annual lodging spending (assumes 42% of non-local trail users stay overnight in a hotel),[15] for a total of $61,693,000 in estimated annual trail-related spending from non-local trail users (**Table 13**). These estimates assume the availability of such goods and services. This section only includes direct economic benefits of the proposed trail system. There are also indirect economic benefits not included, as trail-related spending from non-local users is expected to circulate through the economy, providing a multiplier effect.

Table 13. *Annual Recreation, Tourism, and Retail Benefits*[16]

CATEGORY	WALK
Food/Meals	$23,519,000
Retail	$5,972,000
Entertainment	$1,899,000
Bicycle Rental	$398,000
Lodging	$29,905,000
TOTAL RECREATION, TOURISM, AND RETAIL BENEFITS	**$61,693,000**

Health Benefits

More people bicycling and walking can help encourage an increase in physical activity levels, increased cardiovascular health, and other positive outcomes for users.

REDUCED MORTALITY

Health benefits are calculated as reduced mortality benefits, which include health-care cost savings from people experiencing fewer chronic illnesses and living longer. The benefits from reduced mortality were calculated using the recommended values provided in the 2022 US Department of Transportation Benefit-Cost Analysis Guidance (Table A-12)[17] and the national distribution of age ranges and travel patterns. **Table 14** displays the multipliers that were used.

Table 14. *Mortality Reduction Multipliers*

MORTALITY REDUCTION BENEFITS OF INDUCED ACTIVE TRANSPORTATION	VALUE
Walking Value per Induced Trip	$7.08
Cycling Value per Induced Trip	$6.31
Walking Age Proportion (20–74 years old)	68%
Cycling Age Proportion (20–64 years old)	59%
Trips Induced from Non-Active Modes	89%

These benefits were applied to the estimated number of walking and biking trips along the proposed GRT alignment. For example, the number of expected new walking trips was multiplied by the walking value per induced trip, the walking age proportion multiplier, and the percentage of trips expected to be induced from non-active modes (i.e. personal vehicles).

HEALTH RESULTS

The analysis estimates that the 6.2 to 9.2 million total annual walking and biking trips on the proposed trail system will provide $38,455,000 in health, or reduced mortality, benefits (**Table 15**).

Table 15. *Annual Health Benefits*[18]

CATEGORY	MONETARY VALUE
Mortality Reduction Benefits from Walking	$33,991,000
Mortality Reduction Benefits from Cycling	$4,464,000
TOTAL HEALTH BENEFITS	**$38,455,000**

Transportation Benefits

The GRT will create new opportunities for local residents and visitors to walk and bike more frequently as a means of transportation across the 231-mile portion of the GRT corridor. The results of this analysis are informed by the reduction of 3 million vehicle-miles identified as part of the demand analysis.

GREENHOUSE GAS AND POLLUTANTS

For every vehicle-mile reduced, there is an assumed decrease in greenhouse gases and criteria pollutants. **Table 16** lists the reduction in greenhouse gases and criteria pollutants by VMT, along with the cost to mitigate or clean up those pollutants.

Table 16. *Environmental Protection Multipliers*

POLLUTANT	VALUE (METRIC TONS/VMT)	VALUE ($USD/VMT)
Particulate Matter (PM)[19]	0.00000005	$0.019032
Nitrous Oxides (NO_X)[20]	0.00000069	$0.006051
Sulfur Oxides (SO_X)[21]	0.00000001	$0.000391
Volatile Organic Compounds (VOC)[22]	0.00000103	$0.002205
Carbon Dioxide[23]	0.00042047	$0.005201

COLLISIONS AND ROADWAY MAINTENANCE

Safety benefits are a result of the expected reduction in collisions due to the decrease in VMT. The estimated collision cost reduction is $0.22 per VMT.[24] The estimated roadway maintenance cost savings associated with a reduction in VMT is based on a state-of-good-repair multiplier of $0.06 per VMT.[25]

TRANSPORTATION RESULTS

Real savings can be estimated from the reduction of costs associated with congestion, vehicle crashes, road maintenance, and household vehicle operations. The impact analysis model also evaluates and quantifies annual savings from reduced vehicle emissions, using a number of readily available data inputs. Table 17 displays the monetary value and air quality improvements of these benefits due to the 3-million-mile reduction in vehicle-miles traveled.

Table 17. *Annual Transportation and Emission Benefits*

CATEGORY	VALUE OF BENEFIT
Reduced Traffic Congestion Costs[26]	$206,000
Reduced Vehicle Crash Costs[27]	$669,000
Reduced Road Maintenance Costs[28]	$188,000
Household Vehicle Operation Cost Savings[29]	$1,258,000
CO_2 Emissions Reduced[30]	1,230 (metric tons)
Other Vehicle Emissions Reduced [31]	5.78 (metric tons)
Reduced Total Vehicle Emission Costs[32]	$99,000
TOTAL TRANSPORTATION BENEFITS	**$2,420,000**

Tax Revenue Benefits

The research team calculated the relative splits in combined sales tax (County and State, City when applicable) and transit occupancy (lodging) tax for the jurisdictions that fall under the Great Redwood Trail. These numbers were calculated from non-local spending rates from non-local users of the trail. The combined sales tax was applied to food, entertainment, retail and bicycle rental spending. The transient occupancy tax was applied to lodging spending.

For specific owner operator splits, revenues were calculated using the jurisdiction's specific sales and transient occupancy tax rates. As the Wildlands Conservancy falls within the counties of Trinity, Mendocino and Humboldt, the research team took the average of these counties' tax rates when calculating tax revenues. For county splits, revenues were calculated using each respective county's tax rates.

Limitations

The primary purpose of the analysis is to enable a more informed policy discussion on the benefits of investing in the proposed GRT. Even with extensive primary and secondary research incorporated into the impact analysis model, it is impossible to accurately predict the exact impacts of various factors. Accordingly, all estimated benefit values are rounded and should be considered in order of magnitude estimates, rather than exact amounts.

It should also be taken into consideration that this analysis was done using cross-sectional comparable trails whose counts were at times averaged into a daily score. As a result, the analysis does not consider seasonality, the difference between weekday and weekend visitors, or other temporal factors. Furthermore, in the demand decay methodology, it is of note that all attractions were treated equally. In treating all attractions as the same, there could be areas that were awarded more rural recreation demand than they should have, and conversely less rural recreation demand than they should have. This is likely to balance out over the full alignment, but worth noting.

APPENDIX A FOOTNOTES

[1] All monetary benefits in this assessment are order-of-magnitude estimates that are rounded to the nearest thousand.

[2] Includes particulate matter 2.5, nitrous oxides, sulfur oxides, and volatile organic compounds.

[3] Bureau of Transportation Statistics Local Area Transportation Characteristics for Households Data https://www.bts.gov/latch/latch-data

[4] Buffers that did not have at least one attraction were omitted from the demand decay function.

[5] Travel Day Person Trips (in millions), NHTSA 2017 <https://nhts.ornl.gov/>.

[6] Volker et al (2019). Quantifying Reductions in Vehicle Miles Traveled from New Bike Paths, Lanes, and Cycle Tracks.

[7] Replica Places (2019). https://replicahq.com/.

[8] NHTS (2017). http://nhts.ornl.gov/tables09/fatcat/2009/aptl_TRPTRANS_WHYTRP1S.html.

[9] Ibid.

[10] Safe Routes National Center for Safe Routes to School, Trends in Walking and Bicycling to School from 2007 to 2012 (2013). https://www.pedbikeinfo.org/pdf/SRTSlocal_Trends2007-2012.pdf.

[11] NHTS (2017). http://nhts.ornl.gov/tables09/fatcat/2009/aptl_TRPTRANS_WHYTRP1S.html.

[12] Ibid.

[13] This assumes the average nightly hotel rate of $93 from Budget your Trip <https://www.budgetyourtrip.com/united-states-of-america/> and the proportion of visitors who stay overnight on recreational bicycle rides (42%) from The Economic Significance of Bicycle-Related Travel in Oregon.

[14] Spring Intercept Survey Results. Huntsville/Madison County Convention & Visitors Bureau (2017).

[15] Proportion of visitors who stay overnight on recreational bicycle rides from The Economic Significance of Bicycle-Related Travel in Oregon.

[16] These values are calculated from the average spending totals and rates of spending shown in Table 12.

[17] Benefit-Cost Analysis Guidance for Discretionary Grant Programs. U.S. Department of Transportation (2022). https://www.transportation.gov/sites/dot.gov/files/2022-03/Benefit%20Cost%20Analysis%20Guidance%202022%20%28Revised%29.pdf

[18] These values are calculated from the average spending totals and rates of spending shown in Table 12.

[19] The Safer Affordable Fuel-Efficient Vehicles Rule for MY2021-MY2026 Passenger Cars, BUILD Guidance 2020, Table A-7 and Light Trucks Preliminary Regulatory Impact Analysis (October 2018) https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/ld_cafe_co2_nhtsa_2127-al76_epa_pria_181016.pdf.

[20] The Safer Affordable Fuel-Efficient Vehicles Rule for MY2021-MY2026 Passenger Cars, BUILD Guidance 2020, Table A-7 and Light Trucks Preliminary Regulatory Impact Analysis (October 2018) https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/ld_cafe_co2_nhtsa_2127-al76_epa_pria_181016.pdf.

[21] The Safer Affordable Fuel-Efficient Vehicles Rule for MY2021-MY2026 Passenger Cars, BUILD Guidance 2020, Table A-7 and Light Trucks Preliminary Regulatory Impact Analysis (October 2018) https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/ld_cafe_co2_nhtsa_2127-al76_epa_pria_181016.pdf.

[22] The Safer Affordable Fuel-Efficient Vehicles Rule for MY2021-MY2026 Passenger Cars, BUILD Guidance 2020, Table A-7 and Light Trucks Preliminary Regulatory Impact Analysis (October 2018) https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/ld_cafe_co2_nhtsa_2127-al76_epa_pria_181016.pdf.

[23] Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866. <https://www.epa.gov/sites/default/files/2016-12/documents/sc_co2_tsd_august_2016.pdf>.

[24] Caltrans Highway Safety Improvement Program https://dot.ca.gov/hq/LocalPrograms/HSIP/apply_nowHSIP.htm.

[25] Kitamura, R., Zhao, H., and Gubby, A. R. Development of a Pavement Maintenance Cost Allocation Model. Institute of Transportation Studies, University of California, Davis. https://trid.trb.org/view.aspx?id=261768.

[26] Average Annual Miles per Driver by Age Group. Last modified: September 26, 2014. FHWA. https://www.fhwa.dot.gov/ohim/onh00/bar8.htm; Using Figure ES.3 "Cost of Crashes and Congestion per Vehicle Mile Traveled" ratios from 2008 report and adjusting to 2011 values. <http://exchange.aaa.com/wp-content/uploads/2012/07/AAA-Crashes-vs-Congestion-2011.pdf>.

[27] Average Annual Miles per Driver by Age Group. Last modified: September 26, 2014. FHWA. https://www.fhwa.dot.gov/ohim/onh00/bar8.htm; Using Figure ES.3 "Cost of Crashes and Congestion per Vehicle Mile Traveled" ratios from 2008 report and adjusting to 2011 values. http://www.camsys.com/pubs/AAA.pdf.

[28] Kitamura, R., Zhao, H., and Gubby, A. R. Development of a Pavement Maintenance Cost Allocation Model. Institute of Transportation Studies, University of California, Davis.

[29] American Automobile Association, Your Driving Costs - 2017 Edition (2017) <https://exchange.aaa.com/wp-content/uploads/2017/08/17-0013_Your-Driving-Costs-Brochure-2017-FNL-CX-1.pdf>.

[30] Average Annual Emissions and Fuel Consumption for Gasoline-Fueled Passenger Cars and Light Trucks, EPA (2008) <https://www3.epa.gov/otaq/consumer/420f08024.pdf>.

[31] Ibid. Includes particulate matter, nitrous oxides, sulfur oxides, and volatile organic compounds.

[32] GHG Equivalencies Calculator, EPA <https://www.epa.gov/energy/ghg-equivalencies-calculator-calculations-and-references>.

Prepared by:

alta

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Project Plan Table

GRT PROJECT PLAN

Table 1: *Existing and Planned Projects Relevant to the Great Redwood Trail*

EXISTING AND PLANNED PROJECTS*		LEAD AGENCY	LOCATION	APPROXIMATE MILEPOST	PROJECT SCHEDULE	PROJECT NOTES & CONSIDERATIONS	FUNDING DETAILS & COST ESTIMATES	CONTACT
GREAT REDWOOD TRAIL SEGMENTS								
Hopland to Ukiah		City of Ukiah	South of Ukiah City limits (in Mendocino County)	100-112	The City of Ukiah would be interested in taking on construction of the project but would not be able to fund operation and maintenance in perpetuity. There is a need to identify GRT project partners who would be able to undertake planning, design, permitting, and operations and maintenance.	There is substantial interest at the City staff level to advance this trail segment. City staff believe the only way to complete this section of the trail would be if railbanking is obtained. Landowners have expressed opposition to easements on their land for trails for other trail projects in Ukiah. Railbanking, additional public outreach, and partnered aid in future operation and maintenance costs are critical to advance the trail section outside of the City limits. The City noted that it is unrealistic to plan for volunteer aid to manage operation and maintenance costs in perpetuity.	The City of Ukiah estimates that if railbanking is obtained and a rail salvage company removes the rails and ties and leaves a serviceable gravel road, the cost could be approximately $500,000. If the project were to include pavement on top of the trail, it could cost approximately $3 million. The City of Ukiah notes that pursuing grants for planning and construction are on hold until railbanking is in place.	Mo Mulheren, Supervisor, 2nd District, Mendocino County mulherenm@mendocinocounty.org
Ukiah Rail-Trail	**Phase 4**	City of Ukiah	Commerce Dr to Norgard Ln	112-113	Design completed for the 1-mile trail. CEQA NOE submitted in 2022. Construction is stalled, as railbanking is pending. Construction must be complete in 2024 years to fulfill the CNRA funding that was granted for the trail segment.	The project has been redesigned as a 1-mile trail because railbanking is incomplete; therefore, a portion of the original trail length is planned as a rail-with-trail project.	The City has received $3.5 million, mostly from CNRA's Urban Greening Grant program. Would likely need more funding if railbanking is unsuccessful and construction costs continue to rise. May pursue a Clean CA grant from Caltrans for trail clean-up and maintenance.	Neil Davis, Director of Community Services, City of Ukiah, ndavis@cityofukiah.com; Andrew Strickland, City Engineer, City of Ukiah, astricklin@cityofukiah.com
	Phase 1-3	City of Ukiah	Brush St to Commerce Dr	113-115	An existing 1.7-mile multi-use path through Ukiah. Phase 1 completed in 2015, Phase 2-3 completed in January 2020.	Master Plan adopted by the City Council in 2020, which includes plans to incorporate linear park features to increase use. Local businesses that support continued trail development include Rivino Winery, Holiday Inn, Vichy Hot Springs Resort, and Nelson Vineyard.	Phase 1-3 cost $4.6 million total. Phase 1-2 was funded with ATP funds. A $1.8 million grant from CNRA's Urban Greening Grant program in 2017 was awarded for Phase 3.	
Ukiah to Redwood Valley		City of Ukiah	North of Ukiah City limits (in Mendocino County)	115-122	Need to identify GRT project partners who would undertake planning, design, permitting, construction, and operations and maintenance.	There is substantial interest from City staff in advancing this trail segment. City staff believe the most cost-effective way to expand the trail outside of City limits is if the future trail uses the existing rail bed.	Not yet identified. City staff expressed that the cost of this segment would likely be higher than the Hopland to Ukiah segment because there are more crossings in this segment.	Mo Mulheren, Supervisor, 2nd District, Mendocino County mulherenm@mendocinocounty.org

*See list of acronyms at end of table

EXISTING AND PLANNED PROJECTS*		LEAD AGENCY	LOCATION	APPROXIMATE MILEPOST	PROJECT SCHEDULE	PROJECT NOTES & CONSIDERATIONS	FUNDING DETAILS & COST ESTIMATES	CONTACT
Willits Rail Trail		City of Willits	E. Hill Rd to E. Commercial St	138-140	IS/MND adopted 2022. Construction anticipated to begin in 2024.	1.6 miles of rail-with-trail within the GRTA corridor. In February 2023, 60 percent design plans were submitted to the City to connect downtown to the hospital and California Conservation Corps campus. In early 2023, a rail-to-trail segment was approved north of Commercial St.	$10 million estimated cost of project from the 95 percent design. The City was awarded $6 million in ATP grant funding and $3.8 million in Coastal Conservancy funding.	Dusty Duley, Community Development Director, City of Willits, dduley@cityofwillits.org
Eel River Canyon Preserve and Emerald Waters Reserve		Wildlands Conservancy	Eel River Canyon (Mendocino, Trinity, and Humboldt counties)	188-201	Project planning pending and being discussed. Construction schedule pending, once resource assessments and associated planning phase is complete.	10-15-miles of trail along the GRTA corridor adjacent to the Eel River Canyon Preserve and Emerald Waters Reserve. Vegetation treatment completed for initial 1 mile of trail from Trail Access Point to Kekawaka Creek Crossing. The Wildlands Conservancy was granted a GRTA temporary permit and entry agreement for this veg mgmt work, which has now expired. The preserve managers expressed that the project is not far enough along to provide an accurate project proposal or budget. The current priority for the preserve is to focus on infrastructure repairs and resource assessments to determine scope of work for the future GRT segment on preserve property.	Not yet identified.	Luke Farmer, Regional Director, luke.f@wildlandsconservancy.org
City of Rio Dell Bike Infrastructure and GRT Connections		City of Rio Dell	Rio Dell	256-259	Some planning work has begun. Private parcels need to be acquired for improvements to be completed.	Rio Dell has proposed several on-street and off-street bicycle and pedestrian improvements as an alternative to routing the GRT within the GRTA corridor within the Scotia Bluffs area. Caltrans is in the environmental review process for replacing the northbound 101 bridge across the Eel River. The new bridge design includes a 10-foot vehicular shoulder, but no separated bike/ped facility.	$2.5 million funding secured from two Clean California state grants for bicycle infrastructure improvements throughout town. This does not include the property acquisition needed to complete the City's proposed trail network. The northbound 101 bridge replacement project is estimated to cost $62 million.	Kevin Caldwell, Community Development Director, City of Rio Dell, caldwellk@cityofriodell.ca.gov
Humboldt Bay Trail (MP 280-293)	**Elk River Estuary Extension**	City of Eureka	Tooby Rd to Pound Rd	279-280	Construction completed in 2022.	1-mile extension of the Eureka Waterfront Trail with parking and trailhead access. This section is a piece of the Elk River Estuary and Intertidal Wetlands Restoration Project that will also restore approximately 113 acres of tidal marsh complex and a boating access point. Local project partners include the Humboldt Bay Keepers, Humboldt Trails Council, Redwood Community Action Agency, California Conservation Corps, and HSU.	Estimated $5 million to fund the project in full. In 2018, the Ocean Protection Council awarded the project $1.8 million; SCC awarded $980,000; and $42,000 was awarded from local organizations.	Brian Gerving, Public Works Director, City of Eureka, bgerving@ci.eureka.ca.gov
	Hikshari' Trail	City of Eureka	Pound Rd to Truesdale St	280-282	Construction completed in 2012.	1.5-mile trail with informational kiosks and map information were installed at each access area, in addition to benches, picnic tables, and interpretive signage highlighting the area's natural and cultural history.	City personnel contacted were unable to provide specific funding details.	
	Eureka Waterfront Trail Phase A	City of Eureka	Truesdale St to Del Norte St	282-283	Construction completed in 2016.	1-mile section of trail with a nature park on one end and multiple viewing platforms. Phases A, B, and C were planned together and grants they received support multiple phases of the project.	Estimated spending for Phase A, B, and C is $5 million total. Phase A, B, and C received a $1 million grant from SCC to support all three phases. Phase A also received a $1.2 million grant from Caltrans no-freeway alternate funding.	

*See list of acronyms at end of table

EXISTING AND PLANNED PROJECTS*		LEAD AGENCY	LOCATION	APPROXIMATE MILEPOST	PROJECT SCHEDULE	PROJECT NOTES & CONSIDERATIONS	FUNDING DETAILS & COST ESTIMATES	CONTACT
Humboldt Bay Trail (MP 280-293)	**Eureka Waterfront Trail Phase B**	City of Eureka	Del Norte St to C St	283-284	Construction completed in 2017.	1.4-mile section of trail and connects to the Eureka Boardwalk. This portion of the project includes trail resurfacing, trailheads, interpretive signs, and new crossings. This is the most urban section of the trail and highlights the working parts of the Eureka waterfront including light industrial businesses, a public marina, and fishing terminals.	Estimated spending for Phase A, B, and C is $5 million total. Phase B and C split grant awards from the Regional Transportation Program for $500,000, ATP for $2.3 million, and HCAOG for $100,000. SCC awarded a $1 million grant to support phases A, B, and C.	Brian Gerving, Public Works Director, City of Eureka, bgerving@ci.eureka.ca.gov
	Eureka Boardwalk and Adorni Trail	City of Eureka	C St to CA 255	284-285	Construction completed in 2001.	Original 1-mile trail segment of the Eureka waterfront area to increase public access. Recently Humboldt County has put forth a proposal to maintain boardwalk and trail segment by installing trash receptacles to reduce litter on the trail.	Original cost not applicable for future funding needs; however, a $10,000 litter reduction project will be installed in 202 3 to improve trail maintenance.	
	Eureka Waterfront Trail, Phase C	City of Eureka	CA 255 to Y St and then turns inland to Myrtle Ave	285-286	Construction completed in 2017.	The 1.2-mile trail of Phase C connects to the planned Humboldt Bay South trail section and continues past the proposed route into town to connect to a medical center, businesses, parks, and neighborhoods.	Estimated spending for Phase A, B, and C is $5 million total. Phase B and C split grant awards from the Regional Transportation Program for $500,000, ATP for $2.3 million, and HCAOG $100,000. SCC awarded a $1 million grant to support phases A, B and C.	
	Eureka Bike Master Plan	City of Eureka	C St to Y St	284-286	The City of Eureka is currently working to prepare a Bicycle Master Plan (BMP) and continues to evaluate improvements in Downtown Eureka for improved trail connectivity. Plan development and public engagement underway as of March 2024.	The strategy for improved continuity of the Great Redwood Trail (Trail) through the City includes both short-term and long-term recommendations. The near-term plan includes on-street travel along 1st Street/ Waterfront Drive between C Street and X Street. The near-term improvements likely will include Bicycle Boulevard design treatments and existing bike lanes on Waterfront Drive. The long-term plan includes future gap closure of a separated trail between G and L Streets. Additionally, the BMP will include a master plan vision for an off-street trail between H Street and connection with the Humboldt Bay Trail at Y Street, in the GRTA right-of-way.	Not yet identified	
	Humboldt Bay Trail South	Humboldt County	Y St to US 101/Bracut Intersection	286-290	Construction anticipated to occur from May 2023 – Summer 2024.	4.25-mile rail-with-trail extension of the Humboldt Bay Trail that will complete the connection between Eureka and Arcata.	The total cost is $21 million for both construction and planning phases of the project. The construction bid has a budget of $16.5 million. In 2015, HCAOG approved $2 million for design plans and $2 million for the ROW acquisition phase. In 2019, $13.3 million in ATP funds was awarded for construction. Caltrans has committed $1.25 million and SCC has awarded an additional $2 million for construction costs. Humboldt County has spent $50,000 as of September 2020.	Hank Seemann, Environmental Services Director, Humboldt County, HSeemann@co.humboldt.ca.us
	Humboldt Bay Trail North	Humboldt County	US 101/Bracut Intersection to Samoa Blvd	290-292	Construction completed in 2017.	3-mile trail section. The trail passes through Arcata Marsh and Wildlife Sanctuary and may be a good example for future trail sections that cross wetland areas.	Estimated total cost was $5.67 million. $3.1 million from ATP, $1 million from Caltrans SHOPP Minor Funds program, $550,000 from SCC, and $1 million from Arcata's Measure G Streets Fund.	Hank Seemann, Environmental Services Director, Humboldt County, HSeemann@co.humboldt.ca.us
	Arcata City Trail	City of Arcata	Samoa Blvd to Sunset Ave	292-293	Construction completed in 2015.	1.5-mile trail continues the Humboldt Bay Trail into Arcata and connects to a local skate park. It creates more opportunities to connect to infrastructure in town. The project was split into phases to complete.	The Foster Avenue portion of the project cost approximately $500,000. Rails-with-trail projects through town cost approximately $1.2 million. Humboldt Bay Trail North Samoa Blvd to County Bay Trail South cost approximately $4.78 million. The City of Arcata utilized local Measure G funds, STIP funding, Transportation Development Act Funds, and Transportation Development Enhancement Program, an earlier form of ATP funding.	Emily Sinkhorn, Environmental Services Director, City of Arcata, esinkhorn@cityofarcata.org

*See list of acronyms at end of table

EXISTING AND PLANNED PROJECTS*		LEAD AGENCY	LOCATION	APPROXIMATE MILEPOST	PROJECT SCHEDULE	PROJECT NOTES & CONSIDERATIONS	FUNDING DETAILS & COST ESTIMATES	CONTACT
College of the Redwoods to Eureka		Humboldt County	Tompkin Hill Rd to Tooby Rd	276-279	Planning study is scheduled to be completed in Fall 2024. There is not yet a construction timeline.	Project is in the planning and outreach phase and aims to design a 4-4.5-mile Class I bike path from the College of the Redwoods to South Eureka, connecting at the Tooby Rd Trailhead in the Elk River Estuary to . The trail would provide a safe non-motorized transportation option that is separate from the US 101 corridor. Humboldt County is leading the study; however, the Board of Supervisors has not chosen a lead agency to implement the project.	$322,500 is the anticipated total project planning and design cost. $285,000 obtained from Caltrans Sustainable Communities Grant Program. Match includes $32,500 from HCAOG and $5,000 Humboldt County in-kind services. There is not yet a funding strategy for construction and implementation.	Hank Seemann, Environmental Services Director, Humboldt County, HSeemann@co.humboldt.ca.us
Arcata to Manila Trail		City of Arcata	Along Samoa Blvd, between Arcata and existing Manila trails at Lupin Dr	Samoa Branch 1-5	This segment is conceptual as of April 2024. There is currently no timeline for trail construction.	The trail would connect the 6 miles between Arcata and Manila. The trail will need to cross Mad River and wetland areas. County of Humboldt, City of Arcata, and GRTA are potential collaborators. Stakeholders, including the Timber Heritage Association, are interested in making this section of the project a rail-with-trail for future speeder cars or tourist train services to utilize the rail beds. Understanding and debating this functional element will be part of the planning and design process for this trail. The City expects to begin planning for this segment after the Annie & Mary Trail and Bay Trail South are complete.	Not yet identified.	Emily Sinkhorn, Environmental Services Director, City of Arcata, esinkhorn@cityofarcata.org; Hank Seemann, Environmental Services Director, Humboldt County, HSeemann@co.humboldt.ca.us
Annie and Mary Trail, Arcata to Blue Lake (MP 293-301)	**Annie and Mary Connectivity Project**	City of Arcata	Sunset Ave to West End Rd at Humboldt Bay Municipal Water District Park 1	293-297	IS/MND adopted in December 2022. Construction funded through ATP grant. Construction anticipated to begin in summer 2025 and completed by Fall 2026.	3.5-miles of ROW along Annie & Mary rail corridor will be used for trail because railbanking was unsuccessful. County of Humboldt, Humboldt Bay Municipal Water District, and Caltrans are project partners. The trail project will improve overpasses and drainage crossings. Additional trail phases will need to be planned to fully connect Arcata and Blue Lake.	Total cost is estimated to be $5.3 million, with $4.7 million for construction. This funding is secured from an ATP grant for construction. Initially the City received a Transportation Planning grant for community outreach and preliminary design.	Emily Sinkhorn, Environmental Services Director, City of Arcata, esinkhorn@cityofarcata.org
	Phase 2	Caltrans, District 1	Glendale Dr to Chartin Rd	299-301	The planning phase is anticipated to be completed in November 2024. There is currently no timeline for project construction.	Caltrans District 1, Blue Lake Rancheria, County of Humboldt, and Friends of the Annie & Mary Rail Trail are collaborating on this project. Caltrans is developing a Project Initiation Document (PID). Trail length is 1.7 miles total; 1.3 miles is off the rail ROW and follows the Caltrans ROW along the north side of Hwy 299. The eastern 0.4-mile section of trail connects back to rail ROW and into the City of Blue Lake.	No funding sources are yet in place, but Caltrans is considering the Active Transportation Program and State Hwy Operation and Protection Program. Project has been rejected twice from ATP funding program.	Alexis Kelso, Senior Transportation Planner, Caltrans, District 1, alexis.kelso@dot.ca.gov
	Phase 1	City of Blue Lake	Follows Railroad Ave between Chartin Rd and H Street	301	Construction completed for 0.5-mile section in November 2020.	In 2016, a preliminary land survey and title analysis of the Annie & Mary Rail Trail was finalized. The completed Phase 1 project only covers part of the analyzed area. The City of Blue Lake wants to expand the GRT in the future.	The total project cost to-date is approximately $974,000 . ATP funds were awarded to complete project.	Mandy Mager, City Manager, City of Blue Lake, citymanager@bluelake.ca.gov

*See list of acronyms at end of table

EXISTING AND PLANNED PROJECTS*	LEAD AGENCY	LOCATION	APPROXIMATE MILEPOST	PROJECT SCHEDULE	PROJECT NOTES & CONSIDERATIONS	FUNDING DETAILS & COST ESTIMATES	CONTACT
CONNECTING TRAILS NEAR THE GREAT REDWOOD TRAIL CORRIDOR							
Bay to Zoo Trail	City of Eureka	Eureka, US 101 bridge crossing of Eureka Slough to Sequoia Park Zoo	Connector path that will connect at MP 282	IS/MND completed in March 2021. Next steps are design, permitting, ROW, and construction to begin. Construction anticipated in 2026/2027.	2.75-mile trail that would be an inland spur of Humboldt Bay Trail to connect more inland communities to the GRT corridor. Will connect the hospital, schools, and residential areas for high commuter use potential.	Total project cost is approximately $10.1 million. The City was awarded $10 million in 2022 ATP grant cycle for project construction. ATP funding will become available to the City in September 2023 .	Brian Gerving, Public Works Director, City of Eureka, bgerving@ci.eureka.ca.gov
Fortuna Riverwalk Trail	Humboldt County Public Works	Drake Hill Rd to Riverwalk Dr	Parallel to GRT corridor at MP 263-265	Sandy Prairie Levee was completed in 1959 and there is now a well-used trail on top of the levee.	2-mile gravel path on the Eel River levee in the Fortuna Riverwalk District. Connects into the western edge of John Campbell Memorial Greenway and Strongs Creek Trail Path. Begins at Drake Hill Rd and heads 2-miles north to Riverwalk Dr along the Eel River. The project is not in the trail corridor but could provide alternate connections that would showcase a scenic route near town. It currently connects to the proposed greenway and other proposed connection improvements the City of Fortuna has planned.	Original cost not applicable for future funding needs.	Brendan Byrd, PE, Public Works Director/City Engineer, City of Fortuna, bbbyrd@ci.fortuna.ca.us
John Campbell Memorial Greenway and Strongs Creek Trail	City of Fortuna	Riverwalk Dr and turns east and extends to Rohnerville Rd	Connector trail that connects close to MP 265	Master Plan and concept drawings completed May 2014. Construction not scheduled.	Trail would connect Newburg Park and community center to the existing River Walk Trail via a 2.75-mile trail. The trail would be a 10-foot-wide Class I facility. This trail is important for connecting residential neighborhoods, shopping centers, and parks to the main GRT corridor and to facilitate safe travel for non-motorized commuters. The City anticipates another 4-6 years before construction could occur, pending funding.	The City is stalled by funding shortfalls. The City has applied for several rounds of ATP funds but have been unsuccessful. City personnel expressed uncertainty as to why the project has not been selected for funding given the emphasis on bike path connectivity projects at the state level.	Liz Shorey, Deputy Director Senior Planner, City of Fortuna, lshorey@ci.fortuna.ca.us; Brendan Byrd, PE, Public Works Director/City Engineer, City of Fortuna, bbbyrd@ci.fortuna.ca.us
OTHER RELEVANT PROJECTS							
Eel River Canyon Preserve - Vegetation Management	Wildlands Conservancy	Kekawaka Creek to Trail Access Point approximately 1.5-miles south along rail line	Near MP 199-201	Vegetation management with hand tools for preliminary partnership and stakeholder tour. Work used a GRTA issued permit to complete the project.	Received a temporary GRTA permit for work, which is now expired. Wildlands Conservancy will likely seek similar permits from GRTA soon for more vegetation work. Wildlands Conservancy may be willing to develop portions of the GRT within their Lone Pine Ranch property, a section of which falls into Trinity County. See Eel River Canyon Preserve project described above under the trail “Segments Within Trail” section above.	Staff unable to provide funding details.	Luke Farmer, Regional Manager, Wildlands Conservancy, luke.f@wildlandsconservancy.org

*See list of acronyms at end of table

EXISTING AND PLANNED PROJECTS*	LEAD AGENCY	LOCATION	APPROXIMATE MILEPOST	PROJECT SCHEDULE	PROJECT NOTES & CONSIDERATIONS	FUNDING DETAILS & COST ESTIMATES	CONTACT
Founder's Grove Improvements Phase I	California State Parks, Save the Redwoods League	Humboldt Redwoods State Park, Dyerville Loop Road	Near MP 237-238	CEQA compliance is being completed for the new parking lot, facilities, picnic area, and demolition and restoration activities. Aiming to begin construction in mid-2025 and complete the project in 2026.	Phase I will demolish the existing parking lot, comfort station, restrooms, picnic areas, and accompanying infrastructure and replace these facilities 0.5-mile down the road at Dyerville Loop Road across from GRT corridor for simple accessibility. This phase aims to replace the old facilities while preserving large trees in the park. Both phases will occur somewhat simultaneously but will be operated by different work crews. Park management hopes to expand facilities to include camping and more day-use opportunities along the GRT corridor in the future.	Project estimated to cost $7 million. California State Parks and Save the Redwoods League will split the cost close to half. Capital Outlay Program is funding the State Park's portion and SRL is fundraising approximately $3 million for the project. State Parks contribution will fund the demolition and new facilities.	Luke Farmer, Regional Director, luke.f@wildlandsconservancy.org
Founder's Grove Improvements Phase II	California State Parks, Save the Redwoods League	Humboldt Redwoods State Park, Founder's Grove to Dyerville Loop Road	Near MP 237-238	The two phases of the project will work within similar time periods, and aim to complete the project in 2026.	Phase II will build a new 1-mile trail from the new facilities to the Founder's Grove through second and third-growth redwoods and restore the old facilities site that will be demolished.	Save the Redwoods League's $3 million contribution will fund the new trail build, old site restoration, and interpretation installations along the new trail.	
PALCO Mill Redevelopment Project	City of Fortuna	Adjacent to GRT corridor near Riverwalk Dr and Strong Creek	Closest to MP 265	Planning phase initiated in 2023, as the City works on a draft specific plan. The landowner is working on a development plan parallel to the City and would start improvements after the City's specific plan is complete. Initial projects at the site may be completed sooner if developer acquires conditional use permits from the City of Fortuna.	Area is primarily zoned for commercial and industrial uses, but project could include mixed-uses that include residential. The project is in the early stages as property recently purchased by an enthusiastic developer with intentions to redevelop the property, with a desire to connect to the GRT corridor. The City has notified the applicant about the need to accommodate trail connections through property to the Fortuna River Walk Trail. Applicant is enthusiastic about GRT connection opportunities.	Not yet identified. Developer initiated and funded project.	Brendan Byrd, PE, Public Works Director/ Engineer, City of Fortuna, bbyrd@ci.fortuna.ca.us
City of Fortuna US 101 Interchange Improvements	City of Fortuna/ Caltrans	Three locations: Kenmar Rd, 12th St, and 3rd St	Closest to MP 265-267	IS/MND completed for Kenmar Rd Interchange in December 2022. Preliminary design for Kenmar/101 Interchange is underway and includes a cultural resource study by Caltrans. Preliminary design for 12th Street/101 would take approximately 1.5-2 years. There is no current construction schedule for the projects.	All three interchanges have poor service and outdated geometrics; existing interchanges do not accommodate pedestrian or bicycle access. Interchange was evaluated in 2016 Complete Streets Interconnectivity Study. Kenmar Rd interchange has completed initial design phase and environmental review but has no funding for subsequent phases. All interchanges would accommodate pedestrians, bicyclists, and GRT. 12th and 3rd Street interchange projects are still conceptual with no planning or design work complete.	The City anticipates that Kenmar would cost $25 million and 12th Street would cost $21 million. $550,000 in funding has been secured by STIP for project approval and environmental documentation for the Kenmar/101 interchange. No funding is secured to advance beyond the current 30 percent design phase for Kenmar/101 interchange. The City of Fortuna does not yet have funding for 12th Street and 3rd Street interchange projects. City Staff is working on funding options for these projects to continue.	Brendan Byrd, PE, Public Works Director/City Engineer, City of Fortuna, bbyrd@ci.fortuna.ca.us
Humboldt Bay Harbor Recreation and Conservation District Master Plan	City of Eureka	Humboldt Harbor District, Samoa Branch	MP 274-292 has jurisdictional overlap with GRTA	Preliminary discussions initiated in December 2022 and are ongoing. Planning phases are expected to be initiated in 2024.	GRT ROW crosses the study area. SCC and GRTA initiated discussions with Harbor District staff in late 2022 regarding coordination efforts. Coordination on this project continues, though as of early 2024, the 1.1 mile segment of Class I bike path remains in the early conceptual design stages.	In January 2024, the Harbor District secured an INFRA Grant from the Federal Department of Transportation, which included $1,100,000 in funding for the design and construction of a 1.1 mile segment of Class I bike path and associated fencing.	Rob Holmlund, Director of Development, Humboldt Bay Harbor Recreation and Conservation District, rholmlund@humboldtbay.org

*See list of acronyms at end of table

EXISTING AND PLANNED PROJECTS*	LEAD AGENCY	LOCATION	APPROXIMATE MILEPOST	PROJECT SCHEDULE	PROJECT NOTES & CONSIDERATIONS	FUNDING DETAILS & COST ESTIMATES	CONTACT
Historic Crew Speeder Cars and Museum	Timber Heritage Association	Samoa Branch, Eureka Slough, Korbel	Samoa Branch	Ongoing business and tourist attraction that has purchased property on Samoa Branch to maintain use of rail line and memorialize the history of the timber industry in Humboldt Bay.	The Historic Crew Speeder Cars is a business that promotes timber heritage in the area and plans to add a museum about the timber industry and its legacy in Eureka. THA also uses the rails along the Samoa Branch and in other locations in Eureka to run speeder cars as a tourist activity. They have planned several clean-up days in the rail ROW and support rail-with-trail projects in the Eureka area.	THA purchased 8-acre property on Samoa Branch in 2015 with an Option Agreement. THA must pay for clean-up of any environmental hazards or contaminants, costs for zoning changes, transfer of title, and Coastal Commission approval.	Pete Johnson, President, Timber Heritage Association, petej@sonic.net
Gateway Plan	City of Arcata	Promotes infill development in Arcata. Utilizing a section of the main GRT corridor at L St and 7th St as well as other connection points	Connects multiple locations between MP 292 and 293	The Gateway Plan is a planning-level document. A third draft of Gateway Plan was released in July 2023 and public workshops were underway as of March 2024.	Plan addresses connecting the downtown network of bike paths to the GRT corridor that connects businesses and residences in Arcata. Future project developers and the GRTA will be collaborators. The plan currently proposes a roadway on GRT ROW that could severe the rail and downgrade current Class I trail to a Class IV. There is some community preference to keep the trail and turn the trail corridor into a linear park.	Not yet identified.	Emily Sinkhorn, Environmental Services Director, City of Arcata, esinkhorn@cityofarcata.org

ACRONYMS USED IN TABLE:

ATP	Active Transportation Program
CA	California
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CNRA	California Natural Resources Agency
GRT	Great Redwood Trail
GRTA	Great Redwood Trail Agency
HCAOG	Humboldt County Association of Governments
HSU	Humboldt State University
IS/MND	Initial Study/Mitigated Negative Declaration
MP	Mile Post
NOE	Notice of Exemption
PID	Project Initiation Document *(specific Caltrans acronym)*
ROW	Right-of-Way
SCC	California State Coastal Conservancy
SHOPP	State Highway Operations and Protection Program
SMART	Sonoma Marin Area Rail Transit
SRL	Save the Redwoods League
STIP	State Transportation Improvement Program
THA	Timber Heritage Association

Trail Use & Design

Existing trail in Ukiah

Content for this Appendix located in Chapter 4: Trail Use and Design. The Final Plan will separate the design guidelines chapter as a standalone appendix for easier distribution and reference.

D

Branding Guidelines & Wayfinding Concepts

BRANDING GUIDELINES

This Branding Guideline is a reference tool to help create consistent usage of the Great Redwood Trail logo in visual communications.

The purpose of this guide is to facilitate a clear, effective, and memorable presentation of the logo and a standard brand identity.

LOGO FAMILY

The Great Redwood Trail consists of one primary logo and one workmark logo.

The primary logo should be used in most instances. However, due to the complexity of the logo (both in its detail and 29 colors), it may not be possible to use the logo in all instances. If the logo is to be used smaller than 1” high, please use the wordmark logo. If there are restrictions on number of colors that can be printed, please use the wordmark logo. Anytime where simplicity and succinctness is needed, please use the wordmark logo.

Both logos should be used consistently to project a distinctive brand identity. The logos should not be altered in any way.

PRIMARY LOGO

WORDMARK LOGO

THE GREAT
REDWOOD TRAIL

SPACE & SIZE

CLEAR SPACE

To help the logo tell its story most effectively, a buffer of clear space must be maintained around the Great Redwood Trail logo.

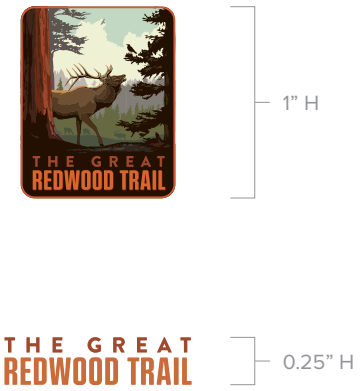
A unit of space equivalent to the height of the “T” found in the logo should be maintained so the logo has enough clear space. See diagram at right.

MINIMUM SIZE

To ensure readability, do not use the primary logo at a size smaller than 1” in height. In the case that the logo needs to be used at a size smaller than 1”, the wordmark logo should be used in its place. Do not use the wordmark logo at a size smaller than 0.25”.

CLEAR SPACE

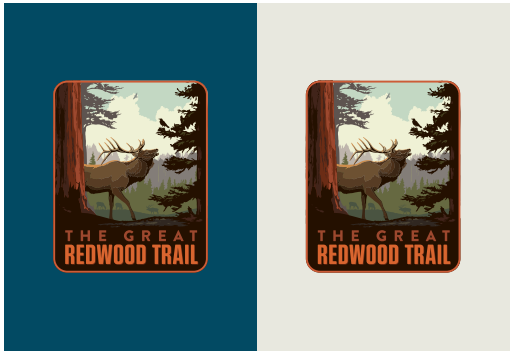
MINIMUM SIZE



PRIMARY LOGO ACCEPTABLE USES

There Great Redwood Trail primary logo can be used in the following ways on various colored or photo backgrounds.

The primary logo should be used in most instances where full color printing is allowed or when it can be used at a minimum height of 1”. In the case that the logo needs to be used at a size smaller than 1”, the wordmark logo should be used in its place.



COLOR BACKGROUND
The background color must be light or dark enough to provide enough contrast between the logo and background color.

ILLUSTRATED BACKGROUND
Since the logo itself is so detailed, make sure to use an illustrated background that is not too busy.

PHOTO BACKGROUND
Since the logo itself is so detailed, it is best to add a color or gradient overlay so that the logo can stand out more.

WORKMARK LOGO ACCEPTABLE USES

There Great Redwood Trail wordmark logo should be used in cases where only 1 or 2-color prints are allowed, or when the primary logo needs to be sized smaller than 1”.

There are three color combinations for the wordmark logo. The wordmark logo should not be altered in any way.

THE GREAT
REDWOOD TRAIL

2-COLOR LOGO
ON WHITE OR LIGHT BACKGROUND

THE GREAT
REDWOOD TRAIL

WHITE
ON BLACK OR DARK BACKGROUND*
*The background must be dark enough to provide contrast for legibility.

THE GREAT
REDWOOD TRAIL

BLACK
ON WHITE OR LIGHT BACKGROUND

PRIMARY LOGO ACCEPTABLE USES

Any deviation from the acceptable uses of the Great Redwood Trail primary logo means the logo will be more difficult to remember—this will negatively impact the effectiveness of the branding. Therefore, no variations of the primary logo are permitted under any circumstances.

Here are a few examples of typical logo violations. The examples are meant to be representative, however, and do not encompass all possible cases.

Do not distort or stretch the logo

Do not tilt or turn the logo

Do not use low-res or pixelated versions of the logo

Do not crop the logo

Do not alter the colors of the logo

Do not attempt to re-draw or re-typeset elements of the logo

WORDMARK LOGO ACCEPTABLE USES

Any deviation from the acceptable uses of the Great Redwood Trail workmark logo means the logo will be more difficult to remember—this will negatively impact the effectiveness of the branding. Therefore, no variations of the workmark logo are permitted under any circumstances.

Here are a few examples of typical logo violations. The examples are meant to be representative, however, and do not encompass all possible cases.

Do not distort or stretch the logo

Do not tilt or turn the logo

Do not use low-res or pixelated versions of the logo

Do not crop the logo

Do not alter the colors of the logo

Do not attempt to re-draw or re-typeset elements of the logo

COLORS

Color is a primary means of visual identification. Below are the designated colors for the Great Redwood Trail logo. Do not apply unapproved colors to the logo.

CMYK

CMYK (cyan, magenta, yellow, key/black) mixes have been customized to match, as closely as possible, the color palette's PMS values. CMYK inks are primarily used in four-color (or full-color) commercial and digital printing.

RGB

RGB (red, green, blue) color system is used when designing for the screen, such as slide presentations, email flyers, and social media posts.

HEX

HEX color values, which appear as a six character combination of letters and numbers, are used for applications viewed on screen, such as web pages.

PRIMARY COLORS

CMYK 8 / 18 / 38 / 0
RGB 232 / 204 / 163
HEX #E8CCA3

CMYK 17 / 67 / 87 / 4
RGB 201 / 107 / 59
HEX #C96B3B

CMYK 27 / 78 / 89 / 20
RGB 156 / 74 / 46
HEX #9C4A2E

CMYK 84 / 24 / 64 / 7
RGB 13 / 138 / 115
HEX #0D8A73

CMYK 97 / 65 / 42 / 26
RGB 0 / 74 / 99
HEX #004A63

SECONDARY COLORS

CMYK 8 / 5 / 11 / 0
RGB 232 / 232 / 224
HEX #E8E8E0

CMYK 18 / 4 / 20 / 0
RGB 207 / 224 / 207
HEX #CFE0CF

CMYK 73 / 20 / 34 / 0
RGB 64 / 158 / 166
HEX #409EA6

TYPOGRAPHY

PROXIMA NOVA

There is one typeface at the heart of the Great Redwood Trail identity: Proxima Nova. Meaning, this typeface must be used whenever possible.

The typeface can be synced via Adobe Fonts for Creative Cloud users:

fonts.adobe.com/fonts/proxima-nova

HEADLINES & SUBHEADERS

Proxima Nova Black
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z
0123456789!@#$%^&*(){}:"<?,./;

Proxima Nova Bold
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z
0123456789!@#$%^&*(){}:"<?,./;

Proxima Nova Semibold
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z
0123456789!@#$%^&*(){}:"<?,./;

BODY, CAPTIONS & FOOTERS

Proxima Nova Medium
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z
0123456789!@#$%^&*(){}:"<?,./;

Proxima Nova Medium Italic
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z
0123456789!@#$%^&(){}:"<?,./;*

Proxima Nova Regular
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z
0123456789!@#$%^&*(){}:"<?,./;

COLLATERAL

The following samples show how the logo and branding can be used in marketing collateral.

SOCIAL MEDIA

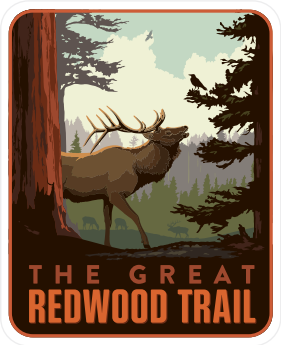
POSTCARD

COLLATERAL

The following samples show how the logo and branding can be used in marketing collateral.

LARGE FORMAT SIGNAGE

GIVEAWAYS



Stickers & Magnets

Note: Due to the complexity of the logo, these are most successful at 3" high or larger.

WAYFINDING CONCEPTS

A wayfinding system is an informational system that helps people orient themselves and navigate from place to place Along the trail, wayfinding will take the form of signage, maps, or environmental graphics.

The following pages outline concepts for a standard suite of wayfinding elements that will be used on the GRT.

REGULATORY SIGNAGE

Regulatory signage provides directives to trail users. Current guidelines for trail signing and striping exist in the California Manual on Uniform Traffic Control Devices (CA MUTCD) standards. These standards provide a baseline set of tools that include regulatory signs, warning signs, street signs, and striping and markings. They apply conditionally to both backcountry and multi-use trail locations.

Stop Sign (CA MUTCD R1-1)
Used to forcibly bring users to a halt, before proceeding. Typically used at intersections and points of high-speed conflicts.

Yield Sign (CA MUTCD R1-2)
Asks users to adhere to traffic conditions, stop if necessary, and join the roadway when safe to do so.

No Motor Vehicles (CA MUTCD R5-3)
Inform vehicles that they are restricted from turning into or driving down the trail.

WARNING SIGNS

Warning signs inform vehicles and trail users about changes in the trail ahead. They are CA MUTCD standard signs.

MODE WARNING SIGNS (CA MUTCD W11/W16 SERIES)

The W11-Series is concerned with alerting vehicles of upcoming trail crossing locations, with signage that indicates what user types are using the trail and how far ahead the crossing it. It can be amended with the W2 series to provide specificity.

TRAIL JUNCTURE SIGNS (CA MUTCD W1/W2 SERIES)

The most prominent signage on roadways, the W1 and W2-series of signage indicates upcoming directional changes in trail conditions.

Regulatory signage provides directives to trail users. Current guidelines for trail signing and striping exist in the *California Manual on Uniform Traffic Control Devices* (CA MUTCD) standards. These standards provide a baseline set of tools that include regulatory signs, warning signs, street signs, and striping and markings. While all of these tools help users safely navigate a trail system, the regulatory signs are the only tools that are legally enforceable. They apply conditionally to both backcountry and multi-use trail locations.

STREET SIGNS

STREET NAME SIGNS (CA MUTCD D5-3)

Where the trail meets a roadway, a street sign may be included for wayfinding and clarity. While the D5-3 sign provides a generic standard, the local jurisdiction street name signage standard should be observed.

PRIVATE ROAD SIGNS

Where the trail crosses a private road, it should be signed as such to discourage public access. While there is no CA MUTCD standard, a simple sign similar to the example below should be used.

STRIPING & MARKING

Striping and markings apply to paved multi-use trails. They are ground treatments to help delineate trails and directions of travel, to alert bicyclists and pedestrians of potential conflict zones, and to warn vehicles of crossing trail users. Striping and markings are informed by local and CA MUTCD standards.

Striping & Marking
Striping and markings apply to paved multi-use trails. They are ground treatments to help delineate trails and directions of travel, to alert bicyclists and pedestrians of potential conflict zones, and to warn vehicles of crossing trail users. Striping and markings are informed by local and CA MUTCD standards.

Solid Center Line (CA MUTCD Standard)
Solid center line striping can improve safety on higher-traffic trail sections and make trail users more aware of potentially dangerous areas. It is appropriate in heavy use areas and areas with limited sight distance such as blind curves, driveways, or underpass conditions.

Dashed Center Line (CA MUTCD Standard)
Dashed center line striping can improve safety on higher-traffic trail sections and make trail users more aware of potentially dangerous areas. It is appropriate in heavy use areas and leading up to a solid center line at areas with limited sight distance such as blind curves, driveways, or underpass conditions.

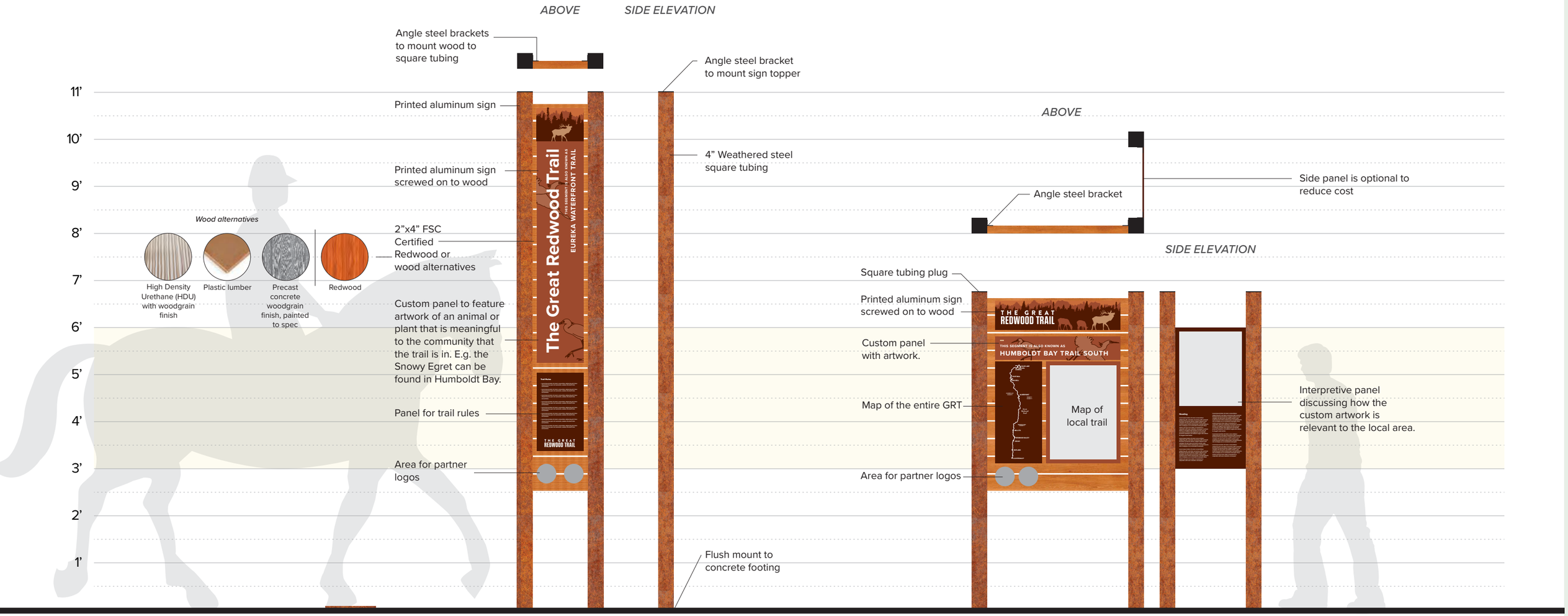
Edge Line (CA MUTCD Standard)
Edge striping increases visibility on the trail system. It helps mark the edge of the trail and can be used to visually narrow the trail to slow bicyclists ahead of a potential conflict zone or hazardous area.

Warning Markings
Intended to direct trail user behavior on the trail. Can be used to set up a hierarchy of which users yield to which. May be utilized with other markings and signs. Potential markings may include ‘stop’, ‘yield’, ‘slow’ etc.

Identity Markings
Can instill a sense of place for trail users. May include GRT branded pavement markings (page 126) or branding of the city’s trail system. Combined with ‘mile marking’ can make it effective for emergency situations. As with all striping, maintenance is a consideration as pavement markings will wear and fade over time. Identity markings should be used at strategic locations and should not clutter pavement.

COLOR PALETTE

REFERENCE IMAGES



GATEWAY ACCESS

KIOSK

GREAT REDWOOD TRAIL

Wayfinding Concept Design

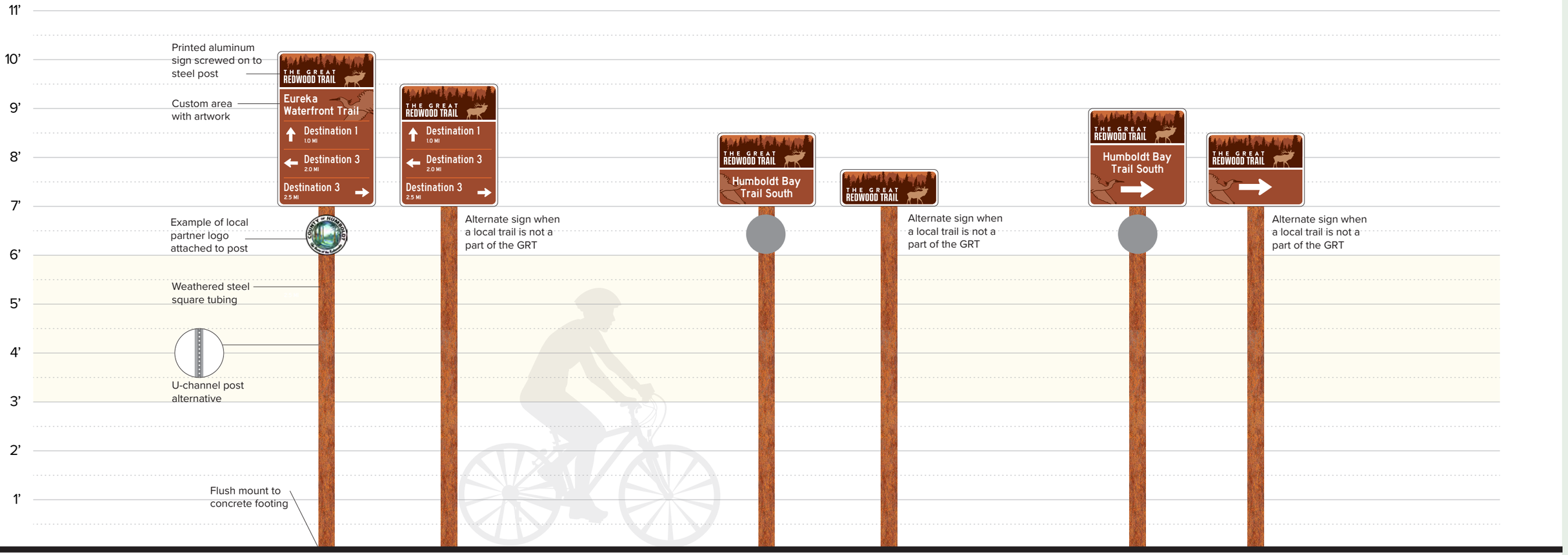
DESIGN CONCEPT: PASSAGE THROUGH TIME

Historic, rustic

SHEET 1

COLOR PALETTE

REFERENCE IMAGES



GREAT REDWOOD TRAIL

Wayfinding Concept Design

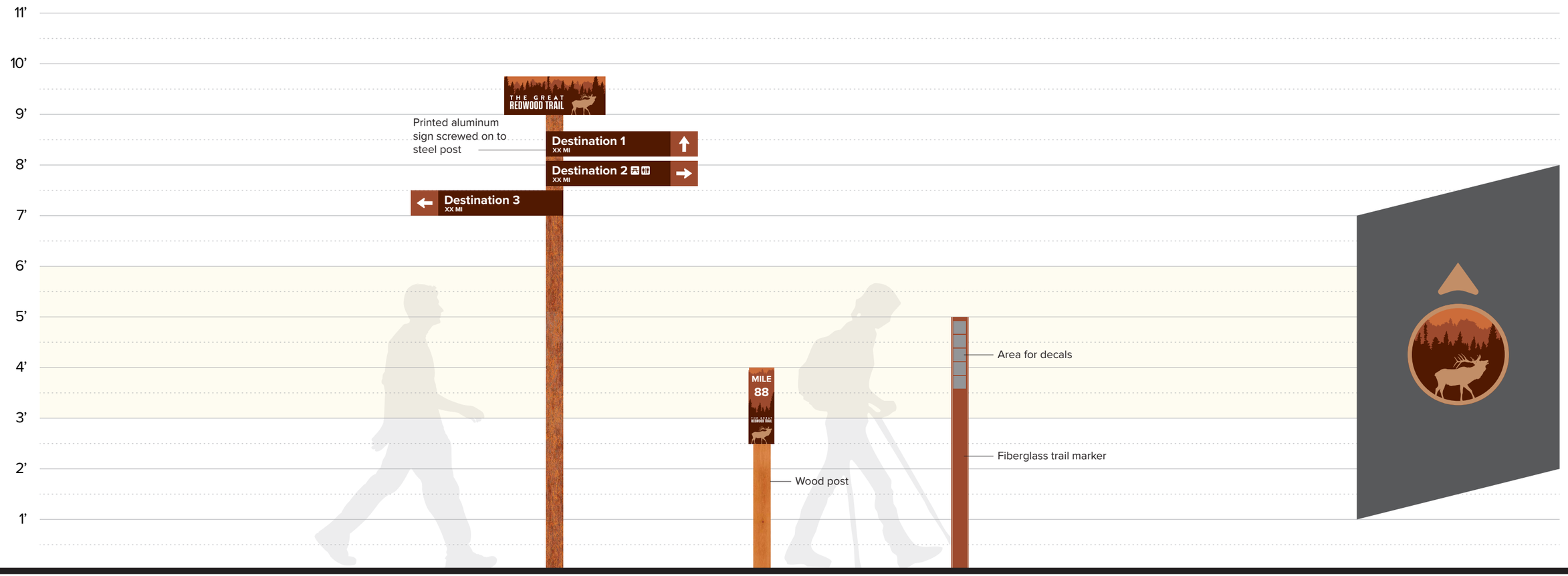
DESIGN CONCEPT: PASSAGE THROUGH TIME

Historic, rustic

SHEET 2

COLOR PALETTE

REFERENCE IMAGES



GREAT REDWOOD TRAIL

Wayfinding Concept Design

DESIGN CONCEPT: PASSAGE THROUGH TIME

Historic, rustic

SHEET 3

E. Project Mapbook

GRT corridor near Humboldt Redwoods State Park

Content for this Appendix can be found in Chapter 6: Project Prioritization. The Final Plan will separate the trail segment maps as a standalone appendix for easier distribution and reference.

F

Restoration and Habitat Enhancement Technical Memo

September 20, 2023

To	Brian Burchfield Alta Planning + Design, Inc.	**Contact No.**	707-246-1219
Copy to		**Email**	brianburchfield@altago.com
From	Mindi Curran and Andrea Hilton, GHD	**Project No.**	12579512
Project Name	Great Redwood Trail Master Plan		
Subject	Restoration and Habitat Enhancement Technical Memorandum		

1. Introduction

This Restoration and Habitat Enhancement Technical Memorandum (tech memo) was prepared in support of the Great Redwood Trail (GRT) Master Plan. Restoration and mitigation measures are an expected component of trail development, and the purpose of this review was to identify opportunities for environmental and habitat restoration along the trail corridor. Integrating habitat restoration into the GRT (Project) to enhance existing wildlife corridors and encourage fish passage is a Project priority. As individual segments of the GRT are designed, planned, and permitted, restoration activities will be incorporated into each segment design wherever feasible and fundable. Therefore, the restoration opportunities identified herein are planned to be integrated into the Design Guidance Report.

1.1 Purpose of this Memorandum

This tech memo was prepared to present the evaluation that was completed for identifying potential key restoration opportunities along the proposed GRT. The tech memo presents the methodologies, assumptions, and results of the evaluation. Each restoration opportunity that was identified is described in detail in the tech memo. The purpose of the evaluation is to identify the first round of key restoration opportunities that can be integrated into the design guidance associated with the Great Redwood Trail Master Plan. These opportunities assist with the development of the prioritization matrix, inform project recommendations, and facilitate coordination of the trail restoration efforts. Note that the restoration opportunities herein identified were selected based on several desirable attributes that make them “low hanging fruit” and are not intended to be an exhaustive list of opportunities. Selected site locations are presented in Attachment 1 Restoration Site Maps. The ID numbers and notes by others for each fish passage barrier evaluated are included in Attachment 2 Fish Passage Barriers. Available photographs and/or Google Earth images for each selected site are presented in Attachment 3 Available Photographs and Google Earth Images.

1.2 Background

The GRT will be an approximate 312-mile-long recreational trail with a main trail alignment that extends from San Francisco to Arcata California. Spur sections of the trail will also include Samoa, Blue Lake, and Carlotta. Sonoma-Marin Area Rail Transit (SMART) manages the GRT in Marin and Sonoma counties, while the Great Redwood Trail Authority (GRTA) manages the GRT in Mendocino, Trinity, and Humboldt counties. This evaluation of key restoration opportunities does not address opportunities in Marin County. This evaluation focused on the section of trail that extends from Cloverdale in Sonoma County to Blue Lake in Humboldt County. The southern portion of the trail is in the Russian River Watershed, while the northern portion of the trail from just north of Ukiah is in the Eel River Watershed.

1.2.1 Eel River Potter Valley Project

The upper Eel River watershed has two reservoirs that are currently owned by Pacific Gas and Electric (PG&E). The lower reservoir is Van Arsdale Reservoir, which is supported by Cape Horn Dam and the upper reservoir is Lake Pillsbury, which is supported by Scott Dam. Scott Dam currently prevents migration

of Chinook Salmon, coho Salmon, winter steelhead, and summer steelhead into several hundred miles of upstream habitat (PVP 2023). Since these reservoirs are located upstream of the GRT and the facilities may be modified from their current use, they are briefly considered here in relation to potential interactions with any GRT related restoration opportunities.

PG&E's license with the Federal Energy Regulatory Commission (FERC) to operate the facilities expired in April 2022 (PVP 2023). PG&E is currently working with federal regulators to develop a decommissioning plan for the hydroelectric facilities (CalTrout 2023). In addition, seismic stability concerns for Scott Dam were identified in early 2023 by PG&E, which has caused PG&E to keep the spillway gates at the top of Scott dam open, resulting in Lake Pillsbury being 26% lower than normal (Active Norcal 2023).

As of the writing of this tech memo, a plan has not been released that provides specific details on the future of the reservoirs or the PVP. However, sources including Humboldt County, California Trout, and the Mendocino County Inland Water and Power Commission have stated that the objectives moving forward are to find a solution that provides the maximum benefit to Eel River fisheries while also securing the water supply for communities through a "two-basin solution" (Sonoma Water 2019).

Under their existing Biological Opinion, PG&E is required to complete specific restoration and conservation-oriented management objectives. For example, specific objectives could be coarse sediment augmentation downstream of Scott Dam, treatment of Pike Minnow, and minimal ongoing annual riverine monitoring. While it is difficult to surmise what future operations and/or requirements may be attached to the PVP under a retired or renewed license, it is generally expected a large volume of sediment will be discharged from the upper reservoir during decommissioning of the upper dam. All or part of the large volume of sediment would likely be allowed to route downstream to the estuary during higher flow events. In 2019, a number of involved parties modelled future streamflow condition under several scenarios, including full project decommissioning considerate of future climate change (Sonoma Water et al. 2020). Results vary by scenario and water year type. Under the model scenario for full removal of the PVP project, winter and spring flood peaks were predicted to be slightly higher than current releases. Summer baseflows were also modestly higher. Routing of sediment and/or future flow adjustments attributable to PVP are not likely to physically effect the trail.

Eventual removal of all or part of the PVP under a retired license would benefit the Eel River anadromous fishery by restoring passage upstream of the existing dams, presumably improving streamflow management for the benefit of the fishery, and enhancing natural riverine processes related to sediment management and riparian function. If the PVP license is renewed, some degree of facility modification and/or removal is anticipated, and a new Biological Opinion from NOAA Fisheries would be required with more contemporary requirements to better protect fishery resources. These activities are proceeding slowly, on a timeline of one to two decades. Once implemented, fisheries-related benefits of PVP decommissioning or operational changes are expected to be complimentary to any GRT recommended restoration actions in the Eel River watershed, resulting in a cumulative benefit.

2. Methods

Potential restoration locations along the trail alignment were identified via stakeholder interviews, utilizing existing data found in publicly accessible online databases, and from previously conducted studies by others. Data found through these sources was collectively housed and presented in an online GIS platform. Restoration locations were then selected through desktop review. The types of locations selected, and GIS process are discussed in detail below.

Existing databases and previous studies conducted along the trail alignment were used to identify potential restoration locations. Each database or previous study that was reviewed is discussed in Section 3. The previous studies collected data related to the physical condition of infrastructure and the landscape along the proposed trail alignment as well as habitat data, such as fish passage barriers. The physical condition of the infrastructure and landscape along the trail alignment (e.g., landslides, collapsed tunnels, damaged sections of trestle, and damaged or degraded bridges) was not the focus of this review unless those locations also present an opportunity for restoration. Locations that address infrastructure repair, but do not necessary represent an opportunity for habitat restoration, are herein referred to as "reconstruction opportunities." Locations that include a known habitat benefit, as described by one of the five options

below, are herein referred to as “restoration opportunities”. Prospective restoration locations were identified based on the potential for implementation of the following types of restoration enhancements:

– Streambank stabilization (using revegetation or bioengineering techniques when feasible)
– Improvements to fish passage (salmonids and Pacific Lamprey)
– Improvements to existing wildlife corridors
– Debris removal
– Combination of the above enhancements

The primary steps applied in this evaluation included:

1. Previous studies done by others were reviewed.
2. Data from field evaluations conducted by others and agency databases (infrastructure conditions, fish passage barriers, geomorphic hazards, etc.) were compiled in GIS.
3. Data were reduced to only include reconstruction opportunities (i.e., infrastructure, fish passage barriers, geomorphic hazards, etc.) along the trail alignment.
4. Data were analyzed based on field evaluation notes and treatment recommendations recorded by the field crews to identify “low-hanging fruit” key restoration opportunities.
5. Key fish barrier restoration opportunities were selected based on several factors, not limited to but including:
    a. The passage barrier has been identified as a barrier to multiple life stages of salmonids and/or a barrier to multiple species (salmonids as well as lamprey).
    b. The area upstream of the passage barrier, that would become accessible following barrier removal, has been field surveyed and identified as being suitable habitat for salmonids and/or Lamprey.
    c. A treatment recommendation that would increase passage capabilities has been made by the party who conducted the field survey. These treatment recommendations are provided in Attachment 2 Fish Passage Barriers.
6. Key rail-related debris removal and bank stabilization locations were selected based on several factors, not limited to but including:
    a. The debris field represents a significant clean-up effort (i.e., the debris field consists of many objects for clean-up including numerous pieces of abandoned equipment, rail cars, sheds/structures, and other debris).
    b. The geomorphic condition and bank stabilization location represents a hazardous condition, as identified by the party that conducted the field survey, that requires repair prior to trail construction.
    c. The debris field and geomorphic hazard location have been identified through aerial imagery as having road access.

2.1 Stakeholder Interviews

Interviews with key stakeholders were organized by the Coastal Conservancy to solicit input on potential restoration opportunities aligned with the GRT. Interviews were held with representatives from California Trout, California Department of Fish and Wildlife (CDFW), NOAA Fisheries, and the Mendocino County Resources Conservation District. Recommendations resulting from stakeholder interviews are summarized in Section 6.4. Aside from the data sources considered herein, no additional applicable data sources were identified.

California Trout indicated they are currently working on a detailed recovery plan for the Eel River, associated with removal of the Potter Valley Project. The recovery plan will be completed subsequent to the GRT Master Plan and will include a variety of restoration strategies beyond the spatial scope of the trail (e.g., floodplain and riparian restoration, flow enhancement opportunities, side channels and other off-channel habitat features, etc.)

2.2 GIS Methods

The ESRI ArcGIS online platform “Atlas” was used as the GIS platform to host the GIS layer data. Shapefiles from the various sources discussed below were added to Atlas and reviewed together to evaluate areas where potential hazards and dilapidated infrastructure overlapped with areas where improved fish passage or other restoration has been identified as a need.

The data from each source was added to Atlas and then filtered to only include data that falls on the trail alignment. The data filtering process was used to eliminate infrastructure and fish passage barriers that were associated with Hwy 101, so that only the projects related to the trail alignment were included in the evaluation.

Additional methods were also used to filter the data, such as filtering points by the previously assigned site name. The fish passage barrier site names generally include the type of infrastructure that is the barrier (i.e., culvert, concrete arch). For example, the fish passage barriers that are related to the railroad corridor generally have names that include “rail”, such as “Railroad Concrete Arch Culvert.” Therefore, having “rail” in the name was one of the data filters used.

The trail alignment was broken into 46 unique trail segments by Alta, numbered from south to north. The 46 trail segments vary in length and typically start and end at roadways. After data filtering was complete, data from the layer attribute tables for the alignment were exported in the form of pivot tables to identify the number of each type of reconstruction opportunity (i.e., infrastructure, fish passage barrier, geomorphic hazard). The data was sorted into the 46 unique trail segments (Project No ID, herein GRT Segment). The GRT Segments start at 1 at the southern end of the trail in Cloverdale and end at 46 at the northern end of the trail in Arcata. The data tables present the number of specific restoration opportunities along the entire trail alignment (e.g., the number of fish passage barriers found along the trail alignment), as well as the number of specific restoration opportunities found in each GRT Segment (e.g., the number of fish passage barriers found in GRT Segment 6). This exercise was completed to identify GRT Segments where there was a high likelihood of finding a potential restoration location, based on the assumption that more reconstruction opportunities in within a GRT Segment provides greater opportunities for potential restoration. Figures 1 through 4 present these findings.

In addition to the data evaluation described above, recommendations by others that are presented in the data sources described below were also considered when selecting potential restoration locations. For example, fish barrier identification and prioritization has been completed through field mapping and analysis by Ross Taylor & Associates and Stillwater Sciences for both anadromous salmonids and Pacific Lamprey. The locations identified and the respective prioritizations were considered when completing the evaluation for potential restoration locations for this exercise.

3. Previous Studies Done by Others

3.1 Alta and Ascent Field Reconnaissance Mapping

Alta and Ascent Environmental, Inc. previously conducted field reconnaissance of the trail alignment for the purpose of evaluating the railway infrastructure conditions along the proposed trail, including mapping key infrastructure reconstruction opportunities such as tunnels, bridges, geomorphic hazards, vehicular crossings, walls, culverts (greater than 12 ft), and miscellaneous obstructions. In addition to feature identification, each feature was assigned a code based on its condition. Shapefiles of the identified infrastructure and landscape reconstruction opportunities were provided by Alta for this analysis to aid in identification of potential restoration opportunities. The shapefiles were added to Atlas to view in conjunction with data from sources described in the following sections. The data are also found online in the GRT Master Plan Interactive Map (Alta 2023).

3.2 GRT Feasibility Analysis Summary

In 2020 a Feasibility, Governance, and Railbanking study was conducted under contract with the California State Parks to partially fulfill the requirements of Senate Bill (SB) 1029 (Statures of 2018) (Alta and Ascent 2020). SB 1029 directed the California State Transportation Agency to conduct the feasibility assessment

for the North Coast Railroad Authority and its rights-of-way for the purpose of identifying the most appropriate way to dissolve the existing agency, establish renewed governance of the corridor, and re-assign corridor assets and liabilities. This was conducted for the potential opportunity to convert over 300 miles of the former Northwestern Pacific Railroad into the GRT recreational trail. Appendix C of the 2020 Feasibility Report contains tables of data related to the existing conditions of the trail alignment. Of most importance, Table C-7 presents the locations of abandoned rail equipment, structures, and rail debris within the rail corridor and table C-8 presents landslides and slope failures along the alignment. Alta provided shapefiles for the locations of these reconstruction opportunities to GHD to include in the evaluation of potential restoration locations.

3.3 Previous Efforts on the GRT Alignment

3.3.1 Ross Taylor & Associates

Ross Taylor & Associates previously conducted a stream crossing inventory and fish passage evaluation within the Eel River Basin (Ross Taylor & Associates 2011a). The primary objective was to assess passage of juvenile and adult coastal rainbow trout/steelhead (*Oncorhynchus mykiss*), coho Salmon (*O. kisutch*), and Chinook Salmon (*O. tshawytscha*) and to develop a prioritized list of corrective treatments to provide unimpeded fish passage at railroad and stream intersections. The inventory and field mapping were conducted between January of 2010 and December of 2011. The evaluation was conducted primarily along the Eel River mainstem between railroad post-miles 135 and 268 (approximately 133 miles). This section extends from approximately south of the town of Willits where the railroad is located within the Outlet Creek and Haehl Creek watersheds, north to the City of Fortuna near the Eel River's confluence with the Pacific Ocean. A stream crossing catalog was produced based on the results of the field evaluation and ranks fish passage locations as low, medium, or high priority (Ross Taylor & Associates 2011b). There were three high priority, two medium priority, and 19 low priority sites identified. The three high priority sites include Woodman Creek (highest priority), Bridge Creek, and a location on Haehl Creek. Based on the latitude and longitude reported for these sites, GHD added the sites and associated priority assignment to the Atlas map to be incorporated into the potential habitat restoration opportunity assessment. As part of this assessment, outreach was conducted to Ross Taylor to discuss unassessed crossings, detailed in Section 6 – Recommendations.

3.3.2 Stillwater Sciences

Stillwater Sciences (Stillwater) previously conducted an evaluation of fish passage barriers to Pacific Lamprey in the Eel River Basin (2014). The goal of the 2014 passage evaluation was to evaluate and prioritize a list of barriers to Pacific Lamprey migration that require remediation. The project aimed to identify the most important barriers to Pacific Lamprey migration in the entire Eel River basin. Pacific Lamprey is another native anadromous species to California, and like anadromous salmonids, removing physical passage barriers is an effective way to aid population regrowth. However, many passage designs that support salmonids continue to impede lamprey passage due to high velocities and large steps that lamprey can't navigate. Pacific Lamprey are particularly important to the Wiyot Tribe who recount large numbers of Pacific Lamprey once existing in the Eel River and tributaries. Results of the 2014 Pacific Lamprey barrier assessment prioritized 24 sites for passage remediation, including four high priority, eight medium priority, and 12 low priority. Based on the latitude and longitude reported for these sites, GHD added the sites and associated priority assignment to the Atlas map to be incorporated into the potential habitat restoration opportunity assessment.

3.3.3 Pacific Watershed Associates

Pacific Watershed Associates (PWA) has conducted field mapping of infrastructure and geologic hazards along approximately 98 miles of the proposed trail alignment from Willits downstream to the Eel River mainstem confluence with the South Fork Eel River (PWA 2023). The infrastructure reconstruction opportunities and hazards identified by PWA were incorporated by Alta into the GRT Master Plan Interactive Map data and therefore were included in this evaluation to identify potential restoration opportunities. In addition to field mapping, PWA has participated in previously completed restoration projects along the proposed trail alignment. Two of these completed restoration projects were high-priority

restoration sites identified by Ross Taylor & Associates during the 2011 fish passage assessment. This includes Woodman Creek Restoration and Bridge Creek Restoration. PWA has also participated in the Elk River Estuary and Tidal Wetlands Enhancement Project located in the City of Eureka along the Humboldt Bay Trail, which ties into the proposed GRT trail alignment through the City of Eureka.

3.4 CDFW Passage Assessment Database

The CDFW Passage Assessment Database (PAD) was explored for potential restoration opportunities (CDFW 2023). The PAD Map Viewer was used to identify fish passage locations that could be downloaded and included in the Atlas map to be viewed with the Alta, Ross Taylor & Associates, and PWA data. The PAD data includes fish passage locations where there are total or partial barriers that are natural or manmade, locations where there are screened and unscreened water diversions, and areas that have not yet been assessed. The PAD database also includes a "2019 Priority Barriers" shapefile, which shows the locations of CDFW's priority fish barriers. This layer was used in conjunction with the other infrastructure data to help identify locations where dilapidated infrastructure could be replaced both for trail and fish passage improvements. Data from other sources are included in this database, including the Ross Taylor & Associates locations discussed above. In these instances, an effort was made to eliminate duplicate data.

The fish passage database assigns a passage status to each barrier included in the database (CDFW 2021). Passage statuses as defined in the PAD include:

- Total: A complete barrier to fish passage for all species at all life stages at all flows.
- Partial: Only a barrier to certain species or life stages.
- Temporal: Only a barrier at certain flows.
- Temporal and Partial: Only a barrier to certain species or life stages and only at certain flows.
- Unknown: Structure/site has been visited or surveyed; however, dataset has no conclusive information about barrier status.
- Unassessed: The structure/site has not been visited and/or surveyed for fish passage.

3.5 EcoAtlas

The California EcoAtlas database provides free public access to information about the quantity and quality of California wetlands (EcoAtlas 2023). The California Aquatic Resource Inventory (CARI) data, conservation easement locations, and California Protected Areas Database (CPAD) data were added to the ArcGIS Atlas Map to be viewed with the other data.

4. Trail Characterization and Initial Findings

After the data were added to the Atlas map and filtered to be along the trail alignment, the attribute tables were used to evaluate the total number of infrastructure and landscape hazards (e.g., debris and erosional features) as well as fish passage barriers for each GRT Segment along the trail alignment. The Eel River canyon stretch, located approximately between Willits and Scotia, was the area that included the greatest number of total erosional, debris, and fish passage constraints, presented in Figure 1.

Fish passage locations were also evaluated separately from other types of infrastructure (culverts, road crossings, tunnels, bridges, etc.) to identify areas where there were potential clusters of barriers as well as to identify if there was a relationship between the GRT Segment and type of fish barrier (i.e., partial, total, unassessed, or unknown[1]). The assignments of unassessed, partial, total, and unknown are assignments to the barrier that were taken directly from PAD. Unassessed barriers are further discussed in Section 6.3. When considering only fish passage locations, the Eel River canyon stretch has the greatest number of partial barriers, total barriers, and unassessed passages. There was no obvious relationship between the GRT Segments and type of fish passage barrier. The total number of fish passage barriers are shown in Figure 2. A more detailed description, provided by whichever source completed the barrier assessment, for each fish passage barrier can be found in Attachment 2 Fish Passage Barriers.

[1] Fish barrier attributes of partial, total, unassessed, and unknown are assigned in CDFW's PAD database.

As discussed in Section 3, there has been significant effort by Ross Taylor & Associates, Stillwater Sciences, and CDFW to catalog and prioritize the fish barriers through field evaluations. The field evaluations were conducted to assess the barrier type, species affected, and if area upstream of the barrier represents good or poor habitat. Because of this, many of the fish passage barriers have been found to either be a good fit for restoration or not fit for restoration. Barriers that are not fit for restoration are those that have little to no usable habitat upstream of the barrier, typically because there is another barrier (usually natural) immediately upstream, the slope is unfit, or the usable habitat is extremely limited spatially and may only be fit for one life stage of salmonid. Those who conducted the studies included notes about if the barrier is fit, or is not fit, for restoration and why. They also included treatment recommendations if the barrier was considered a good fit. GHD evaluated these notes and filtered the barriers accordingly. If there was a note from a field assessment recommending no treatment for a barrier, it is assumed that the barrier is “not fit” for restoration.

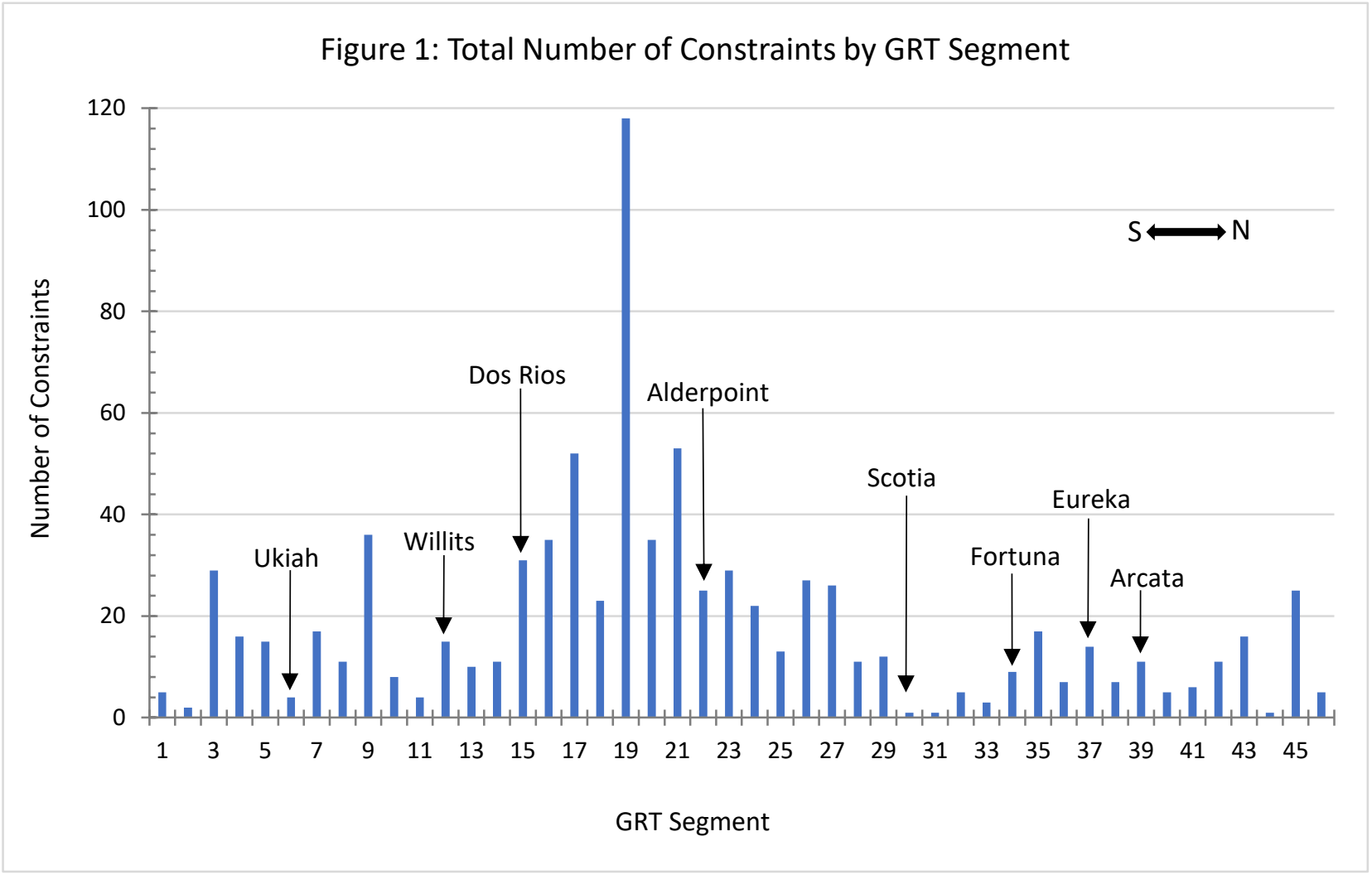


Figure 1 *The total number of infrastructure, debris, erosional, and fish passage constraints by GRT Segment. Data includes all infrastructure (regardless of condition), landscape hazards, and fish passage conditions assessed by the various sources detailed in Section 3.*

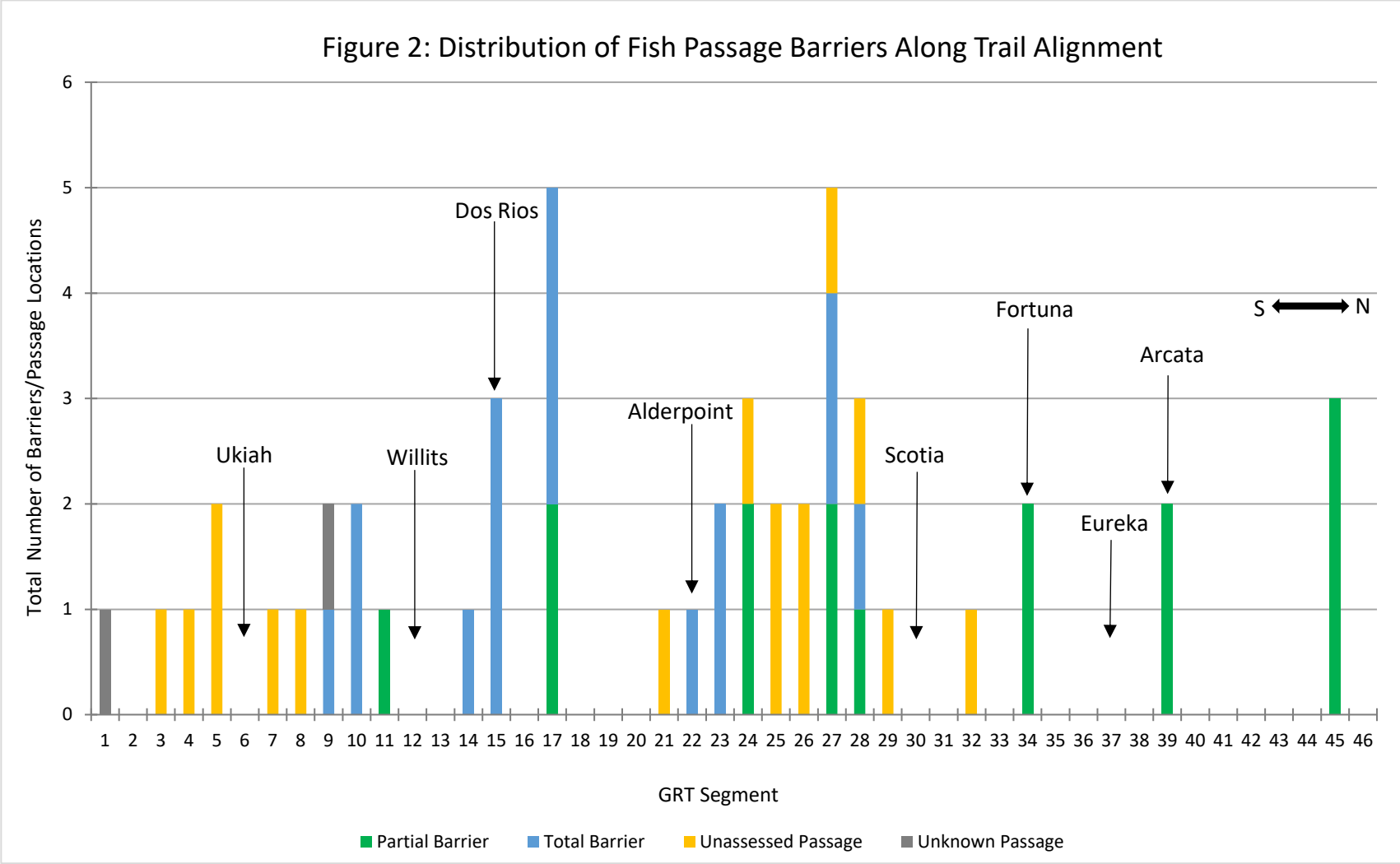


Figure 2 Total number of fish passage barrier locations shown by type for each GRT Segment along the trail alignment. Note that this includes fish passage barrier locations included in the CDFW PAD as well as fish passage barriers included in the Ross Taylor & Associates and Stillwater Sciences evaluations. Duplicates from these three sources were not double counted.

Partial and total fish passage barriers are present in 14 of the 46 Project Sections. Additionally, there are two crossings in two separate Project Sections attributed as unknown passage in the existing databases. There are 13 Project Sections that include an unassessed crossing. Unassessed crossings are discussed in greater detail in Section 6.3 The majority of fish passage barriers are located south of Scotia on tributaries to the Eel River.

There are also several fish passage barriers that were not selected as potential restoration sites for this evaluation that could be revisited in the future. These sites are also shown on Figure 3 as "Not Selected; Additional Studies Needed." These sites were not selected due to the accompanying notes that mentioned larger processes affecting these sites, which would need further evaluation before selecting the site for restoration. For example, some of the sites mention excess, upstream sediment loads. Further investigation into the source of the sediment loads would need to occur prior to being able to design new bridges/culverts/passages for these sites. Other reasons for placing sites in this category included the site passing most fish passage criteria or the site being in close proximity and potentially connected to Hwy 101 culverts. Table 1 lists these fish passage barriers and justification for why they were not selected. These sites should be further assessed and revisited for restoration opportunities.

Table 1 Fish passage barrier sites that could be a good fit for restoration but were not selected because further evaluation is needed.

PAD ID	GRT Segment	Reason for not Selecting
711960	24	Heavily influenced by Eel River. Needs further evaluation for sediment load.
715486	27	Heavy upstream sediment load. Needs further evaluation for sediment supply.
715484	28	CDFW does not include notes or treatment recommendations; therefore, the located would need to be assessed to determine if it is fit for restoration.
712011	34	Immediately adjacent to Hwy 101 and Hwy 101 culverts. Needs further evaluation specific to rights-of-way and culvert connectivity.

In addition to evaluating the total number of reconstruction opportunities (i.e., infrastructure, landscape hazards, fish passage barriers) within each GRT Segment, the specific type and condition were plotted. The purpose of this exercise was to identify areas with dilapidated infrastructure and landscape hazards. These areas were then compared to areas with known historic railroad debris to identify potential locations where debris removal and bank stabilization projects could occur. This was completed by plotting the type of reconstruction opportunity and the condition of the reconstruction opportunity, following the system that Alta and Ascent used while conducting the field reconnaissance (Alta 2020b).

In general, Alta characterized eight types of infrastructure: bridges, culverts, rail debris, tunnels, walls, road crossings, geomorphic hazards, and miscellaneous obstructions. Infrastructures were also assigned a code based on the condition. For example, tunnels are assigned codes based on if they are intact, partially collapsed, or fully collapsed. The infrastructure was filtered to only include infrastructure with codes that suggest infrastructure dilapidation/failure. For example, the tunnels that were coded as intact were removed, while the tunnels that were coded as partially collapsed and fully collapsed were included in this analysis.

The results of plotting these data show that within the Eel River Canyon stretch, geomorphic landscape hazards (e.g., landslides and erosion along the rail alignment) and rail debris (e.g., old box cars, metal parts, and abandoned equipment, etc.) present as good options for reconstruction opportunities. The results are shown in Figure 4.

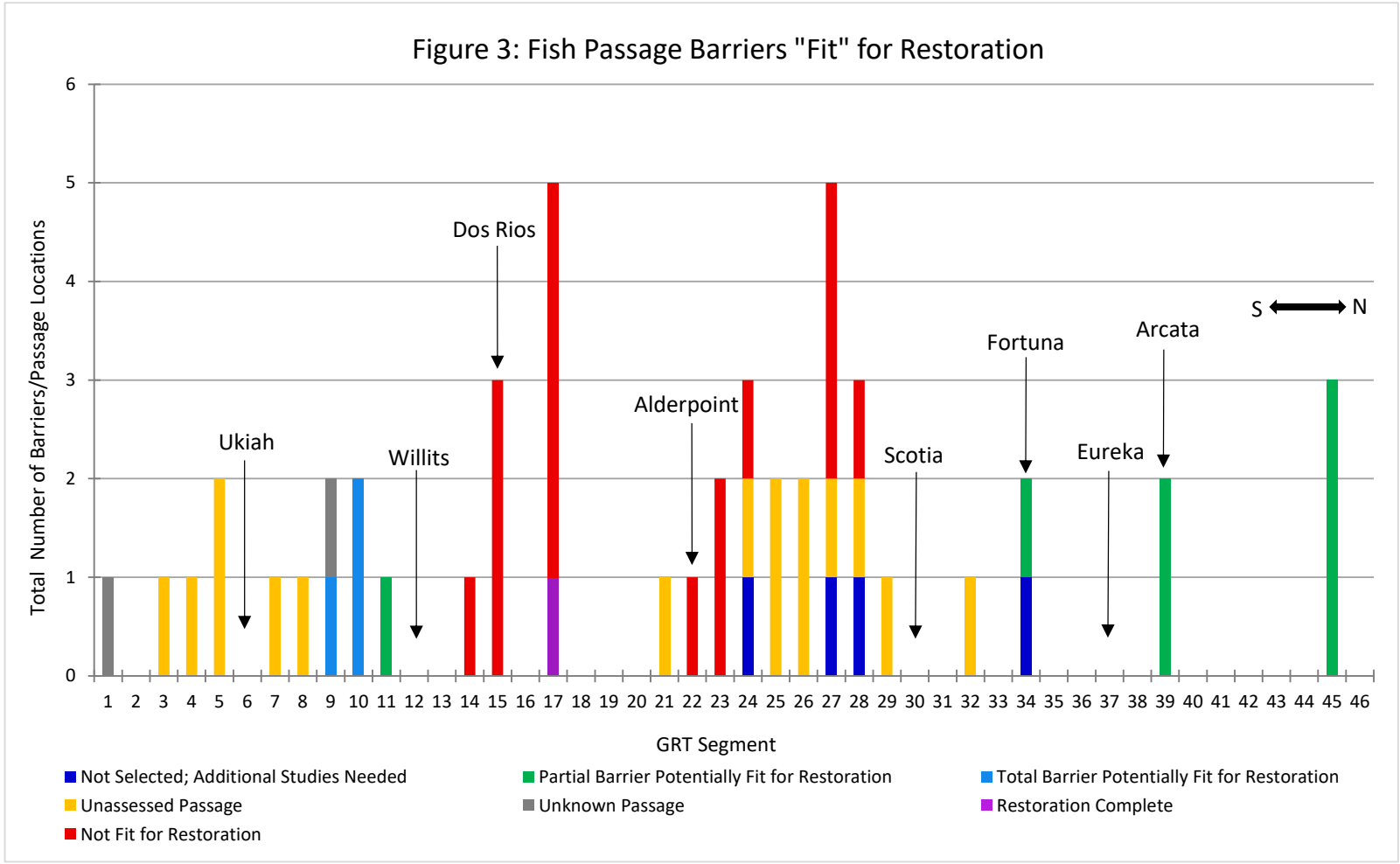


Figure 3 Fish passage barriers presented by type of barrier as well as by the potential "fit" for restoration. The "fit" for restoration was determined by others (Ross Taylor & Associates, Stillwater Sciences, CDFW) during previously conducted studies. GHD assigned "fit" based on notes made by others that were included in the GIS layer attribute tables. The assignments of unassessed, partial, total, and unknown are attributes from CDFW's PAD database. Unassessed barriers are further discussed in Section 6.3. If there was not a note from a field assessment recommending no treatment for a barrier, it is assumed that the barrier is "fit" for restoration. The sites that are "not selected; additional studies needed" are sites that could be good fits but have larger geomorphic processes that need to be addressed. These are further described in Table 1.

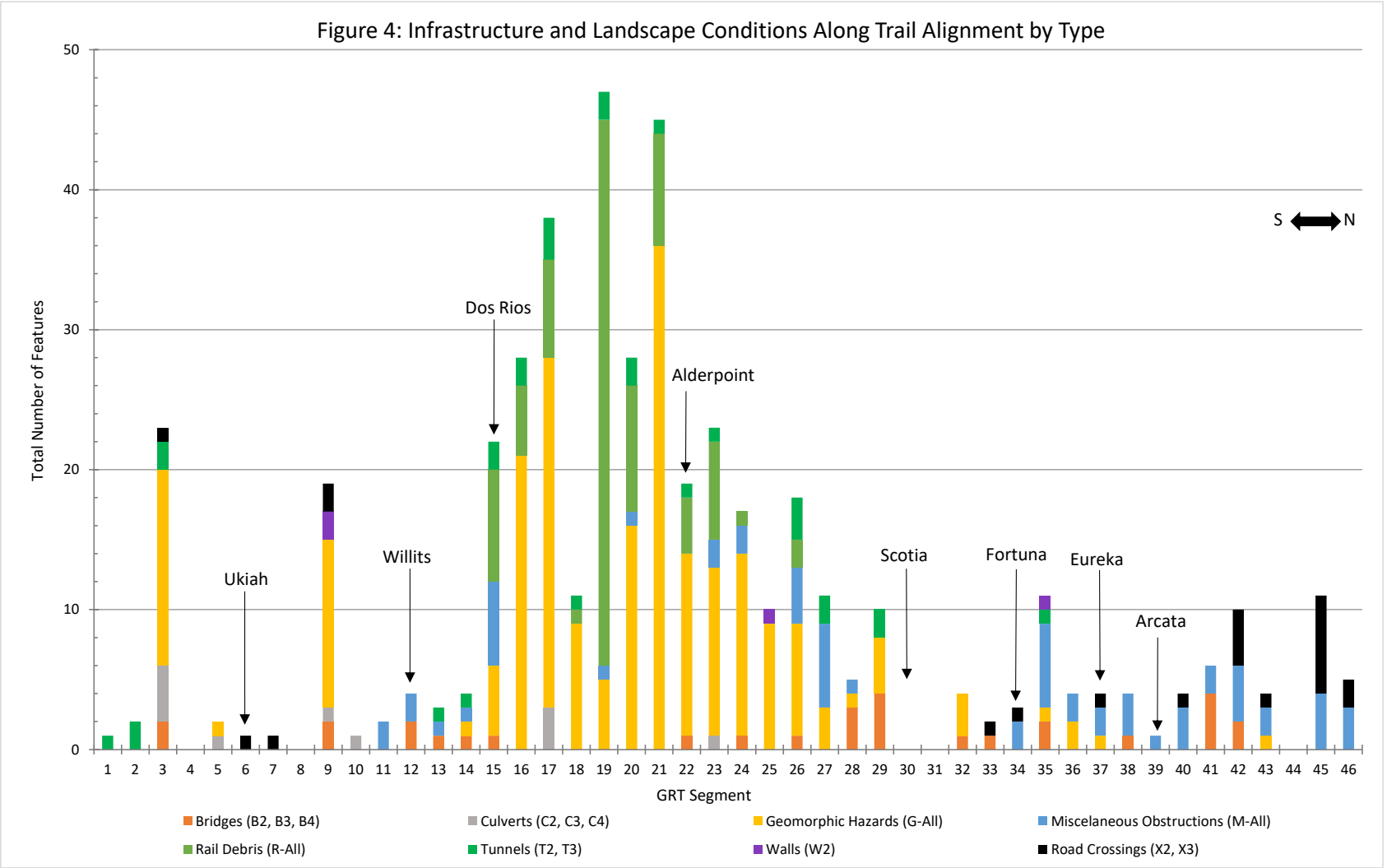


Figure 4 ***Infrastructure and landscape conditions by type and condition for each GRT Segment along the alignment. Note this includes Alta, Ascent, and PWA data, but does not include fish passage data. The codes listed next to each reconstruction opportunity type (e.g., B2, B3, B4) are the codes that were created by Alta and Ascent during field reconnaissance to indicate the condition of the infrastructure. Those codes can be referenced in Alta's Field Visit Survey Key (Alta 2020b).***

The resulting observations were used to narrow down GRT Segments with potential restoration opportunities and are as follows:

– The Eel River canyon stretch between Willits and Scotia includes the greatest number of total, partial, and unassessed fish passage barriers. However, many of these passages have been described by others as not being fit for restoration due to limited or non-existent upstream habitat. When the "fit" for restoration is considered, the Eel River Canyon stretch has the lowest number of potential fish passage barrier restoration opportunities.
– The area south of Willits and the area north of Eureka appear to be the areas with the highest potential for fish passage barrier restoration. However, this does not take into account the 16 unassessed crossings along the alignment, or the preliminary locations identified by the Mendocino County Resource Conservation District during stakeholder interview that require further investigation (see Section 6.4). Recommendations for assessing the 16 unassessed crossings are presented in Section 6.3.
– The Eel River canyon stretch includes the greatest density of dilapidated infrastructure, rail debris, and geomorphic hazards. GRT Segments within the Eel River Canyon provide restoration opportunities in the form of debris removal and streambank stabilization.
– The southern portion of the trail south of Willits to Cloverdale has the fewest dilapidated infrastructure and few locations with geomorphic hazards and rail debris, in comparison to the rest of the proposed trail alignment. This indicates the southern portion of the trail may have opportunity for fish passage barrier restoration, but limited opportunities for debris removal and streambank stabilization.
– There is a significant portion of fish passage barriers along the trail alignment that are classified as "unassessed" or "unknown". Assessments should be completed to identify if these barriers are potential restoration opportunities.

5. Key Opportunity Site Selection

During this evaluation, all sites previously identified by Ross Taylor & Associates, Stillwater Sciences, Pacific Watershed Associates, and CDFW were compiled. The compiled sites include fish passage barriers, dilapidated infrastructure, geomorphic hazards, and debris/abandoned equipment fields (see comprehensive maps appended to the Great Redwood Trail Master Plan showing all identified sites).

Of the compiled sites, seven were selected as key opportunities that could be prioritized as the first set of restoration opportunities. Note, these opportunities were selected because they have several attributes that make them "low-hanging fruit" opportunities; however, this is not an exhaustive list of opportunities. Each of the seven key opportunities identified during this evaluation are listed in Table 2 and described in further detail below. The sites are listed from south to north and are not listed by priority. Additional opportunities identified via stakeholder interviews are discussed Section 6.4.

In summary, the fish passage barriers selected as key restoration opportunities are those that have been identified through field evaluations done by others as having the following desirable attributes:

1. The passage barrier has been identified as a barrier to multiple life stages of salmonids and/or a barrier to multiple species (salmonids as well as lamprey).
2. The area upstream of the passage barrier, that would become accessible following barrier restoration, has been field surveyed and identified as being suitable habitat for salmonids and/or Lamprey.
3. A treatment recommendation that would increase passage capabilities has been made by the party who conducted the field survey. These treatment recommendations are provided in Attachment 2 Fish Passage Barriers.

The rail-related debris removal and bank stabilization locations that have been selected as key restoration opportunities are those that have been identified through field evaluations as having the following desirable attributes:

1. The rail-related debris field represents a significant clean-up effort (i.e., the debris field consists of many objects for clean-up including numerous pieces of abandoned equipment, rail cars, sheds/structures, and other debris).
2. The geomorphic condition and bank stabilization location represents a hazardous condition, as identified by the party that conducted the field survey, that requires repair prior to trail construction.
3. The debris field and geomorphic hazard location have been identified through aerial imagery as having road access.

Maps displaying the location of each site are included in Attachment 1 Restoration Site Maps. Available photographs and/or Google Earth Images of each site are included in Attachment 3 Available Photographs and Google Earth Images.

Table 2 Summary of selected key opportunity sites, which are not listed in order of priority.

Site Name	GRT Segment	Restoration Category
Bakers Creek	9	Fish passage improvement
Haehl Creek	10	Fish passage improvement
Haehl Creek	10	Fish passage improvement
Haehl Creek	11	Fish passage improvement
Dos Rios Road	15 & 16	Debris removal and bank stabilization
Island Mountain	19 & 20	Debris removal and bank stabilization
Jolly Giant Creek	42 & 45	Fish passage improvement

5.1 GRT Segment 9, Bakers Creek (Approximate Mile Post 125.1)

This fish passage barrier is listed as a total barrier for adult and juvenile Steelhead. This location is presented in Attachment 1 on Map 1. The fish passage barrier is shown on Photo 11 in Attachment 3 Available Photographs and Google Earth Images. The barrier is described as in poor condition and extremely undersized. It is noted that failure of this passage would have serious consequences on downstream habitat due to the large volume of fill used in the crossing. The barrier has PAD ID Number 715232 and is described as follows:

715232:

> *"FishXing determined this crossing meets fish passage criteria for adult steelhead on only 1% of the range estimated migration flows and fails to meet passage criteria for all age classes of juveniles. The culvert's >3% slope for a 202-foot length is the crossing's main feature that impedes passage. For all age classes of juveniles there are excessive velocities at higher flows."*

Treatment Recommendation:

> *"Because the current culverts are extremely undersized and in poor condition -- a replacement with a bridge is highly recommended prior to this site failing. NOTE: there is over 30,000 cubic yards of fill material within the crossing's prim that would have serious impacts on downstream spawning and rearing habitat."*

5.2 GRT Segment 10 – Haehl Creek (Approximate Mile Post 135.5)

This fish passage barrier is listed as a total barrier for all life stages of salmonids. This location is presented in Attachment 1 on Map 2. The fish passage barrier is shown on Photo 10 in Attachment 3 Available Photographs and Google Earth Images. The barrier was ranked as a medium-priority barrier by Ross Taylor & Associates and is described as a railroad circular, metal, corrugated culvert in extremely poor condition. The culvert has completed rusted-through and there is flow underneath the culvert. This passage barrier has a PAD ID Number of 758553 and is described as follows:

758553:

"The Green-Gray-Red filter determined this crossing failed to meet passage criteria for adult anadromous salmonids and all age classes of juveniles due to the outlet drop of approximately six feet. The immediate downstream channel also lacked an outlet pool with adequate depth for adult salmon and steelhead to make leap attempts from. Site observed on 4/25/11. A complete survey as not performed on this pipe. Access as not safe and the pipe as an obvious barrier due to it being perched about 10 feet and the pipe is in extremely poor condition. The outlet drop ~ 10 feet. The bottom of the pipe is completely rusted through, alter flow below the culvert and exits about 2-ft below the culvert at the outlet. The habitat is poor, creek is small and there is very limited amount of habitat. Channel splits about 100-ft upstream to two channels. The specie(s) assumed to be present or likely to utilize this watershed: Coho, Steelhead, Chinook."

Treatment Recommendation:

"The best long-term treatment option would be to either 1) temporarily remove the railroad crossing and pull-back the fill to re-establish a natural channel or 2) replace the culvert with a properly sized embedded culvert or open-bottom arch set on footings. Because this crossing is adjacent to the CalTrans Willits Bypass project, there may be opportunities for funding through mitigation. Because the outlet was perched at least eight to ten feet, replacing, or removing the existing culvert would require extensive use of grade-control structures to minimize channel head-cutting."

5.3 GRT Segment 10 – Haehl Creek, Willits (Approximate Mile Post 136.7)

This fish passage barrier is listed as a total barrier for all life stages of salmonids. This location is presented in Attachment 1 on Map 3. The fish passage barrier is shown on Photo 9 in Attachment 3 Available Photographs and Google Earth Images. The barrier was ranked as a high-priority barrier by Ross Taylor & Associates and is described as a concrete arch culvert in extremely poor condition with severe erosion on the downstream side and extensive cracks in the culvert floor. This passage barrier has a PAD ID Number of 758554 and is described as follows:

758554:

"The Green-Gray-Red filter determined this crossing failed to meet passage criteria for adult anadromous salmonids and all age classes of juveniles due to the outlet drop of approximately six feet. The immediate downstream channel also lacked an outlet pool with adequate depth for adult salmon and steelhead to make leap attempts from. Habitat appears fair. Upstream several pools with cobble and gravel tailouts. Riparian is brush and small deciduous trees. Maybe dry channel in summertime. The specie(s) assumed to be present or likely to utilize this watershed: Coho, Steelhead, Chinook."

Treatment Recommendation:

"The best long-term treatment option would be to either 1) temporarily remove the railroad crossing and pull-back the fill to re-establish a natural channel or 2) replace the culvert with a fully spanning bridge and re-establish the creek's natural channel location and slope. Either option would require grade-control structures to minimize channel head-cutting that would occur from the removal of the extremely perched culvert. Because this crossing is near the CalTrans Willits Bypass project, there may be opportunities for funding through mitigation."

5.4 GRT Segment 11 – Haehl Creek, Willits (Approximate Mile Post 138)

This fish passage barrier (PAD ID Number of 758555) is listed as a total barrier for Pacific Lamprey and a partial barrier for juvenile salmonids. This location is presented in Attachment 1 on Map 4. The fish passage barrier is shown on Photo 8 in Attachment 3 Images. The barrier was ranked as a high priority barrier by Stillwater Sciences for Pacific Lamprey. It was ranked as a medium-priority barrier by Ross Taylor & Associates for salmonids and is described as a railroad crossing bridge with hardened concrete

floor with a curb splitting the floor into two. It is also described as having riprap placed at the downstream end of the concrete sill.

Note that at the time of this writing a new bridge crossing at this location is being designed for the GRT. However, there is no work planned below the ordinary high-water line at this location as part of the design. Therefore, this site remains a potential restoration opportunity and could include removal of riprap, debris clearing, and streambed modifications that could enhance passage and fish habitat.

The PAD description for this fish passage barrier is as follows:

758555:

> *"On 8/20/2013, the Wiyot tribe assessed fish passage for adult Pacific Lamprey and determined that this barrier is a total barrier. Railroad crossing with concrete slab foundation perched ~3 ft above water surface during low flows. Haehl Cr. is heavily altered by human activity but has good potential for Pacific Lamprey due to relatively large size and extent of low gradient habitat. Ross Taylor & Associates (2011) evaluated site and determined it was passable by adult salmonids but presents passage problems for juveniles. Severity of perch has potential to worsen if channel head-cuts. A series of other likely migration barriers exist, starting approximately 2 mi upstream of crossing in upper Haehl Cr. (Ross Taylor & Associates 2011). These sites need to be visited to evaluate lamprey barrier status and the extent of suitable lamprey habitat upstream. Prior to lamprey assessment: FishXing evaluated adult anadromous salmonid passage and estimated the crossing met fish passage criteria between 60 and 208 cfs or 72% of the range of migration flows. FishXing evaluated resident trout/age-2+ salmonid passage and age-1+/young of- year salmonid passage and determined the culvert failed to meet passage criteria on all migration flows. Lack-of-depth was the primary passage criteria violation for adults and excessive velocity was the primary passage criteria violation for resident trout and juveniles. Good rearing habitat with deep pools and dense riparian cover of willows and alders. Fish observed in downstream pool. Several YOY salmonid and 10-20 species unknown (roach/suckers?). Thick growth on channel divider has caught storm debris, recommend removal for clearer flow path. The specie(s) assumed to be present or likely to utilize this watershed: Coho, Steelhead, Chinook. Previously surveyed for salmonid passage on 4/25/2011".*

Treatment Recommendation:

> *"Passage conditions could be improved by partial removal of the concrete flooring, clearing of brush and accumulated debris on the concrete sill, and re-working of riprap placed at the downstream end of the concrete sill."*

5.5 GRT Segments 15 & 16 – Dos Rios Road (Approximate Mile Post 166-167)

This site is located at the confluence of the Middle Fork Eel River and the mainstem Eel River, where the Dos Rios Road bridge crosses the mainstem. This location is presented in Attachment 1 on Map 5. This location would primarily be restoration through debris removal as well as streambank stabilization. The railroad debris are shown on Photo 7 in Attachment 3 Available Photographs and Google Earth Images.

This is another location where there is a high density of debris for the area and there are established roads that would allow access. Most of the railroad debris occurs north of the Dos Rios bridge, which the railroad passes under. Immediately south of the bridge there is a failing retaining wall and debris slide that has nearly reached the tracks. This provides the opportunity for streambank stabilization. Streambank stabilization at this location is important for two primary reasons: 1) streambank failure would contribute sediment directly to the confluence point of the Middle Fork Eel River potentially affecting fish passage and 2) the railroad tracks pass under the Dos Rios bridge only 400 feet north of the retaining wall failure and track distortion could impact the bridge.

This location was chosen for the following reasons:

1. The debris removal would be significant as there are at least two railroad cars, a crane, railroad chassis, abandoned infrastructure, and metal debris.

2. The geomorphic hazards south of the bridge provide an opportunity to pair the debris removal with bank stabilization using bioengineering and restoration techniques.
3. There are established roads that provide access to the site.

5.6 GRT Segments 19 & 20 – Island Mountain (Approximate Mile Post 194-195)

This location on Island Mountain would primarily be restoration through debris removal but also has potential to include streambank stabilization using revegetation using bioengineering techniques. This location is presented in Attachment 1 on Map 6. This location is within GRT Segments 19 & 20 and has the highest number of geomorphic hazards as well as rail debris. The railroad debris and distorted tracks are shown on Photo 5 and Photo 6 in Attachment 3 Available Photographs and Google Earth Images. This specific location was chosen for the following reasons:

1. There is a high density of rail debris for the size of the location.
2. The debris removal would be significant as it includes a line of at least 10 rail cars, an excavator, trailer, communication tower, and other rail waste. It is also immediately adjacent to an abandoned house and abandoned living quarters.
3. At the same location, but south of the debris are four identified geomorphic hazards (landslides), two of which have covered the tracks, one that has caused suspension of the tracks, and one that has pushed the tracks down into the Eel River. These geomorphic hazards present both the opportunity to remove more debris (the tracks) from the river as well as potential bank stabilization efforts.
4. In addition, there appears to be dirt road access to the location and given that the residences are abandoned there is potential that the existing roads could be utilized for debris removal and restoration efforts.

5.7 GRT Segments 39 & 45 – Jolly Giant Creek, Arcata (Approximate Mile Post 292.5 -293)

These fish passage barriers are immediately adjacent to one another (despite the numbering) and located in Arcata. There is a group of three partial fish passage barriers in GRT Segment 45 and a pair of partial fish passage barriers in GRT Segment 39, all five of which are located along an approximate 0.5-mile section of Jolly Giant Creek between 11th Street and Foster Avenue. These are along an existing length off trail through Arcata. However, these barriers remain and are related to railroad infrastructure and are therefore included as potential restoration candidates. It is possible that these barriers could be included in one restoration project that includes all five partial fish barriers or it could be divided into two projects, one project for the GRT Segment 45 group and one project for the GRT Segment 39 pair. These locations are presented in Attachment 1 on Map 7. The fish passage barriers are shown in Photos 1 through 4 in Attachment 3 Available Photographs and Google Earth Images.

5.7.1 GRT Segment 45 Group

This group of three partial fish barriers is specifically located on Jolly Giant Creek, between 11th and 14th Streets and parallel to M Street. These three partial fish barriers have PAD ID numbers 765079, 765080, and 765081 and were assessed by Ross Taylor & Associates. Note that the Ross Taylor & Associates treatment recommendation states that there are three passages that can be addressed at this location. However, there are only two passages identified in CDFW's PAD and therefore only two locations are shown on Map 1. The description provided by Ross Taylor & Associates for these barriers is as follows:

765079:

> *"Extremely undersized circular CSP culvert (4' dia x 41.3' L) in poor condition. FishXing estimated the culvert met fish passage criteria on 100%, 100% and 37% of migration flows for adult anadromous salmonids, resident trout/age-2+ salmonids and age-1+/young-of-year salmonids, respectively. The trash rack at the inlet was not accounted for when evaluating fish passage however the trash rack is most likely an impediment for a wide range of the passage window if not*

cleaned on a regular basis. There is ~5,250 ft of potential fish-bearing habitat upstream of poor quality due to the large amount of the creek channel contained within culverts through downtown Arcata, the relative lack of spawning habitat, and the relative lack of pool habitat. However, the reach between 11th Street and 14th has the potential for restoration/creation of suitable spawning habitat and improved rearing pools. Presumed species in this Creek are coho, steelhead and coastal cutthroat trout".

765080: Only included in group description (see treatment recommendation below).

765081:

"Extremely undersized circular CSP culvert (4' dia x 34.4' L) in fair condition. FishXing estimated the culvert met fish passage criteria on 93%, 34% and 0% of migration flows for adult anadromous salmonids, resident trout/age-2+ salmonids and age-1+/young-of-year salmonids, respectively. There is ~4,650 ft of potential fish-bearing habitat upstream of poor quality due to the large amount of the creek channel contained within culverts through downtown Arcata, the relative lack of spawning habitat, and the relative lack of pool habitat. However, the reach between 11th Street and 14th has the potential for restoration/creation of suitable spawning habitat and improved rearing pools. Presumed species in this Creek are coho, steelhead and coastal cutthroat trout."

Treatment Recommendation for 765079, 765080, and 765081:

"Because the railroad tracks are no longer used by the railroad and the culvert is highly undersized and in poor condition, remove culvert under railroad tracks and realign channel through the parcel of land between 11th and 14th Streets. There are three crossings that can be eliminated in this channel realignment (COA-JGC-08, 09, and 10 (PAD IDs 765079-81))."

5.7.2 GRT Segment 39 Pair

The two partial fish barriers located in GRT Segment 39 are both along the stretch of Jolly Giant Creek that is in Shay Park, located approximately between 17th Street and Foster Avenue. The partial barriers (PAD ID numbers of 765084 and 765085) and were assessed by Ross Taylor & Associates. The description provided by Ross Taylor & Associates for these barriers is as follows:

765084:

"Extremely undersized circular CSP (2' dia, x 74.7' length) in poor condition. FishXing estimated the culvert met fish passage criteria on 54%, 3% and 0% of migration flows for adult anadromous salmonids, resident trout/age-2+ salmonids and age-1+/young-of-year salmonids, respectively. However, the trash rack at the inlet is most likely impeding fish passage more than FishXing estimated. There is ~3,200 ft of potential fish-bearing habitat upstream of fair quality because the habitat quality improved within the reach of Jolly Giant Creek between Alliance Road and Highway 101. The channel was less confined and incised, the riparian canopy was more intact, and suitable spawning substrate was present on some pool-tails and riffle crests. Presumed species in this Creek are coho, steelhead and coastal cutthroat trout."

765085:

"Extremely undersized circular CSP (4' dia, x 52.8' length) in poor condition. FishXing estimated the culvert met fish passage criteria on 100%, 37% and 16% of migration flows for adult anadromous salmonids, resident trout/age-2+ salmonids and age-1+/young-of-year salmonids, respectively. There is ~2,000 ft of potential fish-bearing habitat upstream of fair quality because the habitat quality improved within the reach of Jolly Giant Creek between Alliance Road and Highway 101. The channel was less confined and incised, the riparian canopy was more intact, and suitable spawning substrate was present on some pool-tails and riffle crests. Presumed species in this Creek are coho, steelhead and coastal cutthroat trout."

Treatment Recommendation for 765084 and 765085 (Opinion listed as same for both):

"The current crossing is in poor condition (crushed inlet and rusted through invert) and should either be replaced or removed. Because the crossing is located on a non-utilized section of railroad track and is used as a footpath, its removal should be considered as a cost-effective option to

restore passage and reduce flooding. A foot bridge could be installed if the City determines that this path should be maintained."

6. Recommendations

Recommendations focus on identified restoration opportunities resulting from review of existing databases, consideration of sites that require additional evaluation, unassessed crossings and small drainages, and outcomes of stakeholder interviews.

6.1 Identified Restoration Opportunities

All sites identified previously identified by Ross Taylor & Associates, Stillwater Sciences, Pacific Watersheds Associates, and CDFW were compiled into a single map set (see comprehensive maps appended to the Great Redwood Trail Master Plan). Through a detailed desktop evaluation using available data, GHD identified seven key restoration enhancement opportunities along the trail alignment using the site selection methodology presented in Section 5. Field reconnaissance data collected by others and information from agency databases were cross evaluated during the site selection process utilizing GIS methods and Excel analyses. The potential restoration enhancements identified include locations for improved fish passage, debris removal, and streambank/slope stabilization. These key sites are presented in Table 2. It is recommended that these potential restoration enhancement opportunities be incorporated into the Design Guidance Report. Whenever possible, trail segments should be constructed in conjunction with restoration opportunities to capitalize on the opportunity to obtain concurrent trail and restoration funding.

6.2 Sites Requiring Additional Evaluation

The sites listed in Table 1 were not selected as key restoration opportunities because additional studies need to be completed prior to restoration design occurring at the sites. However, these sites do represent other potential restoration opportunities that could be pursued. It is recommended that studies be conducted to evaluate if restoration at these sites is warranted.

Two of the sites (PAD ID 711960 and 715486) need to have upstream sediment evaluations completed due to heavy sediment loads. However, notes and treatment recommendations indicate that these two sites could be fit for restoration.

PAD ID 712011 is immediately adjacent to Hwy 101 and culvert connectivity to Hwy 101 culverts and rights-of-way will need to be assessed prior to restoration. However, notes and treatment recommendations indicate that this site could be fit for restoration.

PAD ID 715484 has no notes or treatment recommendations; therefore, it is uncertain if this site would be a good fit for restoration.

6.3 Unassessed Crossings and Improvements to Small Drainage Crossings

There are 16 fish passage barriers on the trail alignment that are listed in the PAD as unassessed. These unassessed passages are presented on Figure 2 and Figure 3 (in yellow) and in Attachment 2. Note that although these passages have a status in PAD of unassessed, 10 of the 16 passages have detailed notes suggesting that they have been assessed. The notes suggest that these barriers are likely not a good fit for restoration due to steep slopes upstream, lack of water upstream, or high upstream sediment loads. These notes are presented in Attachment 2.

As part of this assessment, outreach was conducted with Ross Taylor & Associates to review their 2010 and 2011 effort. Ross Taylor & Associates confirmed that the entire corridor was assessed and there were no gaps in the field review. Ross Taylor & Associates also noted that crossings on non-fish bearing streams were not assessed. Therefore, as discussed above, unassessed barriers in the CDFW PAD are likely non-fish bearing streams or other small crossings (e.g.., small drainage culverts). Future coordination with the Coastal Conservancy, CDFW, Ross Taylor & Associates (or similarly qualified firm) is recommended to

confirm the locations currently attributed in the CDFW PAD as unassessed are in fact non-fish bearing streams. If the determination is made that identified locations may be fish bearing streams, a passage assessment is recommended.

As part of the Regional Board Clean Water Act Section 401 and CDFW Section 1602 permitting processes, all drainage crossings, even if not fish bearing, will be required to be upgraded to pass a 100-year flood event. These required drainage improvements will enhance flood conveyance across the trail alignment and reduce the risk of erosion and mass wasting.

6.4 Recommendations Resulting from Stakeholder Interviews

Key recommendations from stakeholder interviews are listed below.

- Expand the assessment of potential restoration opportunities to include the Russian River watershed, including an assessment of fish passage barriers associated with the old rail line in the Russian River watershed.
- Establishment of a boundary for Wild and Scenic Rivers designation.
- Individual segment designs should include an assessment of restoration opportunities to provide fish passage, erosion control, and enhanced drainage.
- Address existing discrete patches of pampas grass, scotch broom, Himalayan berry, arundo, tamarisk, and other non-native invasives as encountered.
- The large tunnel near Island Mountain and other tunnels should be circumvented to effectively allow passage of bats but not people.
- Complete biological reports for individual trail segments as part of the design process to ensure avoidance, minimization, and, if needed, mitigation measures are established for sensitive wildlife species included but not limited to Bald Eagles, bat colonies and special status bats, and Cliff Swallows.

The Mendocino RCD noted several barriers and erosional hazards on Russian River tributaries, including:

- A fish passage barrier near Cominksy Station Road downstream of Hopland, California. A location was not provided to GHD and therefore this location is not presented in the map series.
- A fish passage barrier in Hopland near the mouth of McNab Creek. The approximate location is shown on Map 8.
- An erosional site in Redwood Valley where the railroad tracks are hanging in the air. Reconnaissance mapping previously completed by Alta and Ascent Environmental indicate erosion and track washout in this area, which is presumed to be the same site (See comprehensive maps appended to the Great Redwood Trail Master Plan).

These locations were not previously mapped in the CDFW PAD database or other sources utilized for this assessment. These locations should be further evaluated to confirm they align with the GRT right of way and/or general planned trail alignment to and to pinpoint exact locations.

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Attachments

Attachment 1

Restoration Site Maps

Paper Size ANSI A

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Miles

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California II FIPS 0402 Feet

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Alta Planning and Design
Great Redwood Trail

Restoration Site Locations

Project No. **12579512**
Revision No. **-**
Date **Sep 2023**

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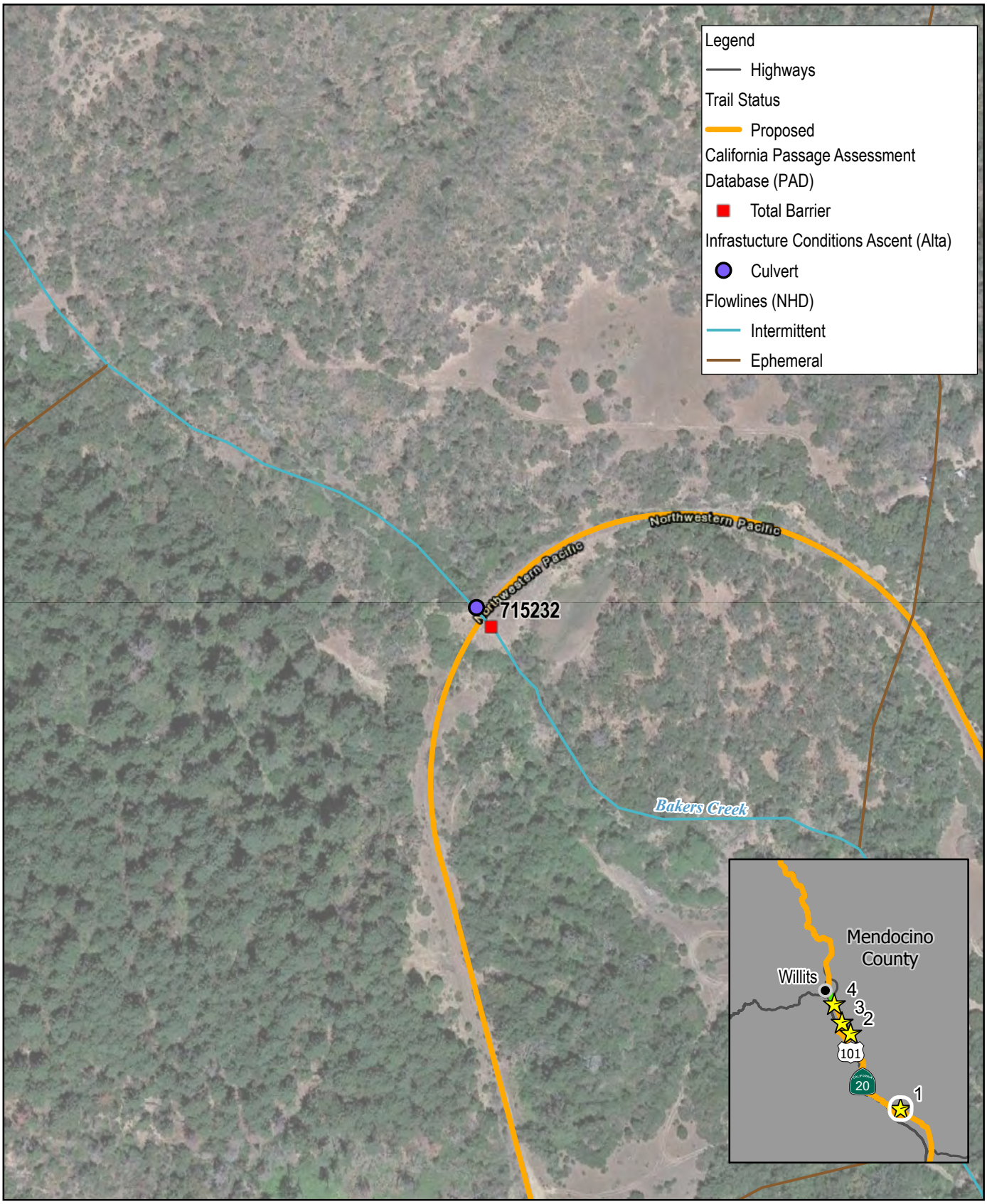

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Alta Planning and Design
Great Redwood Trail

GRT Segment 9
Bakers Creek
(Approximate Mile Post 125.1)

Project No. **12579512**
Revision No. **-**
Date **Sep 2023**

MAP 1

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Map Projection: Lambert Conformal Conic
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Alta Planning and Design
Great Redwood Trail

GRT Segment 10
Haehl Creek
(Approximate Mile Post 135.5)

Project No. **12579512**
Revision No. **-**
Date **Sep 2023**

MAP 2

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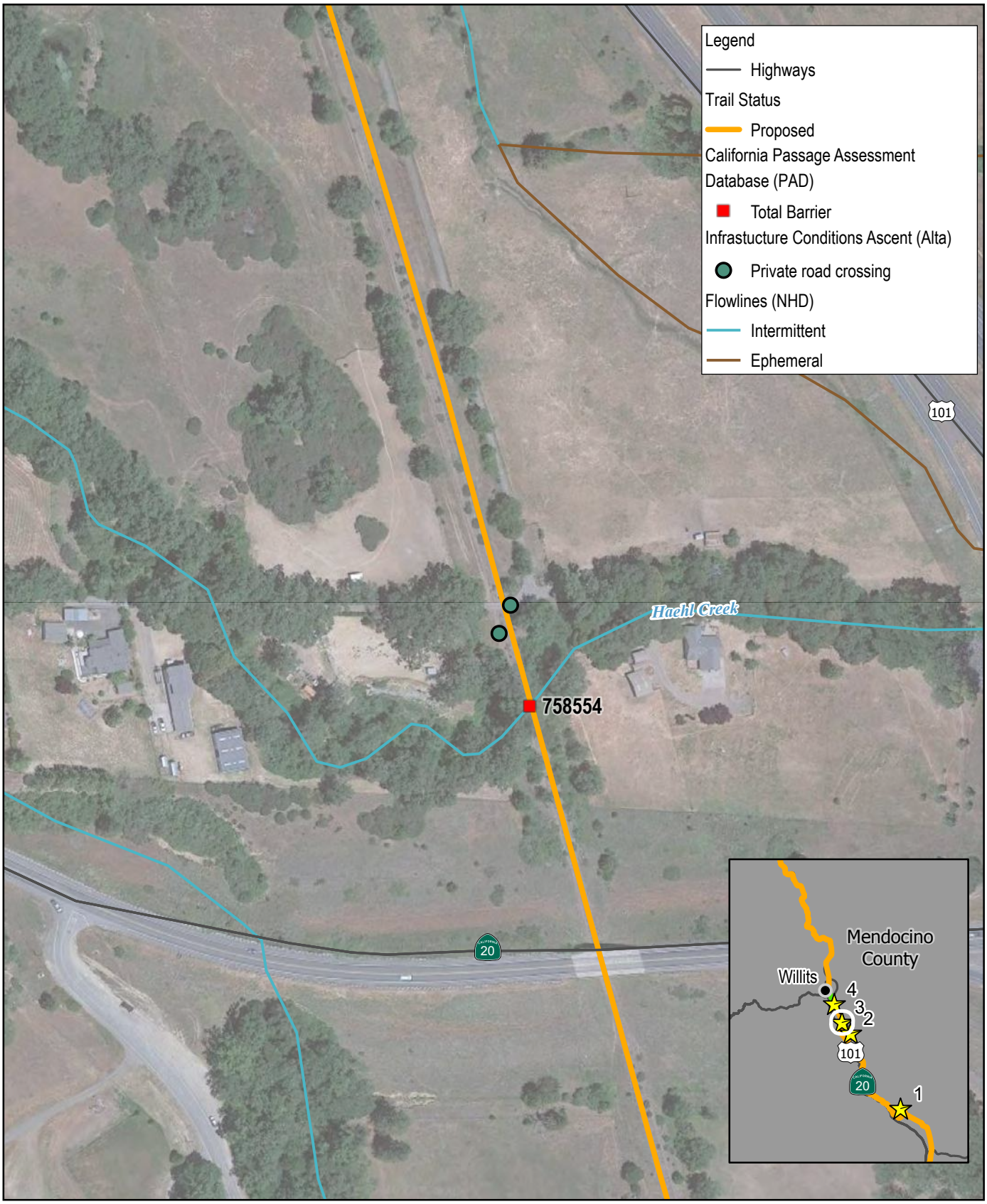

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Alta Planning and Design
Great Redwood Trail

GRT Segment 10
Haehl Creek
(Approximate Mile Post 136.7)

Project No. **12579512**
Revision No. **-**
Date **Sep 2023**

MAP 3

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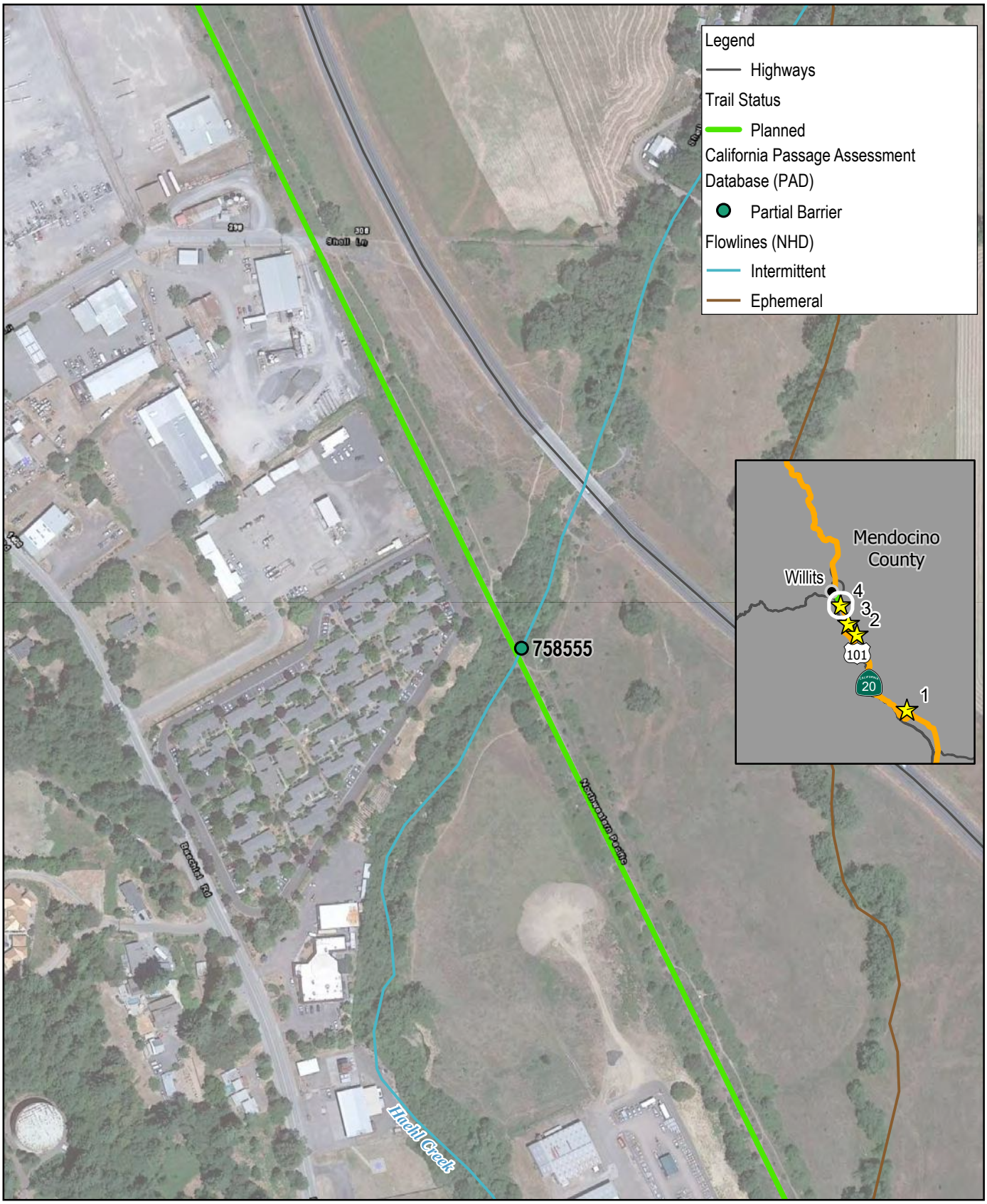

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Alta Planning and Design
Great Redwood Trail

GRT Segment 11
Haehl Creek, Willits
(Approximate Mile Post 138)

Project No. **12579512**
Revision No. **-**
Date **Sep 2023**

MAP 4

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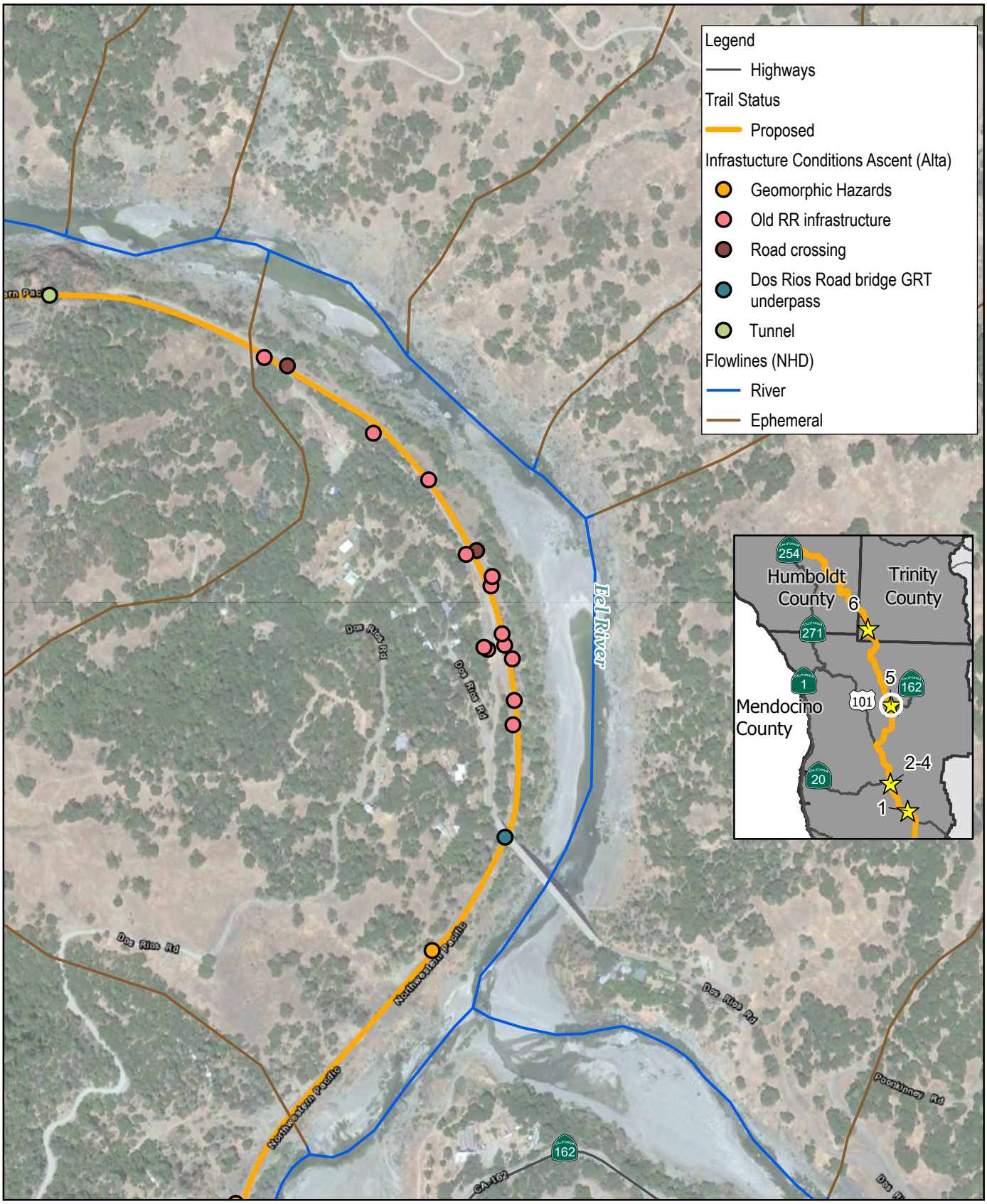

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Alta Planning and Design
Great Redwood Trail

GRT Segments 15 & 16
Dos Rios Road
(Approximate Mile Post 166-167)

Project No. **12579512**
Revision No. **-**
Date **Sep 2023**

MAP 5

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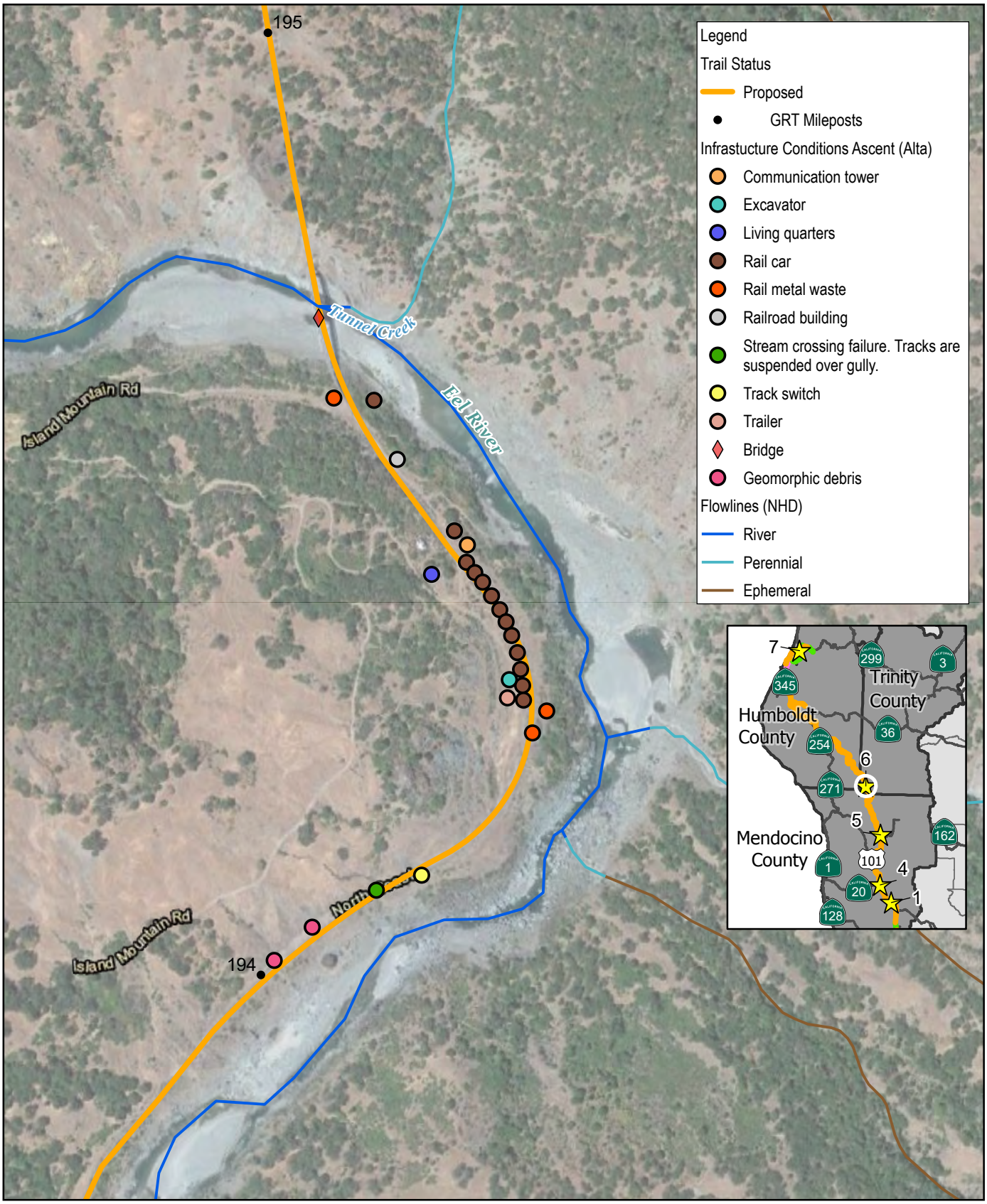

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Alta Planning and Design
Great Redwood Trail

GRT Segments 19 & 20
Island Mountain
(Approximate Mile Post 194-195)

Project No. **12579512**
Revision No. **-**
Date **Sep 2023**

MAP 6

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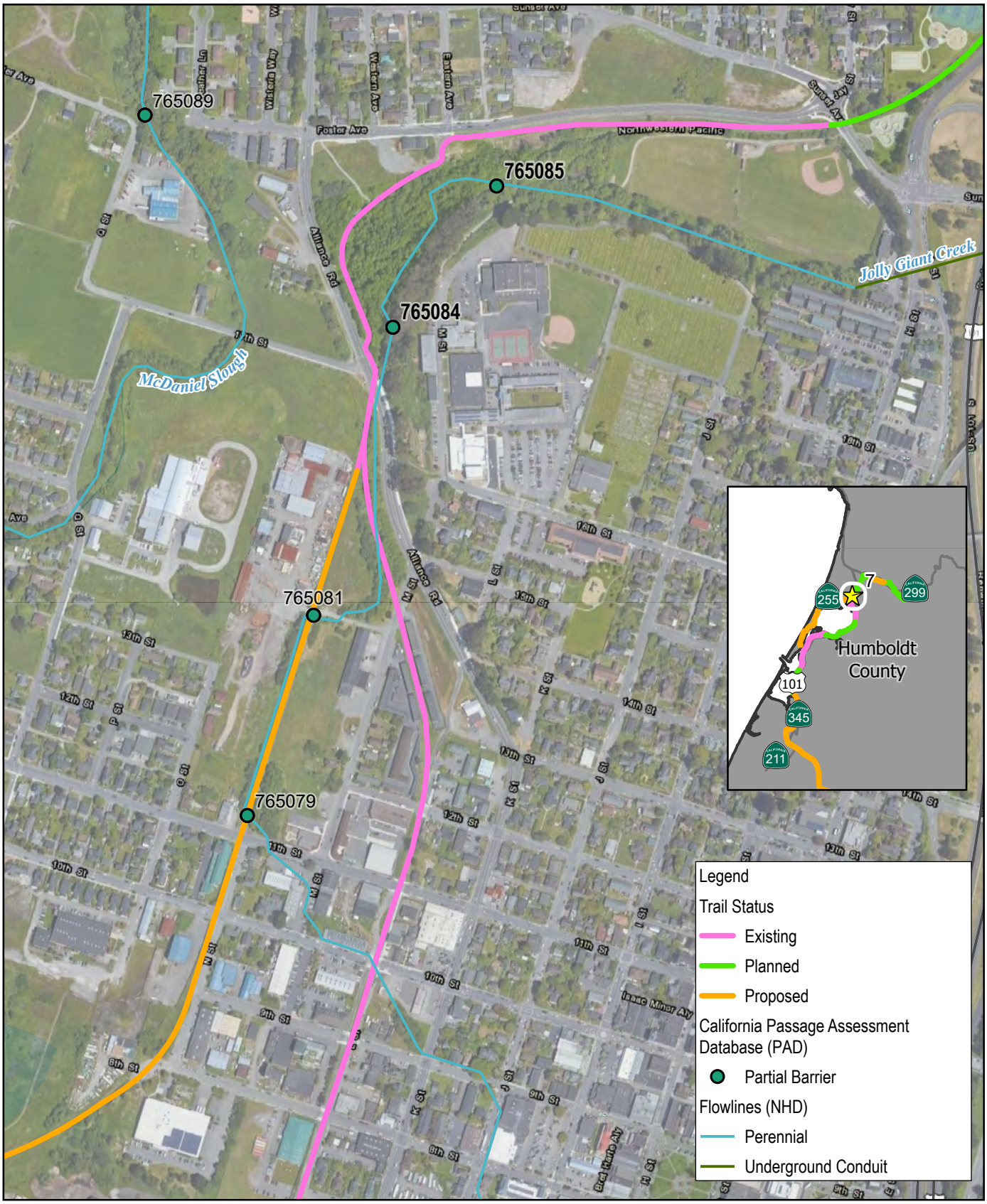

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Alta Planning and Design
Great Redwood Trail

GRT Segments 39 & 45 – Jolly Giant Creek, Arcata
(Approximate Mile Post 292.5-293)

Project No. **12579512**
Revision No. **-**
Date **Sep 2023**

MAP 7

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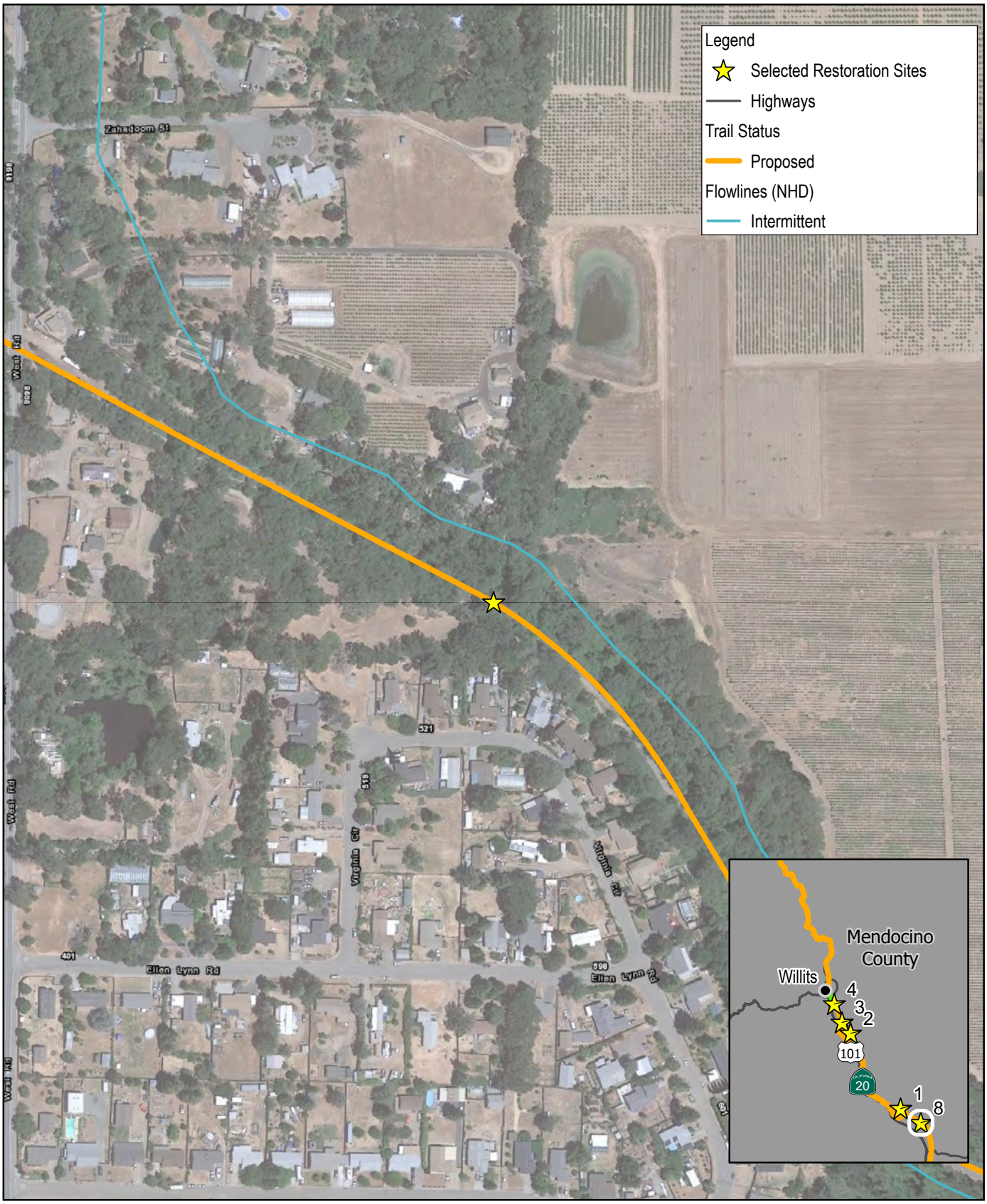

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Alta Planning and Design
Great Redwood Trail

GRT Segment 8
Redwood Valley
(Approximate Mile Post 125.1)

Project No. **12579512**
Revision No. **-**
Date **Sep 2023**

MAP 8

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Data source: World_Transportation: Esri, HERE, IPC
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Attachment 2

Fish Passage Barriers

Stream Name	PAD_ID	Alta GRT Project Number	Point_X	Point_Y	Barrier Status Listed in PAD	Description	Treatment Recommendations	Notes
Haehl Creek	758555	11	-123.341702	39.396303	Partial[a]	Concrete Railroad Bridge with hardened floor	Passage conditions could be improved by partial removal of the concrete flooring, clearing of brush and accumulated debris on the concrete sill, and re-working of riprap placed at the downstream end of the concrete sill.	On 8/20/2013 , the Wiyot tribe assessed fish passage for adult pacific lamprey, and determined that this barrier is Total barrier. Railroad crossing with concrete slab foundation perched ~3 ft above water surface during low flows. Haehl Cr. is heavily altered by human activity, but has good potential for Pacific lamprey due to relatively large size and extent of low gradient habitat. RTA (2011) evaluated site and determined it was passable by adult salmonids, but presents passage problems for juveniles. Severity of perch has potential to worsen if channel head-cuts. A series of other likely migration barriers exist, starting approximately 2 mi upstream of crossing in upper Haehl Cr. (RTA 2011). These sites need to be visited to evaluate lamprey barrier status and the extent of suitable lamprey habitat upstream. Prior to lamprey assessment: FishXing evaluated adult anadromous salmonid passage and estimated the crossing met fish passage criteria between 60 and 208 cfs or 72% of the range of migration flows. FishXing evaluated resident trout/age-2+ salmonid passage and age-1+/youngof- year salmonid passage and determined the culvert failed to meet passage criteria on all migration flows. Lack-of-depth was the primary passage criteria violation for adults and excessive velocity was the primary passage criteria violation for resident trout and juveniles. Good rearing habitat with deep pools and dense riparian cover of willows and alders. Fish observed in donstream pool. Several YOY salmonid and 10-20 species unknown (roach/suckers?). Thick growth on channel divider has caught storm debris, recommend removal for clearer flow path. The specie(s) assumed to be present or likely to utilize this watershed: Coho, Steelhead, Chinook. Previously surveyed for salmonid passage on 4/25/2011
Woodman Creek	705114	17	-123.39182	39.776611	Partial	Fishway at the railroad crossing, with rock falls DW	<Null>	Maintenance-intensive fish ladder with a very large amount of fil. At time RR bridge was buildt, ~500 ft of Creek was filled in and fish have to leap 12 feet vertically to access the creek creating a manmade water fall downstream and cutting off access to most fish. Woodman system has supported Chinook and steelhead, and could support coho with its water quality and discharge if coho had the opportunity to get there. Caltrout is working to restore passage by removing fill and 4,000ft of RR; however the RR bridge will remain. The project will be complete in Sept. 2018, cost $2.2 million, and restore access to 14 miles of prime fish habitat. http://www.times-standard.com/article/NJ/20180712/NEWS/180719945
unnamed	758564	17	-123.417992	39.831121	Partial	Railroad Concrete arch culvert	No treatment is recommended for fish passage due to lack of significant fish-bearing habitat upstream of the railroad crossing; however we suspect that this crossing would need to be replaced for structural reasons if the NWPRR was going to re-open the railroad. If replaced by NWPRR, then fish passage should be addressed.	The Green-Gray-Red filter determined that this crossing was a temporal/partial barrier. FishXing evaluated adult anadromous salmonid passage, resident trout/age-2+ salmonid passage and age-1+/young-of-year salmonid passage and determined the culvert failed to meet passage criteria for all age classes over all migration flows. Lack-of-depth and excessive velocities were impediments to passage. Fair habitat, moderate slope, dense riparian, large substrate with not much spaning sized material, several small pools. Culvert has several large fractures that go the entire circumference of the arch and floor. The specie(s) assumed to be present or likely to utilize this watershed: Steelhead.
unnamed	758571	27	-123.896792	40.339011	Partial	Railroad Concrete arch culvert	No treatment is recommended for fish passage due to lack of significant fish-bearing habitat upstream of the railroad crossing; however the current culvert was extremely undersized for storm flow conveyance.	FishXing evaluated adult anadromous salmonid passage and estimated the culvert met fish passage criteria between 7.9 and 42.2 cfs or 88% of the range of migration flows. FishXing evaluated resident trout/age-2+ salmonid passage and age-1+/young-of-year salmonid passage and determined the culvert failed to meet passage criteria on all migration flows. Excessive velocity was the main violation of the passage criteria.Poor fish habitat, dry channel 3 days after 3" of rain. No defined pools and no real channel. Appears to be drainage ditch which might receive diverted flow from mainstem Pipeline Ck. Mainstem of pipeline creek was not surveyed since the crossing was completely embedded with gravel up to the base of the railroad on the upstream side. To circular metal pipes were used to try and relieve the embedded pipe. Mainstem pipeline has fair to good quality fish habitat with spaning gravels, pools and riffles. Water upstream but none downstream. The specie(s) assumed to be present or likely to utilize this watershed: Coho, Steelhead.
Weber Creek	715484	28	-123.916836	40.377335	Partial	Culvert at Railroad Crossing	<Null>	<Null>
Rocky Gulch	730850	38	-124.082845	40.831224	Partial	Rail Road Culverts	<Null>	Site visited at low tide on 3/24/2014 by CDFW. CDFW survey notes: Rail road crossing with deteriorated 60” diameter corrugated metal culverts on Rocky Gulch. Southern culvert is collapsed at the outlet with some capacity, whereas, the northern culvert’s sidewalls and inlet are collapsed restricting stream flow and with little capacity. The undermined culverts are causing a partial blockage of fish passage at both ends. The gravel fill and railroad prism above the culvert have hanging/disconnected rail ties with a large unstable hole that appears to feed material down into northern culvert and to be inundated during extreme high tides, up and over, as well as, possible upwelling up through the void. Concerns include imminent and complete culvert failure, deposition of additional railroad gravel material into the stream, fish passage issues, and potential stranding and entrapment. In a previous 2007 USFWS culvert inventory, prior to culvert failure, this was recorded as not a barrier per professional judgement by USFWS. Habitat upstream is listed as saline marsh.
Old Car Creek	711960	24	-123.66599	40.230676	Temporal & Partial[b]	Railroad Crossing Culvert (Arch, concrete)	Modification of raod culvert outlet to form step pools to improve fish passage or replace with bridge. Clean out PR culvert. Place thermograph and monitor. Evaluation of upstream habitat conditions and assess sediment sources.	Only 15' of stream below xing and then flow goes underground. large log lodged at inlet end of arch, crosswise in channel. Arch is 33% plugged at inlet and 75% plugged at outlet end. Most of this probably was deposited over the last winter high flows The Eel River flows over the end of the arch during almost any kind of high water. Heavily influenced by the Eel River most of the way to the barrier.
Ort Creek	711964	24	-123.700775	40.238927	Temporal & Partial	Railroad Crossing Culvert (Arch, concrete)	<Null>	Not a fish bearing stream at this time, but stream bed appears to have been moved when RR was built. If it ever did bear fish it was a very short reach; gradient is very steep after 400' with very large boulders. Dry for 300' then water, but channel gradient becomes very steep with very large boulders.
Pipe Line Creek	715486	27	-123.889384	40.34024	Temporal & Partial	Culvert at Railroad Crossing (Arch, concrete)	Clean out culvert. Habitat evaluation of upstream conditions and assessment of sediment sources.	Channel was dry for 750' below xing, very overgrown with vegetation. Xing is 95% plugged with gravel. There are two 24" CMP's for overflow that are 33% and 100% plugged. This is a fish bearing stream that is seriously affected by the RR xing plugging 971' above xing is a pool (3.0' depth) with a 10" SHRT observed in it. This was the only fish observed after the first barrier. There were few fish in the stream. Low gradient channel, heavy sediment deposits, good canopy, subsurface flow in spots.
Little Palmer Creek	712011	34	-124.17983	40.60485	Temporal & Partial	Railroad Crossing Culvert	Culvert modifications to allow for fish passage.	494' total length of culvert. First 60' of culvert multi-plate then turns to concrete. Good, good canopy, good gravel. Young of year steelhead (YOY) observed.
Strongs Creek	415460	34	-124.15115	40.58101	Partial	Railbank	Identified by Stillwater Sciences for Pacific Lamprey	Ranked as a low priority by Stillwater Sciences
Jolly Giant Creek	765081	45	-124.091616	40.8743	Temporal & Partial	Culvert at Railroad Crossing at 14th Street	Because the railroad tracks are no longer used by the railroad and the culvert is highly undersized and in poor condition, remove culvert under railroad tracks and realign channel through the parcel of land between 11th and 14th Streets. There are three crossings that can be eliminated in this channel realignment (COA-JGC-08, 09, and 10 (PAD IDs 765079-81)).	Extremely undersized circular CSP culvert (4’ dia x 34.4’ L) in fair condition. FishXing estimated the culvert met fish passage criteria on 93%, 34% and 0% of migration flows for adult anadromous salmonids, resident trout/age-2+ salmonids and age-1+/young-of-year salmonids, respectively. There is ~4,650 ft of potential fish-bearing habitat upstream of poor quality due to the large amount of the creek channel contained within culverts through downtown Arcata, the relative lack of spawning habitat, and the relative lack of pool habitat. However, the reach between 11th Street and 14th has the potential for restoration/creation of suitable spawning habitat and improved rearing pools. Presumed species in this Creek are coho, steelhead and coastal cutthroat trout.
Jolly Giant Creek	765081	45	-124.091616	40.8743	Temporal & Partial	Culvert at Railroad Crossing at 14th Street	Because the railroad tracks are no longer used by the railroad and the culvert is highly undersized and in poor condition, remove culvert under railroad tracks and realign channel through the parcel of land between 11th and 14th Streets. There are three crossings that can be eliminated in this channel realignment (COA-JGC-08, 09, and 10 (PAD IDs 765079-81)).	Extremely undersized circular CSP culvert (4’ dia x 34.4’ L) in fair condition. FishXing estimated the culvert met fish passage criteria on 93%, 34% and 0% of migration flows for adult anadromous salmonids, resident trout/age-2+ salmonids and age-1+/young-of-year salmonids, respectively. There is ~4,650 ft of potential fish-bearing habitat upstream of poor quality due to the large amount of the creek channel contained within culverts through downtown Arcata, the relative lack of spawning habitat, and the relative lack of pool habitat. However, the reach between 11th Street and 14th has the potential for restoration/creation of suitable spawning habitat and improved rearing pools. Presumed species in this Creek are coho, steelhead and coastal cutthroat trout.
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a: Partial: Only a barrier to certain species or life stages.

b: Temporal and Partial: Only a barrier to certain species or life stages and only at certain flows.

c: Total: A complete barrier to fish passage for all species or life stages and at all flows.

d: Unassessed: The structure/site hasn't been visited and/or surveyed for fish passage.

e: Unknown: The structure/site has been visited or surveyed; however, dataset has no conclusive information about barrier status.

Stream Name	PAD_ID	Alta GRT Project Number	Point_X	Point_Y	Barrier Status Listed in PAD	Description	Treatment Recommendations	Notes
Jolly Giant Creek	765084	45	-124.090633	40.877281	Temporal & Partial	Culvert at Lower Railroad Crossing in Shay Park	This crossing is in poor condition (crushed inlet and rusted-through invert) and should either be replaced or removed. Because the crossing is located on a nonutilized section of railroad track and is used as a footpath, its removal should be considered as a cost-effective option to restore passage and reduce flooding. A foot bridge could be installed if the City determines that this path should be maintained.	Extremely undersized circular CSP (2' dia, x 74.7' length) in poor condition. FishXing estimated the culvert met fish passage criteria on 54%, 3% and 0% of migration flows for adult anadromous salmonids, resident trout/age-2+ salmonids and age-1+/young-of-year salmonids, respectively. However, the trash rack at the inlet is most likely impeding fish passage more than FishXing estimated. There is ~3,200 ft of potential fish-bearing habitat upstream of fair quality because the habitat quality improved within the reach of Jolly Giant Creek between Alliance Road and Highway 101. The channel was less confined and incised, the riparian canopy was more intact, and suitable spawning substrate was present on some pool-tails and riffle crests. Presumed species in this Creek are coho, steelhead and coastal cutthroat trout.
Jolly Giant Creek	765084	45	-124.090633	40.877281	Temporal & Partial	Culvert at Lower Railroad Crossing in Shay Park	This crossing is in poor condition (crushed inlet and rusted-through invert) and should either be replaced or removed. Because the crossing is located on a nonutilized section of railroad track and is used as a footpath, its removal should be considered as a cost-effective option to restore passage and reduce flooding. A foot bridge could be installed if the City determines that this path should be maintained.	Extremely undersized circular CSP (2' dia, x 74.7' length) in poor condition. FishXing estimated the culvert met fish passage criteria on 54%, 3% and 0% of migration flows for adult anadromous salmonids, resident trout/age-2+ salmonids and age-1+/young-of-year salmonids, respectively. However, the trash rack at the inlet is most likely impeding fish passage more than FishXing estimated. There is ~3,200 ft of potential fish-bearing habitat upstream of fair quality because the habitat quality improved within the reach of Jolly Giant Creek between Alliance Road and Highway 101. The channel was less confined and incised, the riparian canopy was more intact, and suitable spawning substrate was present on some pool-tails and riffle crests. Presumed species in this Creek are coho, steelhead and coastal cutthroat trout.
Jolly Giant Creek	765084	45	-124.090633	40.877281	Temporal & Partial	Culvert at Lower Railroad Crossing in Shay Park	This crossing is in poor condition (crushed inlet and rusted-through invert) and should either be replaced or removed. Because the crossing is located on a nonutilized section of railroad track and is used as a footpath, its removal should be considered as a cost-effective option to restore passage and reduce flooding. A foot bridge could be installed if the City determines that this path should be maintained.	Extremely undersized circular CSP (2' dia, x 74.7' length) in poor condition. FishXing estimated the culvert met fish passage criteria on 54%, 3% and 0% of migration flows for adult anadromous salmonids, resident trout/age-2+ salmonids and age-1+/young-of-year salmonids, respectively. However, the trash rack at the inlet is most likely impeding fish passage more than FishXing estimated. There is ~3,200 ft of potential fish-bearing habitat upstream of fair quality because the habitat quality improved within the reach of Jolly Giant Creek between Alliance Road and Highway 101. The channel was less confined and incised, the riparian canopy was more intact, and suitable spawning substrate was present on some pool-tails and riffle crests. Presumed species in this Creek are coho, steelhead and coastal cutthroat trout.
Jolly Giant Creek	765085	39	-124.089271	40.878758	Temporal & Partial	Culvert at Upper Railroad Crossing in Shay Park	The current crossing is in poor condition (crushed inlet and rusted through invert) and should either be replaced or removed. Because the crossing is located on a non-utilized section of railroad track and is used as a footpath, its removal should be considered as a cost-effective option to restore passage and reduce flooding. A foot bridge could be installed if the City determines that this path should be maintained.	Extremely undersized circular CSP (4' dia, x 52.8' length) in poor condition. FishXing estimated the culvert met fish passage criteria on 100%, 37% and 16% of migration flows for adult anadromous salmonids, resident trout/age-2+ salmonids and age-1+/young-of-year salmonids, respectively. There is ~2,000 ft of potential fish-bearing habitat upstream of fair quality because the habitat quality improved within the reach of Jolly Giant Creek between Alliance Road and Highway 101. The channel was less confined and incised, the riparian canopy was more intact, and suitable spawning substrate was present on some pool-tails and riffle crests. Presumed species in this Creek are coho, steelhead and coastal cutthroat trout.
Jolly Giant Creek	765085	39	-124.089271	40.878758	Temporal & Partial	Culvert at Upper Railroad Crossing in Shay Park	The current crossing is in poor condition (crushed inlet and rusted through invert) and should either be replaced or removed. Because the crossing is located on a non-utilized section of railroad track and is used as a footpath, its removal should be considered as a cost-effective option to restore passage and reduce flooding. A foot bridge could be installed if the City determines that this path should be maintained.	Extremely undersized circular CSP (4' dia, x 52.8' length) in poor condition. FishXing estimated the culvert met fish passage criteria on 100%, 37% and 16% of migration flows for adult anadromous salmonids, resident trout/age-2+ salmonids and age-1+/young-of-year salmonids, respectively. There is ~2,000 ft of potential fish-bearing habitat upstream of fair quality because the habitat quality improved within the reach of Jolly Giant Creek between Alliance Road and Highway 101. The channel was less confined and incised, the riparian canopy was more intact, and suitable spawning substrate was present on some pool-tails and riffle crests. Presumed species in this Creek are coho, steelhead and coastal cutthroat trout.
Jolly Giant Creek	765085	39	-124.089271	40.878758	Temporal & Partial	Culvert at Upper Railroad Crossing in Shay Park	The current crossing is in poor condition (crushed inlet and rusted through invert) and should either be replaced or removed. Because the crossing is located on a non-utilized section of railroad track and is used as a footpath, its removal should be considered as a cost-effective option to restore passage and reduce flooding. A foot bridge could be installed if the City determines that this path should be maintained.	Extremely undersized circular CSP (4' dia, x 52.8' length) in poor condition. FishXing estimated the culvert met fish passage criteria on 100%, 37% and 16% of migration flows for adult anadromous salmonids, resident trout/age-2+ salmonids and age-1+/young-of-year salmonids, respectively. There is ~2,000 ft of potential fish-bearing habitat upstream of fair quality because the habitat quality improved within the reach of Jolly Giant Creek between Alliance Road and Highway 101. The channel was less confined and incised, the riparian canopy was more intact, and suitable spawning substrate was present on some pool-tails and riffle crests. Presumed species in this Creek are coho, steelhead and coastal cutthroat trout.
Jolly Giant Creek	765079	45	-124.092452	40.872224	Temporal & Partial	Culvert at Railroad Crossing Near 11th & N Streets	Because the railroad tracks are no longer used by the railroad and the culvert is highly undersized and in poor condition, RTA recommends removal of this culvert under the railroad tracks and realignment of the channel through the parcel of land between 11th and 14th Streets. There are three crossings that can be eliminated from this channel realignment (COA-JGC-08, 09, and 10 (PAD IDs 765079-81)).	Extremely undersized circular CSP culvert (4' dia x 41.3' L) in poor condition. FishXing estimated the culvert met fish passage criteria on 100%, 100% and 37% of migration flows for adult anadromous salmonids, resident trout/age-2+ salmonids and age-1+/young-of-year salmonids, respectively. The trash rack at the inlet was not accounted for when evaluating fish passage however the trash rack is most likely an impediment for a wide range of the passage window if not cleaned on a regular basis. There is ~5,250 ft of potential fish-bearing habitat upstream of poor quality due to the large amount of the creek channel contained within culverts through downtown Arcata, the relative lack of spawning habitat, and the relative lack of pool habitat. However, the reach between 11th Street and 14th has the potential for restoration/creation of suitable spawning habitat and improved rearing pools. Presumed species in this Creek are coho, steelhead and coastal cutthroat trout.
Jolly Giant Creek	765079	45	-124.092452	40.872224	Temporal & Partial	Culvert at Railroad Crossing Near 11th & N Streets	Because the railroad tracks are no longer used by the railroad and the culvert is highly undersized and in poor condition, RTA recommends removal of this culvert under the railroad tracks and realignment of the channel through the parcel of land between 11th and 14th Streets. There are three crossings that can be eliminated from this channel realignment (COA-JGC-08, 09, and 10 (PAD IDs 765079-81)).	Extremely undersized circular CSP culvert (4' dia x 41.3' L) in poor condition. FishXing estimated the culvert met fish passage criteria on 100%, 100% and 37% of migration flows for adult anadromous salmonids, resident trout/age-2+ salmonids and age-1+/young-of-year salmonids, respectively. The trash rack at the inlet was not accounted for when evaluating fish passage however the trash rack is most likely an impediment for a wide range of the passage window if not cleaned on a regular basis. There is ~5,250 ft of potential fish-bearing habitat upstream of poor quality due to the large amount of the creek channel contained within culverts through downtown Arcata, the relative lack of spawning habitat, and the relative lack of pool habitat. However, the reach between 11th Street and 14th has the potential for restoration/creation of suitable spawning habitat and improved rearing pools. Presumed species in this Creek are coho, steelhead and coastal cutthroat trout.
Jolly Giant Creek	765079	45	-124.092452	40.872224	Temporal & Partial	Culvert at Railroad Crossing Near 11th & N Streets	Because the railroad tracks are no longer used by the railroad and the culvert is highly undersized and in poor condition, RTA recommends removal of this culvert under the railroad tracks and realignment of the channel through the parcel of land between 11th and 14th Streets. There are three crossings that can be eliminated from this channel realignment (COA-JGC-08, 09, and 10 (PAD IDs 765079-81)).	Extremely undersized circular CSP culvert (4' dia x 41.3' L) in poor condition. FishXing estimated the culvert met fish passage criteria on 100%, 100% and 37% of migration flows for adult anadromous salmonids, resident trout/age-2+ salmonids and age-1+/young-of-year salmonids, respectively. The trash rack at the inlet was not accounted for when evaluating fish passage however the trash rack is most likely an impediment for a wide range of the passage window if not cleaned on a regular basis. There is ~5,250 ft of potential fish-bearing habitat upstream of poor quality due to the large amount of the creek channel contained within culverts through downtown Arcata, the relative lack of spawning habitat, and the relative lack of pool habitat. However, the reach between 11th Street and 14th has the potential for restoration/creation of suitable spawning habitat and improved rearing pools. Presumed species in this Creek are coho, steelhead and coastal cutthroat trout.
Bakers Creek	715232	9	-123.245136	39.286713	Total[c]	Railroad crossing	Because the current culverts are extremely undersized and in poor condition -- a replacement with a bridge is highly recommended prior to this site failing. NOTE: there is over 30,000 cubic yards of fill material within the crossing's prim that would have serious impacts on downstream spawning and rearing habitat.	RED: FishXing determined this crossing meets fish passage criteria for adult steelhead on only 1% of the range estimated migration flows and fails to meet passage criteria for all age classes of juveniles. The culvert's >3% slope for a 202-foot length is the crossing's main feature that impedes passage. For all age classes of juveniles there are excessive velocities at higher flows.
Haehl Creek	758553	10	-123.31793	39.365659	Total	Railroad Circular corrugated metal culvert	The best long-term treatment option would be to either 1) temporarily remove the railroad crossing and pull-back the fill to re-establish a natural channel or 2) replace the culvert with a properly sized embedded culvert or open-bottom arch set on footings. Because this crossing is adjacent to the CalTrans Willits Bypass project, there may be opportunities for funding through mitigation. Because the outlet was perched at least eight to ten feet, replacing or removing the existing culvert would require extensive use of grade-control structures to minimize channel head-cutting.	The Green-Gray-Red filter determined this crossing failed to meet passage criteria for adult anadromous salmonids and all age classes of juveniles due to the outlet drop of approximately six feet. The immediate downstream channel also lacked an outlet pool with adequate depth for adult salmon and steelhead to make leap attempts from. Site observed on 4/25/11. A complete survey as not performed on this pipe. Access as not safe and the pipe as an obvious barrier due to it being perched about 10 feet and the pipe is in extremely poor condition. The outlet drop ~ 10 feet. The bottom of the pipe is completely rusted through, alter flow below the culvert and exits about 2-ft below the culvert at the outlet. The habitat is poor, creek is small and there is very limited amount of habitat. Channel splits about 100-ft upstream to to channels. The specie(s) assumed to be present or likely to utilize this watershed: Coho, Steelhead, Chinook.
Haehl Creek	758554	10	-123.330146	39.376645	Total	Concrete Arch Railroad Culvert	The best long-term treatment option would be to either 1) temporarily remove the railroad crossing and pull-back the fill to re-establish a natural channel or 2) replace the culvert with a fully-spanning bridge and re-establish the creek's natural channel location and slope. Either option would require grade-control structures to minimize channel head-cutting that would occur from the removal of the extremely perched culvert. Because this crossing is near the CalTrans Willits Bypass project, there may be opportunities for funding through mitigation.	The Green-Gray-Red filter determined this crossing failed to meet passage criteria for adult anadromous salmonids and all age classes of juveniles due to the outlet drop of approximately six feet. The immediate downstream channel also lacked an outlet pool with adequate depth for adult salmon and steelhead to make leap attempts from. Habitat appears fair. Upstream several pools with cobble and gravel tailouts. Riparian is brush and small deciduous trees. Maybe dry channel in summertime. The specie(s) assumed to be present or likely to utilize this watershed: Coho, Steelhead, Chinook.

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c: Total: A complete barrier to fish passage for all species or life stages and at all flows.

d: Unassessed: The structure/site hasn't been visited and/or surveyed for fish passage.

e: Unknown: The structure/site has been visited or surveyed; however, dataset has no conclusive information about barrier status.

Stream Name	PAD_ID	Alta GRT Project Number	Point_X	Point_Y	Barrier Status Listed in PAD	Description	Treatment Recommendations	Notes
unnamed	758556	14	-123.385386	39.583856	Total	Railroad Concrete arch culvert	No treatment is recommended for fish passage due to the relative lack of fish-bearing habitat upstream of the railroad crossing.	The Green-Gray-Red filter determined this crossing failed to meet passage criteria for adult anadromous salmonids and all age classes of juveniles. The outlet was perched 3.8 feet and had a slope of greater than 4%. Upstream habitat is fair, channel gets steep, may also be dry in summer. Most cobbles & boulders covered in moss, even in current wetted channel. 4 to 5 foot waterfall over boulders approximately 200-ft upstream. No fish observed in large pool. Culvert has some cracks present on the floor. The specie(s) assumed to be present or likely to utilize this watershed: Steelhead.
unnamed	758557	15	-123.347966	39.66706	Total	Railroad Steel pipe arch culvert	No treatment is recommended for fish passage due to lack of significant fish-bearing habitat upstream of the railroad crossing.	The Green-Gray-Red filter determined this crossing failed to meet passage criteria for adult anadromous salmonids and all age classes of juveniles due to the 18.5 ft drop at the culvert outlet and the culvert slope of 5.75%. Culvert appears to be sitting on bedrock, not really fish habitat upstream. Bedrock drops and chutes upstream. Habitat Quality = RTA rated the potential upstream habitat as “poor” due to the steep channel and lack of low-gradient habitat. The specie(s) assumed to be present or likely to utilize this watershed: Steelhead.
Brad Turner Creek	758558	15	-123.358468	39.685141	Total	Railroad Concrete arch culvert	No treatment is recommended for fish passage due to lack of significant fish-bearing habitat upstream of the railroad crossing.	The Green-Gray-Red filter determined this crossing failed to meet passage criteria for adult anadromous salmonids and all age classes of juveniles due to the nearly 10-foot drop at the culvert outlet. Steep, bouldery channel upstreamwith large angular substrate. Culvert is extremely worn on the inside and worn through in spots. Very perched with no real outlet pool. Habitat Quality = RTA rated the potential upstream fish-bearing habitat as “poor” due to the steep channel, the lack of pools and the large angular substrate. The specie(s) assumed to be present or likely to utilize this watershed: Steelhead.
Dean Creek	758559	15	-123.360946	39.694405	Total	Railroad Concrete arch culvert	No treatment is recommended for fish passage due to the relatively insignificant reach of fish-bearing habitat upstream of the railroad crossing; however we suspect that this crossing would need to be replaced for structural reasons if the NWPRR was going to re-open the railroad. If replaced by NWPRR, then fish passage should be addressed.	The Green-Gray-Red filter determined this crossing failed to meet passage criteria for adult anadromous salmonids and all age classes of juveniles due the 8.5 foot drop at the outlet and the slope of 11% through the culvert. Additional Stream Crossings: Downstream – None. Upstream Crossing in very poor condition, channel is fairly steepwith a 6-8 ft falls just upstream of the inlet and 150-ft upstream is a 10-15 ft high cascade. Habitat Quality = the potential upstream habitat was rated as “fair” for rearing habitat due to relatively cool water temperatures and shaded pools; however no suitable spawning habitat was observed. Dean Creek is cooler than the Eel River. The specie(s) assumed to be present or likely to utilize this watershed: Coho, Steelhead.
Barn Creek	758561	17	-123.409161	39.810243	Total	Railroad Concrete arch culvert	No treatment is recommended for fish passage due to lack of significant fish-bearing habitat upstream of the railroad crossing; however we suspect that this crossing would need to be replaced for structural reasons if the NWPRR was going to re-open the railroad. If replaced by NWPRR, then fish passage should be addressed.	The Green-Gray-Red filter determined this crossing failed to meet passage criteria for adult anadromous salmonids and all age classes of juveniles. The outlet was perched 4.4 feet and the crossing had a slope of 7.7%. Poor habitat, no pools upstream, appears like it could go dry in the summer. Large sediment deposit upstream of inlet. Culvert has several cracks in walls, floor is completely torn through in numerous locations. The specie(s) assumed to be present or likely to utilize this watershed: Steelhead.
Black Oak Creek	758562	17	-123.414634	39.812064	Total	Railroad Concrete arch culvert	No treatment is recommended for fish passage due to lack of significant fish-bearing habitat upstream of the railroad crossing; however we suspect that this crossing would need to be replaced for structural reasons if the NWPRR was going to re-open the railroad. If replaced by NWPRR, then fish passage should be addressed.	The Green-Gray-Red filter determined this crossing failed to meet passage criteria for adult anadromous salmonids and all age classes of juveniles. The outlet was perched nearly four feet and the arch culvert had a slope of 3.9%. Walked ~550 upstream of Xing. Fair habitat with bedrock chutes, several pools, moderately dense riparian. Land owner says creek is mostly dry in summer and has observed steelhead in some years. Fractures in inlet headall and arch walls. Floor has numerous fractures and is worn through in to locations. The specie(s) assumed to be present or likely to utilize this watershed: Steelhead.
Corbet Creek	758563	17	-123.417769	39.817156	Total	Railroad Concrete arch culvert	No treatment is recommended for fish passage due to lack of significant fish-bearing habitat upstream of the railroad crossing; however we suspect that this crossing would need to be replaced for structural reasons if the NWPRR was going to re-open the railroad. If replaced by NWPRR, then fish passage should be addressed.	The Green-Gray-Red filter determined this crossing failed to meet passage criteria for adult anadromous salmonids and all age classes of juveniles. The outlet was perched 1.8 feet and the arch culvert had a slope of 4.3%. However, due to irregularities in the culvert floor, areas of slower velocities and greater depths were present, thus passage of adult steelhead may be possible. Floor of culvert is partially natural and paved, appear to have worn through concrete bottom. Large outlet pool. Walked 700-ft upstream of crossing. Fair fish habitat, but should be better assessed for quality. The specie(s) assumed to be present or likely to utilize this watershed: Steelhead.
Mill Creek	758565	22	-123.601515	40.152449	Total	Railroad Concrete arch culvert	No treatment is recommended for fish passage due to lack of significant fish-bearing habitat upstream of the railroad crossing; however we suspect that this crossing would need to be replaced for structural reasons if the NWPRR was going to re-open the railroad. If replaced by NWPRR, then fish passage should be addressed.	The Green-Gray-Red filter determined this crossing failed to meet passage criteria for adult anadromous salmonids and all age classes of juveniles. The culvert has a slope of 4% over 156 foot length. The arch culvert was located right at the confluence with the Eel River and probably gets backwatered on high flows, thus allowing some passage. Extensive cracks and holes in culvert floorwith exposed rebar and flow below the crossing. The specie(s) assumed to be present or likely to utilize this watershed: Coho, Steelhead.
Soda Creek	711956	23	-123.653385	40.198848	Total	Railroad Crossing Culvert (Arch, rock)	<Null>	700' above xing to first water. Dry again at 1270' and channel gradient becomes very steep. 1340' water again. Channel blasted through rock at xing when the RR was built and moved through a tunnel to avoid building a bridge. The 24' barrier below the xing was formed when the stream was put through the tunnel. This was probably a fish bearing stream before the modifications, at least the bottom reach was, but no longer is. Dry channel for the most part, moderate to steep channel gradient, fair canopy, boulder dominated substrate.
Jackass Creek	711957	23	-123.65106	40.201501	Total	Railroad Crossing Culvert (Arch, rock)	<Null>	Very steep channel gradient. Was probably never a fish bearing stream, even before the RR. Man made tunnel under RR., stream channel was moved when they built the RR creating a 30' barrier below the crossing. Very steep channel gradient.
Bloyd Creek	758569	27	-123.856449	40.338063	Total	Railroad Circular corrugated steel pipe culvert	No treatment is recommended for fish passage due to lack of significant fish-bearing habitat upstream of the railroad crossing, as well as the presence of two additional migration barriers at stream crossings. We suspect that this crossing would need to be replaced for structural reasons if the NWPRR was going to re-open the railroad. If replaced by NWPRR, then fish passage should be addressed at all three stream crossings.	The Green-Gray-Red filter determined this crossing was GRAY; however due to the completely plugged culvert inlet and the collapsing railroad fill prism the output was changed to RED. The extremely poor condition of the crossing failed to meet passage criteria for adult anadromous salmonids and all age classes of juveniles. Culvert is completely pluggedwith inlet buried and is blocking fish passage. water is either entering from seepage or going through a rust hole and then exiting the pipe through the outlet. Fill around the tracks at the inlet is failing and actively eroding beteen RR ties. US is highly aggradedwith fine sediment. Habitat is fair. Small channel, highly aggradedwith gravel and fines, several small pools. Dense riparian mixed canopy. Observed several frogs and pacific giant salamanders in channel up and down stream. Entire crossing is in poor condition. Additional Stream Crossings Upstream – Two crossings were identified in the field. The first, owned by Humboldt RedwoodCompany, was about 550 ft upstream from Site #NWPRR-233.93. The HRC crossing was a slightly-perched, moderately steep culvert that appeared to have a diameter of approximately five feet. The second crossing was located on Dyerville Loop Road approximately 800 ft upstream of Site #NWPRR-233.93. This Humboldt County-maintained crossing consisted of a 3 ft diameter SSP culvert with a 5.5% slope that was assessed as “RED” by RTA in 2003. The specie(s) assumed to be present or likely to utilize this watershed: Steelhead.
unnamed	758573	27	-123.903186	40.337365	Total	Railroad Trestle bridge and concrete channel	No treatment is recommended for fish passage due to the relatively insignificant reach of fish-bearing habitat located upstream of the railroad crossing.	The Green-Gray-Red filter determined this crossing failed to meet passage criteria for adult anadromous salmonids and all age classes of juveniles. The outlet was slightly perched and the concrete channel had a slope of greater than 3%. Lack-of-depth and excessive velocities were the main impediments to fish passage. Crossing is a concrete channel which is below a RR bridge and next to a county road. The channel as probably put in by the county. The crossing is essentially a box culvert without a top on it. Habitat is fair. Small channel mostly riffles with several pools US of crossing. Slope increases quickly. DS is lo gradient through a closed, private campground, about 300 ft to confluence with Poison Oak Creek. Open bottom arch (6x4) about 100 ft downstream. The specie(s) assumed to be present or likely to utilize this watershed: Coho, Steelhead.
Allen Creek	758575	28	-123.923309	40.387313	Total	Railroad Circular concrete pipes (culverts)	No treatment is recommended for fish passage due to lack of significant fish-bearing habitat upstream of the railroad crossing; however we suspect that this crossing would need to be replaced for structural reasons if the NWPRR was going to re-open the railroad.	RTA was unable to complete a survey at this crossing because of safety issues with the actively failing, and nearly vertical, fill slope on the downstream side and the inlet was also inaccessible. However, the crossing was considered a complete barrier due to the five-foot perched outlet, lack of a defined outlet pool, and the completely plugged inlet. Crossing in extremely poor condition. Outlet is blown out with pieces of the culvert laying in the channel, the banks are highly eroded from being over topped. Railroad ties and track at outlet used for bank stablization are scoured out and ready to fall into creek. No survey conducted due to unsafe conditions at the crossing. Obvious RED site. Inlet is completely plugged and aggraded over the top of the pipes, can not even see the inlet of the pipes. Outlet is severely perched. Poor fish habitat donstream, channel ~15% donstream. Upstream has signs that it ponds-up on high flows. The channel is highly aggraded, trees have silt lines at 7 to 8 feet up their trunks. Large amount of scour at inlet. 150 ft to the Eel River. The specie(s) assumed to be present or likely to utilize this watershed: Steelhead.

a: Partial: Only a barrier to certain species or life stages.

b: Temporal and Partial: Only a barrier to certain species or life stages and only at certain flows.

c: Total: A complete barrier to fish passage for all species or life stages and at all flows.

d: Unassessed: The structure/site hasn't been visited and/or surveyed for fish passage.

e: Unknown: The structure/site has been visited or surveyed; however, dataset has no conclusive information about barrier status.

Stream Name	PAD_ID	Alta GRT Project Number	Point_X	Point_Y	Barrier Status Listed in PAD	Description	Treatment Recommendations	Notes
unnamed	716408	3	-123.081538	38.938638	Unassessed[d]	Railroad Crossing/Unnamed Tributary #1	<Null>	Xing identified in the topographic map by Ross Taylor.
La Franchi Creek	716410	4	-123.110725	38.96006	Unassessed	Railroad Crossing	<Null>	Xing identified in the topographic map by Ross Taylor.
Romers Dairy Creek	716422	5	-123.177105	39.084233	Unassessed	Railroad Crossing	<Null>	Xing identified in the topographic map by Ross Taylor.
Cleland Mountain Creek	716434	5	-123.192704	39.112617	Unassessed	Railroad Crossing	<Null>	Xing identified in the topographic map by Ross Taylor.
Calpella Creek	716467	7	-123.203497	39.222178	Unassessed	Railroad Crossing	<Null>	Xing identified in the topographic map by Ross Taylor.
Salt Hollow Creek	716477	8	-123.202594	39.254387	Unassessed	Crossing at Railroad Tracks	<Null>	Xing identified in the topographic map by Ross Taylor.
Ticknor Creek	711933	21	-123.578176	40.129604	Unassessed	Railroad Crossing Culvert (Arch, concrete)	<Null>	Just below xing is a 6' fall with a 2.5' deep jump pool and small landing pocket and then a 10' bedrock sheet at a 45 degree angle, together are probably a fish barrier. There is a crack all the way around the arch midway through it. Very steep channel gradient.
unnamed	711959	24	-123.662626	40.229219	Unassessed	Railroad Crossing Culvert (Arch, concrete)	<Null>	Arch is working fine.
unnamed	711973	25	-123.73118	40.267786	Unassessed	Railroad Crossing Culvert (Arch, concrete)/Unnamed 8	<Null>	Arch seems to be working fine. Stream seems big enough for fish but none were observed. Reach is very short and would probably not support many fish if any. Good canopy, few pools, fairly steep channel gradient.
unnamed	711974	25	-123.737795	40.270249	Unassessed	Railroad Crossing Culvert (Arch, concrete)/Unnamed 7	<Null>	8" log at outlet end of arch is retaining gravel, backing it up into the arch. A 1' x 10' log lodged at the inlet end of the arch may contribute to future/further plugging. 814' upstream is a slide; above slide channel gradient becomes very steep.
unnamed	711983	26	-123.758583	40.306657	Unassessed	Railroad Crossing Culvert (CMP)	<Null>	The rust in the culvert is very light and the culvert is working fine. There may be steelhead up to the crossing as the stream is large enough to support them, but none were observed. Walked upstream for 500' and observed no water.
unnamed	711984	26	-123.76448	40.309864	Unassessed	Railroad Crossing Culvert (Arch, concrete)	<Null>	<Null>
unnamed	711993	27	-123.903186	40.337319	Unassessed	Railroad Crossing Bridge	<Null>	Roadway overpass-subway. Small stream runs under as well and is fish bearing. Just below xing flow went underground. Stream runs through Seventh Day Adventists Camp and is a tributary to Poison Oak Creek. Very small stream, small pools, good canopy, heavy sediment deposits, LWD.
Perrott Creek	711994	28	-123.916078	40.35878	Unassessed	Railroad Crossing Culvert (Arch, concrete)	<Null>	Xing is 50% plugged with gravel and debris. Stream dry, walked upstream 1000' and found no water or flow.
unnamed	712001	29	-124.03343	40.451311	Unassessed	Railroad Crossing Culvert (Box)	<Null>	Stream is dry. Box culvert is in good condition. Not a fish bearing stream.
unnamed	712008	32	-124.100424	40.509461	Unassessed	Railroad Crossing Bridge	<Null>	5' x 2' channel. Large amounts of fines and debris in channel for 750' upstream , then channel turns very steep with large amounts of woody debris. Heavily silted, several log jams, good canopy.
Cloverdale Creek	716726	1	-123.011504	38.807153	Unknown[e]	Railroad Crossing	<Null>	<Null>
Bakers Creek	716470	9	-123.239189	39.281213	Unknown	Private Crossing on Jeep Trail	<Null>	Barrier status not provided in CDFG survey notes.

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c: Total: A complete barrier to fish passage for all species or life stages and at all flows.

d: Unassessed: The structure/site hasn't been visited and/or surveyed for fish passage.

e: Unknown: The structure/site has been visited or surveyed; however, dataset has no conclusive information about barrier status.

Attachment 3

Available Photographs and Google Earth Images

Available Photographs & Google Earth Images

Photo 1 ***Photograph from CDFW's PAD for fish passage barrier ID number 765079, located on Jolly Giant Creek in Arcata.***

Photo 2 ***Photograph from CDFW's PAD for fish passage barrier ID number 765081, located on Jolly Giant Creek in Arcata.***

Inlet Photos taken by Ross Taylor and Associates Outlet

Photo 3 ***Photograph from CDFW's PAD for fish passage barrier ID number 765084, located on Jolly Giant Creek in Arcata.***

Inlet Photos taken by Ross Taylor and Associates Outlet

Photo 4 ***Photograph from CDFW's PAD for fish passage barrier ID number 765085, located on Jolly Giant Creek in Arcata.***

Photo 5 *Image from Google Earth of the railroad debris and railcars located at the Island Mountain site.*

Photo 6 *Image from Google Earth of the landslide and distorted railroad tracks located at the Island Mountain Site.*

Photo 7 *Image from Google Earth of the railroad debris and abandoned equipment located at the Dos Rios Road Site.*

Photo 8 *Photograph from CDFW's PAD for fish passage barrier ID number 758555, located on Haehl Creek south of Willits.*

Photo 9 *Photograph from CDFW's PAD for fish passage barrier ID number 758554, located on Haehl Creek south of Willits.*

Photo 10 *Photograph from CDFW's PAD for fish passage barrier ID number 758553, located on Haehl Creek south of Willits.*

Photo 11 ***Photograph from CDFW's PAD for fish passage barrier ID number 715232, located on Bakers Creek between Willits and Ukiah.***

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Creek Restoration Concepts

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July 26, 2023

March 26, 2024

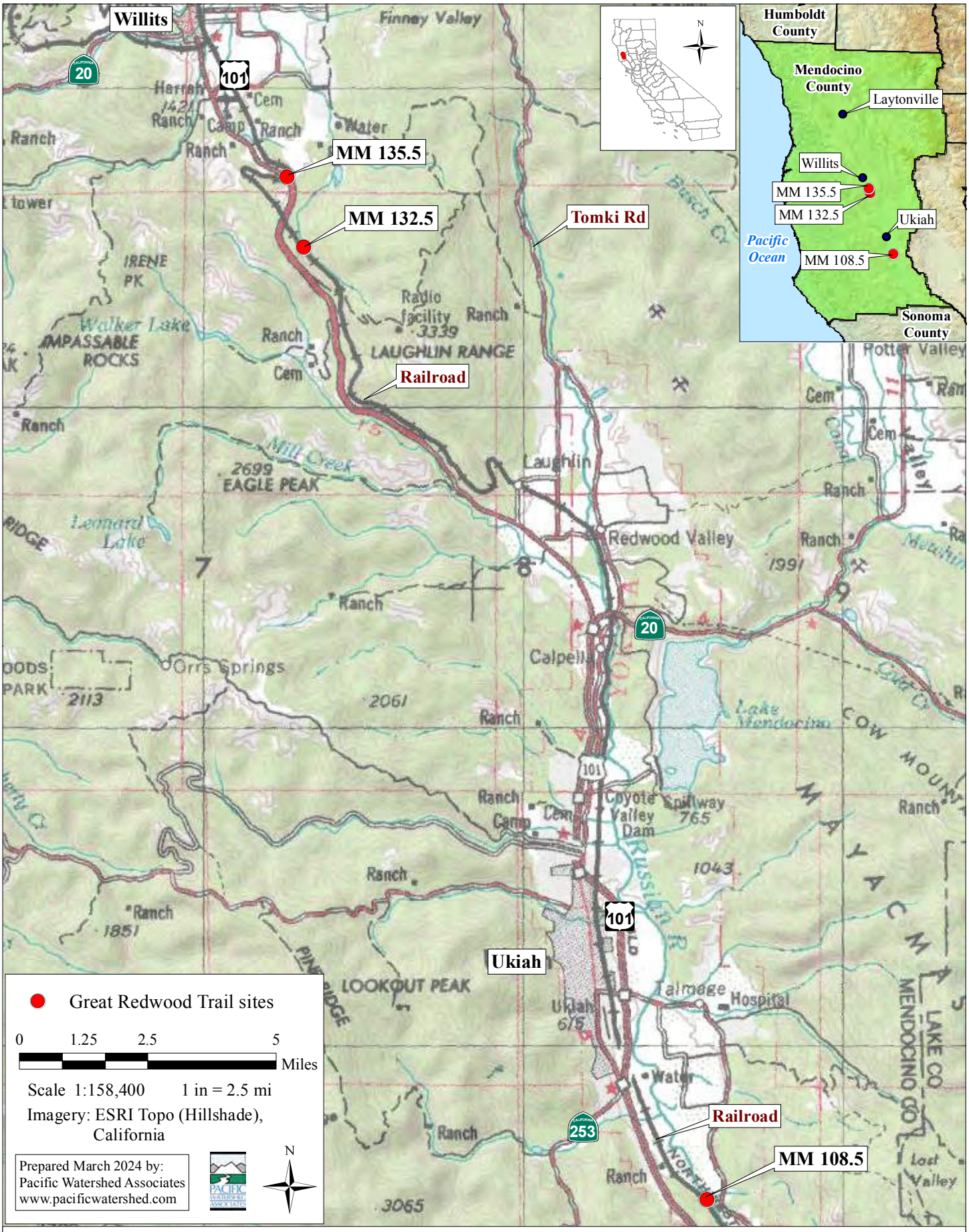
Brian Burchfield
Group Leader/ Senior Design Associate
Alta Planning + Design, Inc.
Oakland, CA

Re: Identify significant gaps and provide design solutions for the Great Redwood Trail Master Plan and Design Guide.

1. Purpose

The Great Redwood Trail (GRT) corridor presents the opportunity to repurpose the 231-mile portion of the former North Coast Railroad Authority rights-of-way on the North Western Pacific (NWP) railroad alignment into a long-distance recreational trail. Over 160 miles (68% of total trail) of the GRT is proposed as multi-use trail. Paved multi-use trails account for 85 miles (36%) and are predominately located near cities and towns (Alta, 2023). The purpose of this document is to provide conceptual 10% design alternatives at three site-specific locations on the GRT in Mendocino County, California. Alta Planning + Design, Inc. (Alta) selected the site-specific locations in preparation of the GRT Master Plan and Design Guide. Pacific Watershed Associates, Inc. (PWA) has completed Alta's request and is providing conceptual (10%) design alternatives for the following sites: (1) South Ukiah at Mile Marker (MM) 108.5, (2) Laughlin Grade at MM 132.5, and (3) South Willits at MM 135.5 (Map 1).

Railroad corridor sites at MM 108.5 (stream crossing), MM 132.5 (ditch relief culvert), and MM 135.5 (stream crossing) occur between the communities of Ukiah and Willits. Upon completion, the GRT will feature a 8- to16-ft wide paved or 8- to 12-ft wide crushed stone, multi-use trail connecting the two communities that will easily accommodate wheel chairs, roller blading, walking, or bicycling (Alta, 2023). In locations with convenient access to utilities along the GRT multi-use trail, integral lighting will be considered. The legal requirements of the Americans with Disabilities Act (ADA) are a minimum standard for accessibility and provide technical guidance and best practices for accessible design of trails and recreational amenities. The proposed design alternatives include a variety of restoration techniques that are described in the Handbook for Forest, Ranch, and Rural Roads (Weaver et al., 2015) and the California Salmonid Stream Habitat Restoration Manual, Part X (Weaver, et al., 1998), guidance documents authored by Pacific Watershed Associates and adopted for use by multiple regulatory agencies. Stream crossing culvert upgrades will be designed to pass the 100-year peak storm flow, and designed for adequate fish passage, if the stream is fish bearing, and the passage of other aquatic organisms. Fish passage design is required for all life stages of migratory and resident fish that access or have the potential to access stream habitat above the stream crossing site. Class I watercourse (fish bearing) stream crossings must meet CDFW and NMFS fish passage criteria.



Map 1. Location of three site-specific stream crossing restoration sites along the Great Redwood Trail, Great Redwood Trail Master Plan and Design Guide, Mendocino County, California.

Document Path: P:\GIS\10645 GRT\10645_LocationMap_GRT_03072024.mxd

2. Conceptual 10% Design Solutions and Alternatives

On December 7, 2023, Alta requested PWA to develop conceptual 10% design alternatives for three discrete sites along the railroad corridor between the cities of Ukiah and Willits (Table 1).

Table 1. Railroad and GRT sites chosen by Alta for 10% design alternatives developed by PWA, Great Redwood Trail Master Plan and Design Guide, Mendocino County.

Mile Marker	Site #	Reach Name	Site Type	Designer
108.5	5	South Ukiah	Creek (stream) Restoration	PWA
132.5	9	Laughlin Grade	Creek (stream) Restoration	PWA
135.5	10	South Willits	Creek (stream) Restoration	PWA

To develop the design alternatives, PWA conducted a field-based assessment of each site between February 16-17, 2024, including an assessment of general site conditions, existing condition of drainage structures (culverts), erosion potential, basic tape-and-clinometer topographic surveys of the estimated area to be excavated and restored, and photo documentation of the assessed sites.

2.1 GRT Mile Marker 108.5: South Ukiah

PWA conducted a stream crossing assessment at MM 108.5, a stream crossing culvert, on the Great Redwood Trail approximately 4.3 miles south of Ukiah, California (Photos 1-2, Map 1, Figure 1). The stream crossing is on an unnamed Class II watercourse, a tributary to the Russian River. The stream crossing has a large 6-ft wide x 6-ft tall concrete culvert with a 6-ft diameter steel culvert built into the lower (downstream) 1/3 of the stream crossing structure. The culvert inlet, outlet, and bottom are open and in sound condition. The stream crossing culvert inlet has a low plug potential and the inboard and outboard fillslopes are stable. The culverted stream crossing structure is in good condition and has no active erosional features.

PWA analyzed the size and stream flow capacity of the concrete culvert. PWA staff calculated the necessary culvert size for the 89-acre drainage area using the empirical equations of the USGS Magnitude and Frequency Method (Gotvald et al., 2012). PWA uses this culvert sizing method for drainage areas equal to or larger than 80 acres. PWA estimated the 100-year peak storm flow rate at approximately 68 cubic feet per second (cfs) and determined that the existing culvert is properly sized to convey the 100-year peak stream flow including expected sediment and organic debris in transport. PWA did not identify instream wood or stored sediment deposits upstream of the culvert inlet that could threaten the drainage structure.

The culvert sizing calculations were compared to the (1) 10-ft wide x 2-ft high channel cross-sectional area (field-estimated cross-sectional area at bankfull stage), (2) the annual high flow line within the existing culvert, and (3) the width of the active stream channel in the vicinity of the crossing. Based on this analysis, the MM 108.5 stream crossing will not need to be redesigned and replaced, upgraded, or converted to a bridge to prevent future failure. Figure 1 shows that the preferred conceptual 10% design alternative will retain the existing stream crossing culvert structure when constructing the Great Redwood Trail along the historic railroad alignment.

Photo 1. View of concrete culvert inlet at MM 108.5 a stream crossing culvert, on the Great Redwood Trail approximately 4.3 miles south of Ukiah, California. Arrows show flow direction. PWA estimated the 100-year peak storm flow rate at approximately 68 cubic feet per second (cfs) and determined that the existing culvert is properly sized to convey the 100-year peak stream flow including expected sediment and organic debris in transport.

Photo 2. View of metal culvert outlet at MM 108.5 on the Great Redwood Trail. The channel has a relatively small scour hole at the culvert outlet, hydraulic forces during peak storms have eroded the stream channel bottom. Note geologist standing on the railroad alignment below arrow. This stream crossing culvert sized appropriately for 100-year peak stream flows and is functional.

2.2 GRT Mile Marker 132.5: Laughlin Grade to Ridge

PWA conducted an erosion site assessment at MM 132.5, a ditch relief culvert, located on the Great Redwood Trail approximately 4.5 miles south of Willits, California (Photos 3-4, Map 1). The site is also upstream of the Morris Dam along the inner gorge of Davis Creek, a tributary to Outlet Creek. PWA also identified and evaluated a rotational/translational, cutbank landslide with no sediment delivery to the stream network located upslope of the ditch relief culvert. The cutbank landslide appears to have failed approximately 20 years ago based on the age of Douglas fir trees on the landslide deposit, which are 15 to 20 years old. The majority of the landslide is inactive, although a small rock fall occurred near the top in the recent past. The railroad tracks and wooden ties are slightly buckled and a little twisted.

The cutbank landslide deposit was the greatest impact to the proposed GRT alignment at the MM 132.5 site location. Eroded sediment from this deposit plugged the existing 18-inch diameter ditch relief culvert (DRC). Seeps and flow through the plugged DRC are active, which indicates that the area upslope of the DRC is wet and contains small springs and seeps. At the DRC outlet, concentrated runoff has developed a prominent hillslope gully that eroded the railroad fill prism downslope for 50 feet. The hillslope gully is 5-feet-wide x 4-feet-deep x 50-feet-long and has delivered approximately 37 yd^3 of eroded coarse sediment to Davis Creek.

Conceptual 10% design alternative drawings include two possible options: (1) maintain the existing DRC or (2) remove the existing DRC and replace it with a new DRC (Figures 2a, 2b). Sites recommended for treatment will require heavy equipment (e.g., excavator, bulldozer, dump truck, grader, roller, and water truck). Hand labor is also required at road sites needing new culverts or culvert repairs, or for applying seed and mulch to ground disturbed during construction activities.

Photo 3. View of buried DRC at MM 132.5 located on the Great Redwood Trail approximately 4.5 miles south of Willits, California. Eroded sediment from a cutbank landslide deposit plugged the existing 18-inch diameter ditch relief culvert (DRC). Arrow shows vicinity of plugged culvert in inboard ditch with the thick brush. PWA recommends upgrading the existing DRC as the preferred alternative.

Photo 4. View of cutbank landslide (basic shape of main scarp is outlined in red) that plugged DRC (yellow arrow) and buckled tracks (green arrow) at MM 132.5 on the Great Redwood Trail. The cutbank landslide appears to have failed approximately 20 years ago based on the age of Douglas fir trees on the landslide deposit, which are 15 to 20 years old (basic shape of main scarp is outlined in red). The majority of the landslide is inactive, although a small rock fall occurred near the top in the recent past. The railroad tracks and wooden ties are slightly buckled and a little twisted.

Alternative 1: Recommended maintenance of the existing DRC includes cleaning the plugged culvert inlet and removing the cutbank landslide deposit along the inboard ditch. Treatments also include placement of drain rock to construct a rock-lined apron and/or construct the inlet with a slotted riser (Photo 5) and capped with a debris screen to protect the existing DRC from plugging in the future. Other maintenance activities include installation of a full-round 40-ft long downspout with steel anchor posts and elbow to the base of the fillslope. See Figure 2a for a list of these proposed maintenance activities.

Alternative 2: Alternatively, PWA recommends upgrading the existing DRC, which includes the replacement of the existing, plugged DRC and installing a new 40-ft long DRC, including (1) attaching a slotted riser and cap to the new DRC inlet and (2) installation of a full-round 40-ft long downspout with steel anchor posts and elbow. See Figure 2b for a list of these proposed DRC replacement activities.

PWA recommends selection of Alternative 1 as the preferred alternative. Alternative 2 (new culvert upgrade) will be more costly but will not markedly improve the function of the existing ditch relief drainage structure. Alternative 1 (maintaining the existing DRC with a fitted riser) will protect the DRC inlet from plugging and sieve out most debris and transported sediment while the downspout will prevent fillslope erosion and prevent hillslope instabilities. Both maintenance treatments will improve water quality. Alternative 1 maintenance treatments will be less expensive compared to Alternative 2, as well as a long lasting and effective drainage structure. However, by design, risers reduce the hydraulic efficiency of the DRC, so it may increase the vulnerability of ponding and routine maintenance.

Photo 5. View of a vertical riser on a culvert inlet, usually of the same diameter as the culvert, and often slotted to allow water to flow into the culvert as streamflow rises around the outside. Drop inlets are often used on stream or ditch relief culverts where sediment or debris would otherwise threaten to plug a traditional horizontal inlet (Weaver et al., 2015).

2.3 GRT Mile Marker 135.5: South Willits

PWA conducted a stream crossing assessment at MM 135.5 located on Walker Creek, a failed stream culvert, located on the Great Redwood Trail approximately 3.2 miles south of Willits, California (Photos 6-8, Map 1). The stream crossing failed in the past and has a separated, full-round 48-inch diameter culvert that threatens to fail. The railroad fill is deep and contains a large volume of erodible fill and a significant volume of past erosion and sediment delivery that has already occurred and been delivered to Walker Creek, a potentially historic Class I stream and a tributary to Haehl Creek (NOAA, 2014). PWA measured approximately 830 yd^3 of past erosion and sediment delivery and we estimate approximately 1,550 yd^3 of future potential erosion will occur if the stream crossing is allowed to fail and is not restored soon. Currently, the erosion is active, the culvert is separated and internally detached, and the inlet, outlet, and bottom are rusted with holes.

PWA analyzed the size and stream flow capacity of the existing, failed culvert. Even if the existing culvert were intact, results show that the culvert is not properly sized to convey the 100-year peak storm flow, including expected sediment and organic debris in transport. PWA staff calculated the necessary culvert size for the 315-acre drainage area. PWA estimated the 100-year peak storm flow rate at approximately 203 cfs, which significantly exceeds the current culvert capacity. In addition, PWA observed a large deposit of stored sediment located just upstream of the culvert inlet, much of which occurs on the adjacent land ownership. This sediment fan was likely created by the undersized culvert

Photo 6. View of debris that blocked the stream crossing culvert inlet at MM 135.5 located on Walker Creek located on the Great Redwood Trail approximately 3.2 miles south of Willits, California. PWAs culvert sizing analysis determined that the culvert is not properly sized to convey the 100-year peak storm flow, including expected sediment and organic debris in transport. Arrow points to a log that floated into stream crossing and blocks culvert inlet.

Photo 7. View of the fillslope failure and past erosion that occurred from the top of the railroad alignment to the base of the fillslope. Note the PWA geologist (yellow arrow) is standing on railroad alignment taking notes, conducting a rapid survey and sketching the existing conditions of the stream crossing site.

Photo 8. View of failed and separated culvert (yellow arrow) that lays dismantled and deposited in Walker Creek downstream of the railroad alignment. The separated and dislodged stream crossing culvert and significant volume of past erosion along the left stream bank makes this stream crossing site a high priority to upgrade.

which restricted flood flows and caused sediment to be deposited during period of high flow. The current channel thalweg has been diverted around the eastern side of the alluvial main alluvial fan or deposit and now enters the culvert at a sharp 90-degree bend. Originally, before the undersized culvert and railroad fill was installed, the stream likely flowed directly (straight) into the culvert inlet.

The culvert sizing calculations were compared to (1) the 12-ft wide x 2-ft high channel cross-sectional area (field-estimated, cross-sectional area at bankfull stage), (2) the annual high flow line within the existing culvert, and (3) the width of the active stream channel in the vicinity of the crossing. This culverted stream crossing will need to be redesigned, replaced and upgraded or converted to a bridge to prevent future failure.

The 10% conceptual design alternatives involve upgrading the existing culvert by removing the existing, undersized culvert, railroad track, wooden ties, concrete headwall, and base aggregate. Specifically, design alternatives for culvert removal and replacement include (1) replacing the culvert in the same location with an appropriately designed and sized drainage structure, (2) embedding a new culvert and constructing a roughened channel upstream of the culvert inlet to prevent headcutting of the stored sediment deposit on the adjacent landowner's property, or 3) removing the culverted fill crossing and installing a footbridge over the exhumed stream channel. The 10% conceptual designs are included in Figures 3a-3c.

Alternative 1 (Figure 3a): For the first alternative, PWA recommends replacing the culvert with a 100-ft long 96-inch diameter culvert, which is the proper size for the 100-year peak flow.

Alternative 2 (Figure 3b): For the second alternative, the culvert will be replaced with a properly sized culvert that will be embedded 8 to 12 inches into the natural channel substrate. In addition to the culvert replacement, a roughened channel will be constructed approximately 80 feet upstream onto the adjacent landowner's parcel. The roughened channel is designed to remove and stabilize the stored sediment located upstream of the culvert inlet and match the original channel gradient.

Alternative 3 (Figure 3c): The third alternative includes excavating and removing the stream crossing fill, stabilizing the newly exhumed channel sideslopes, and replacing the failed culvert (and fill) with a 125-ft long footbridge. The channel bed would be excavated to its native, natural channel bottom, and channel grade control would be installed along the channel to prevent headcutting into the upstream channel-stored sediment located on the neighboring private parcel.

PWA recommends selection of Alternative 1 as the preferred alternative. Removing the failed culvert and replacing it with a new culvert will be a cost-effective and long lasting solution. Alternative 1 upgrading treatments will be less expensive compared to Alternative 2 or Alternative 3. Alternative 1 will work if this stream reach is a Class II watercourse. Selection of Alternative 2 or Alternative 3 may be (or will be) imperative and requirement of CDFW if they identify this channel as a Class I stream or stream reach. Replacement of natural spawning gravels, increased channel complexity, reduction of stream velocities, and unimpeded fish passage will be required for all life stages of fish. The best design for fish passage is not to install a stream crossing that disrupts the natural stream channel characteristics. The use of bridges that span the stream to allow for long term dynamic channel stability and hydraulic conditions suitable for year-round fish passage is preferred. Bottomless arches or embedded culverts that simulate the natural streambed characteristics area also preferred or potential treatments.

3. Conclusion

Pacific Watershed Associates has provided conceptual 10% design alternatives at three site-specific locations on the Great Redwood Trail (GRT) in Mendocino County. As part of the GRT development, problematic sites will require maintenance or upgrading. Culverted stream crossings (of various types and sizes) and ditch relief culverts are the most common stream and road drainage structures employed along the GRT corridor. Proper design and construction standards for culverted stream crossings have been described conceptually at the site level and are outlined in the Handbook for Forest, Ranch and Rural Roads (Weaver et al. 2015) and other publications (e.g., Cafferata et al. 2017, Weaver et al. 2006, and others). Culverted stream crossing structures should minimize their impact on water quality, pass 100-year design peak flood flows, and provide for passage of fish and other aquatic organisms, as appropriate. Culverted stream crossings need to be properly designed, constructed, and maintained to prevent hydraulic exceedance, plugging, overtopping, diversion of flood flows, and loss (erosion) of fill and subsequent sediment delivery to downstream channels. Current designs must accommodate the 100-year peak flow, including the passage of sediment and debris following standards adopted by the California Forest Practice Rules (Calfire), the State Water Quality Control Board (and all Regional Water Quality Control Boards), and the Department of Fish and Wildlife, among others.

As stated above, stream crossings should be designed or redesigned for adequate fish passage and the passage of other aquatic organisms. Accommodation for fish passage is now expected at all culverted

Class I watercourse stream crossings for all life stages of migratory and resident fish encountering the crossing site (Weaver et al., 2015). Class I watercourse stream crossings must meet CDFW and NMFS fish passage criteria (CDFG, 1998).

Erosion control projects such as storm-proofing unstable and potentially unstable cutbanks and fillslopes, and upgrading poorly designed or installed stream crossings, can lead to prevention of significant failures or damage to the GRT road prism and large volumes of sediment delivery directly to streams. As a preventative measure, unstable cutbank and fillslope materials should be excavated and relocated (endhauled or pushed) to a permanent, stable spoil disposal site elsewhere along the alignment and away from watercourses. Currently failing or poorly designed or installed stream crossings will need to be upgraded to meet current design standards.

PWA appreciates the opportunity to provide erosion control solutions for development of the GRT. The field assessment and development of the conceptual 10% design alternatives will generate baseline information that will mitigate potential impacts and lay the foundation of the GRT Master Plan and Design Guide.

Sincerely,

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GREAT REDWOOD TRAIL MASTER PLAN MILE MARKER 108.5

Recommended Alternative : Retain existing culvet

1. Excavate and remove existing railroad track and wooden ties.
2. Retain concrete and metal culvert that is sized for the peak storm event (Q100).
3. Pave 8 - 16-ft wide Great Railroad Trail along existing railroad alignment.
4. Install signs and striping.

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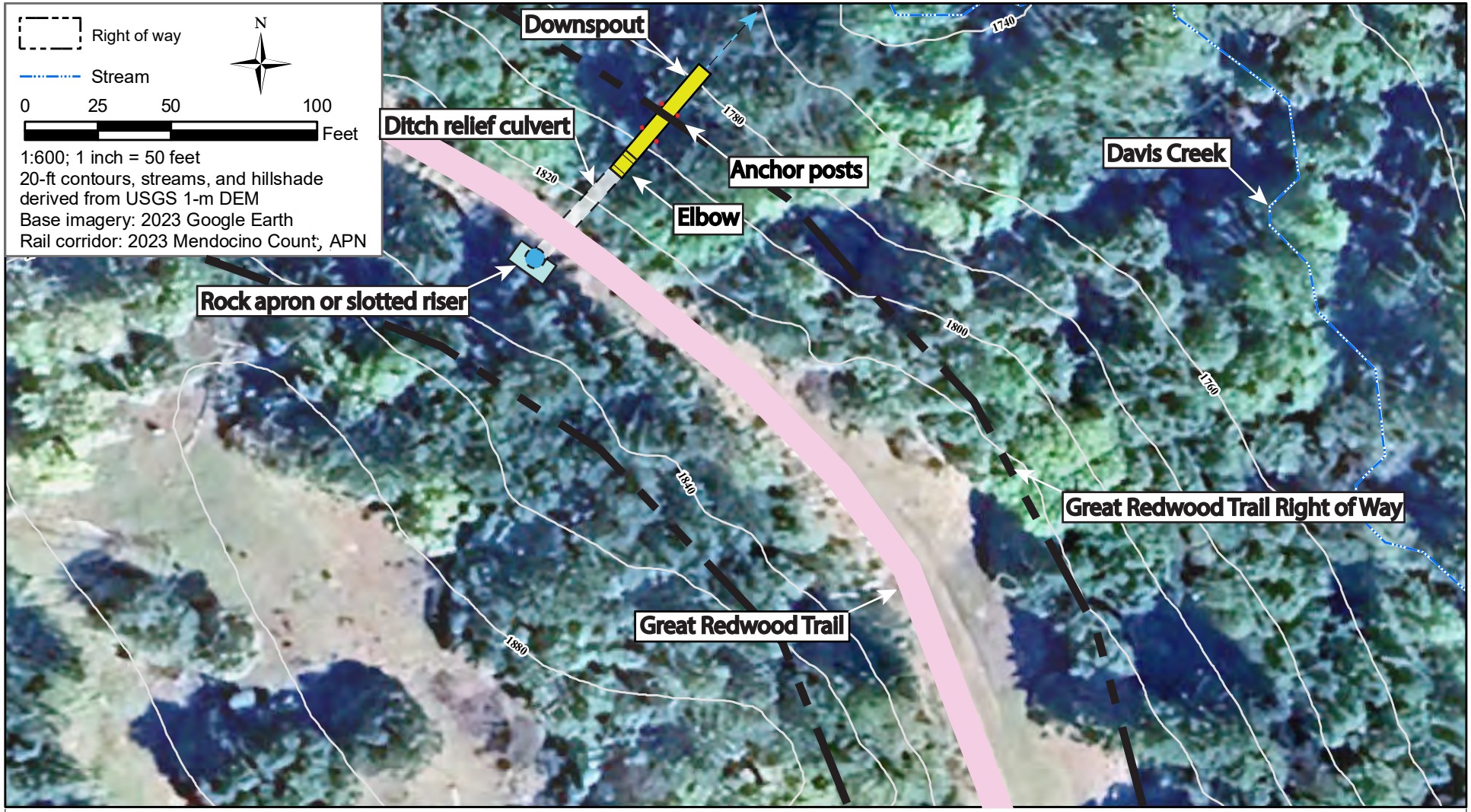
FIGURE 1.



GREAT REDWOOD TRAIL MASTER PLAN MILE MARKER 132.5

Alternative A: Ditch relief culvert maintenance

1. Retain existing ditch relief culvert.
2. Install slotted riser or rock apron around ditch relief culvert inlet.
3. Install a new 18-inch diameter x 40-ft long round downspout to existing ditch relief culvert.
4. Secure downspout inplace with 18-inch diameter elbow and four steel anchor posts.
5. Remove existing railroad tracks and wooden ties.
6. Apply crushed stone to trail surface approximately 8 - 12-ft wide along existing railroad alignment.
7. Install signs.
8. Seed and mulch all bare soil areas.

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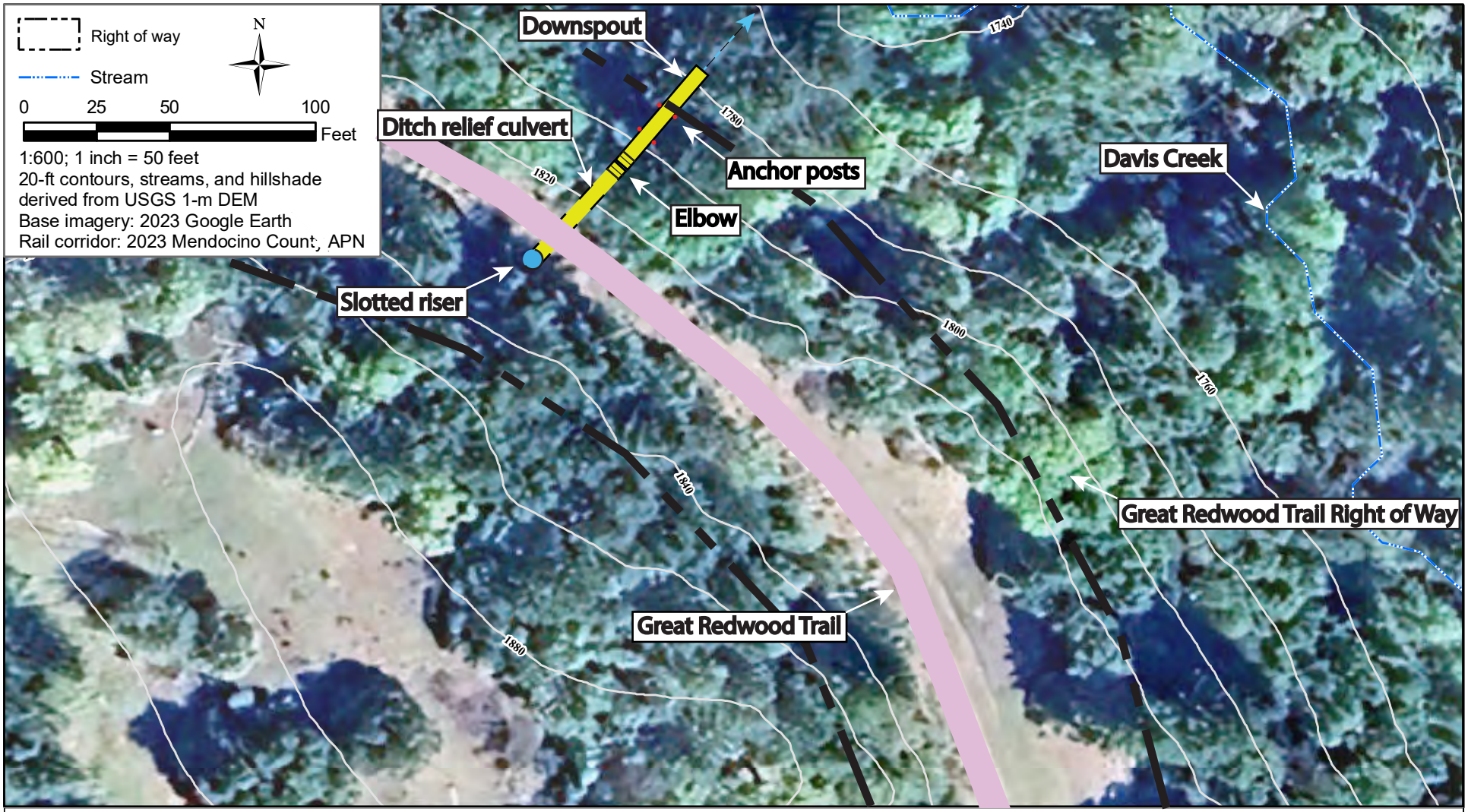
FIGURE 2A.



GREAT REDWOOD TRAIL MASTER PLAN MILE MARKER 132.5

Alternative B: Recommended treatment for ditch relief culvert upgrade

1. Excavate and remove existing railroad track, wooden ties, 18-inch diameter ditch relief culvert, and base aggregate.
2. Install a new 18-inch diameter x 40-ft long ditch relief culvert.
3. Install slotted riser and capped screen to ditch relief culvert inlet.
4. Install a new 18-inch diameter x 40-ft long round downspout to new ditch relief culvert.
5. Secure downspout inplace with 18-inch diameter elbow and four steel anchor posts.
6. Apply and spread crushed stone to trail approximately 8 - 12-ft wide along existing railroad alignment.
7. Install signs.
8. Seed and mulch all bare soil areas.

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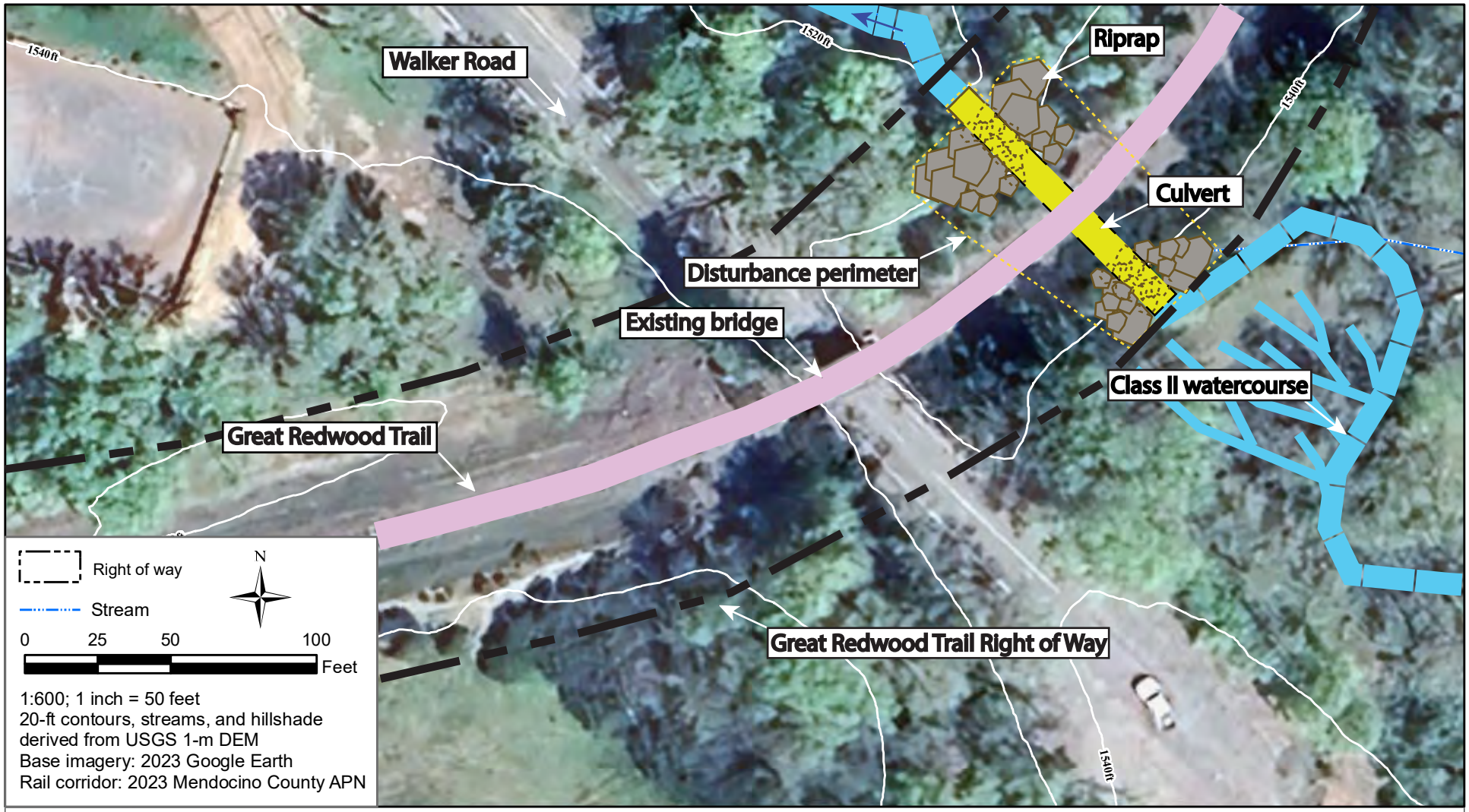
FIGURE 2B.



GREAT REDWOOD TRAIL MASTER PLAN MILE MARKER 135.5

Alternative A: Recommended treatment replace failed culvert with new culvert

1. Excavate and remove existing railroad track, wooden ties, 48-inch diameter culvert, concrete headwall, and base aggregate.
2. Construct a evenly graded channel bed for new culvert.
3. Install a 96-inch diameter x 100-ft long round culvert that is sized for the peak storm event (Q100).
4. Backfill culvert and compact railroad aggregate to match original railroad elevation and gradient.
5. Place 40 cubic yards of 1 - 3-ft diameter riprap on the downstream and upstream fillfaces.
6. Apply, spread and compact crushed stone approximately 8 - 12-ft wide along existing railroad alignment.
7. Install signs.
8. Seed and mulch all bare soil areas.

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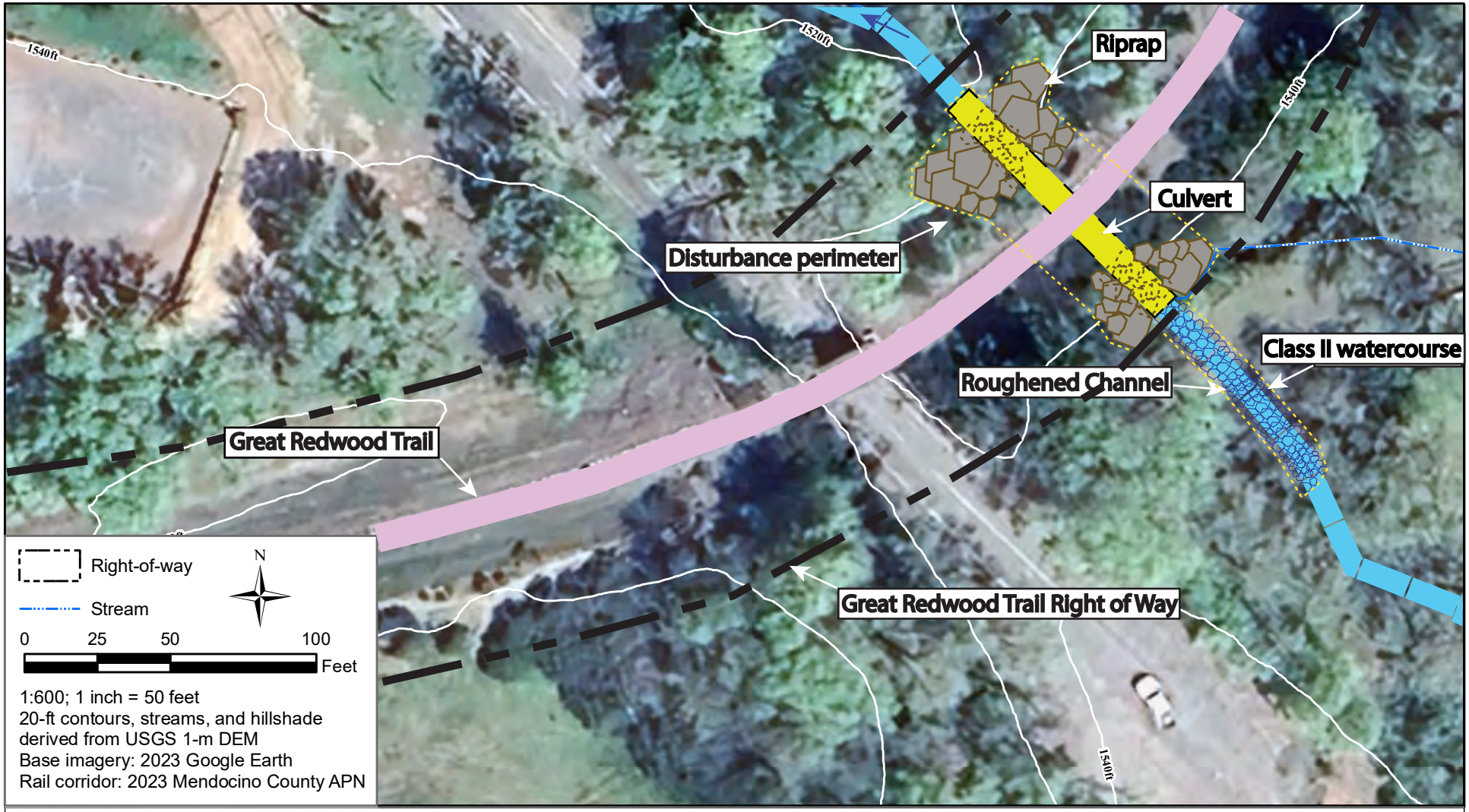
FIGURE 3A.



GREAT REDWOOD TRAIL MASTER PLAN MILE MARKER 135.5

Alternative B: Replace failed culvert with new culvert and roughened channel

1. Excavate and remove existing railroad track, wooden ties, 60-inch diameter culvert, concrete headwall, and base aggregate.
2. Remove stored sediment for 80-ft upstream of culvert inlet.
3. Construct a roughened channel that is 14-ft wide and 80-feet long to new culvert inlet.
3. Install a 96-inch diameter x 100-ft long round culvert that is sized for the peak storm event (Q100).
4. Backfill culvert and compact railroad aggregate to match original railroad elevation and gradient.
5. Place 40 cubic yards of 1 - 3-ft diameter riprap on the downstream and upstream fillfaces.
6. Apply, spread, and compact crushed stone for approximately 8 - 12-ft wide along existing railroad alignment.
7. Install signs.
8. Seed and mulch all bare soil areas.

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FIGURE 3B.

GREAT REDWOOD TRAIL MASTER PLAN MILE MARKER 135.5

Alternative C: Install bridge and grade control structure

1. Excavate and remove existing railroad track, wooden ties, 48 inch diameter culvert, concrete headwall, and base aggregate.
2. Construct a new channel alignment and grade control structure approximately 14 ft wide x 100 ft long.
3. Install a 12 ft wide x 125 ft long concrete footbridge with pre-cast concrete abutments and guardrails (42-54 in. height).
4. Place 40 cubic yards of 1 ft to 3 ft diameter riprap on the left and right bank.
5. Apply, spread, and compact crushed stone approximately 8 - 12 ft wide along existing railroad alignment.
6. Install signs.
7. Seed and mulch all bare soil areas.

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FIGURE 3C.

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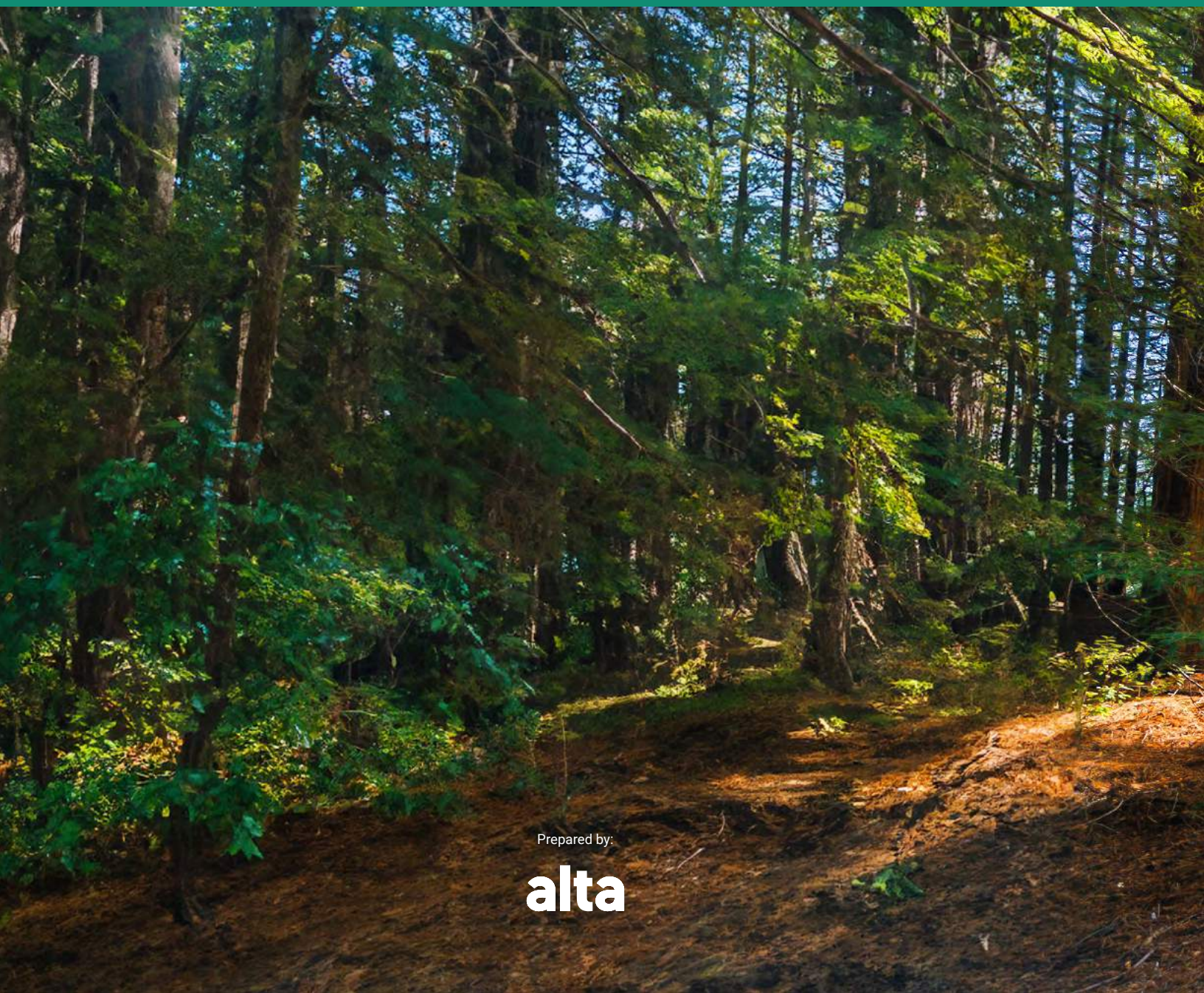

Prepared by:

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