

THE EMERALD CROWN TRAIL MASTER PLAN

March 2019

Produced by the Regional Trail Work Group

*In coordination with the National Park Service
Rivers, Trails, and Conservation Assistance Program*



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Acknowledgements

Many individuals contributed to the creation of this plan. Key participants in the planning process include:

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TEXAS STATE UNIVERSITY GIS CLASS

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Introduction and Vision

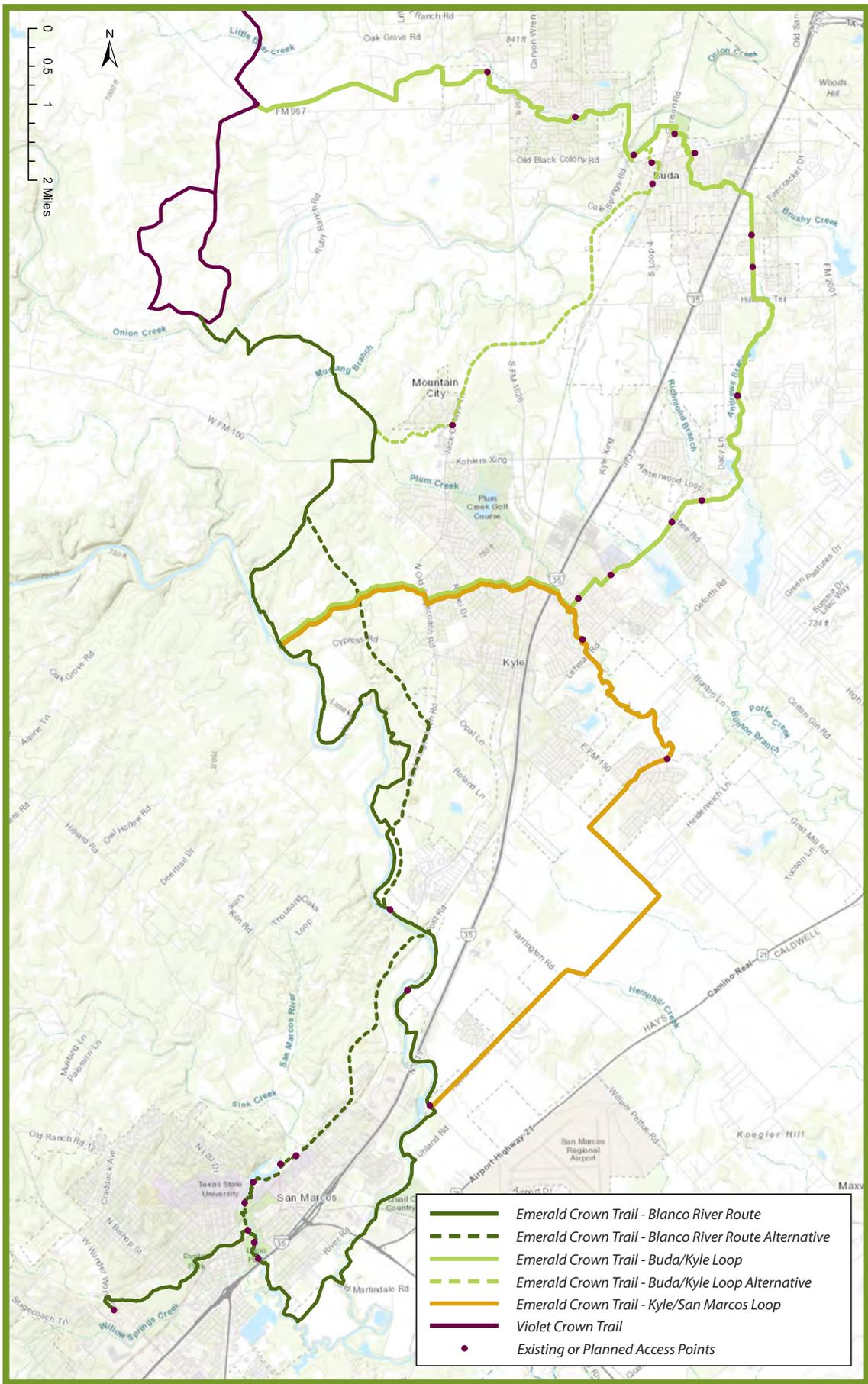
The Emerald Crown Trail Master Plan lays out a vision for a regional trail linking the communities of eastern Hays County. From tranquil opportunities to experience nature to convenient opportunities to walk or bike to local destinations, this spine trail will provide a diverse set of recreational experiences to Hays County residents and visitors.

Development of this Emerald Crown Trail concept followed an extensive public process. The Regional Trail Work Group--representing governmental, non-profit, and community stakeholders--worked to engage the public in envisioning what the trail would look like, how trail users might use it, and where it might go. They then worked with key stakeholders to identify and refine feasible trail corridors. The result is a proposed Emerald Crown Trail route that is both visionary and innately feasible.

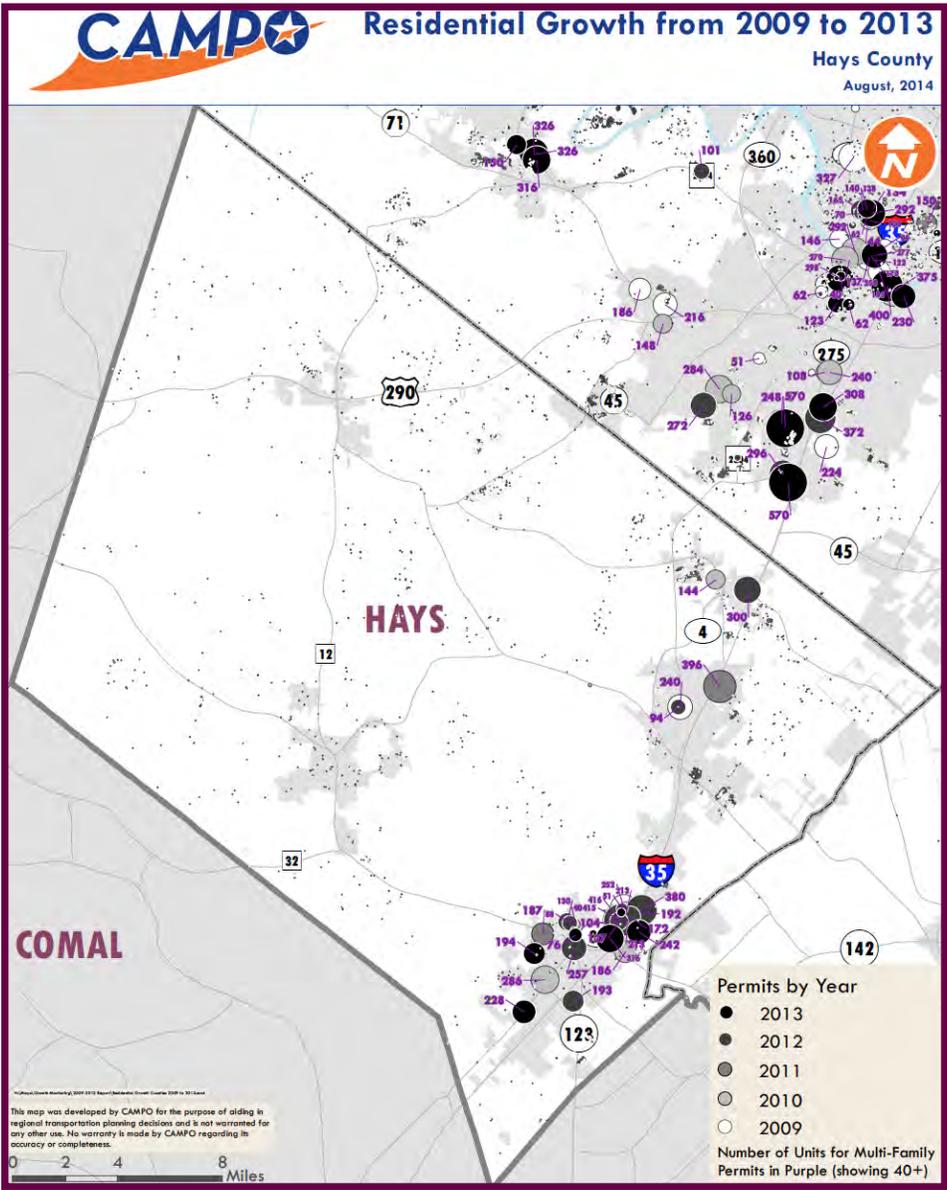
The following plan lays out a vision for over 75 miles of connected trail corridors that make up the Emerald Crown Trail. These include a 26-mile route along the Blanco River, plus two loop trails that link residential and commercial areas in Buda and Kyle, including areas east of IH-35.

This route concept is exactly that: a concept. The Regional Trail Work Group fully expects that the final route will change based on local conditions. To that end, several alternative alignments have been identified that either highlight short-term opportunities or alternatives to more challenging routes. Further alternatives are available, but these highlighted routes capture the most likely and most desirable corridors for the future Emerald Crown Trail.

Development of this regional trail will require continued coordination and commitment from Buda, Kyle, Mountain City, San Marcos, Hays County, and their local partners. Working together, they have the opportunity to create an outstanding regional asset that connects communities, brings people to nature, and supports an active and healthy population: The Emerald Crown Trail.







214k
Residents

15k
Housing Units
Since 2010

57k
New Residents
Since 2010

DEVELOPMENT PATTERNS

As of 2017, Hays County is home to 214,485 residents located primarily along the IH-35 and US-290 corridors. The county's three largest communities are Buda (population 16,163), Kyle, (population 43,480), and San Marcos (population 63,071), with additional residents clustered in Dripping Springs, Wimberley, and Mountain City. Hays County is one of the fastest-growing counties in the country, adding over 57,000 residents in the

seven-year period from 2010-2017. The growth has a visible impact on the landscape: the county has added over 15,000 housing units since 2010, and ranches and agricultural land continue to be converted into new subdivisions. As Austin and San Antonio continue to grow, Hays County will continue to add new development and population.

CURRENT TRAIL NETWORKS

As the county grows and adds population, the cities in Hays County are developing parks and trail networks in order to provide recreational opportunities and options for alternative transportation. Demand is strong—citizens in these communities have repeatedly cited new and improved trails as a priority in local planning studies and citizen surveys. To meet the demand, local governments have pursued a variety of funding and development

strategies to expand their trail networks, including direct expenditures, grants and outside funding, leveraging new development, and partnerships with nonprofits. This burgeoning county-wide trail network will provide a variety of close-to-home recreational and transportation options to the citizens of Hays County. Many of these existing or proposed trails make up portions of the proposed Emerald Crown Trail.

Buda



15+ Miles of Trail

Kyle



8+ Miles of Trail

San Marcos



25+ Miles of Trail



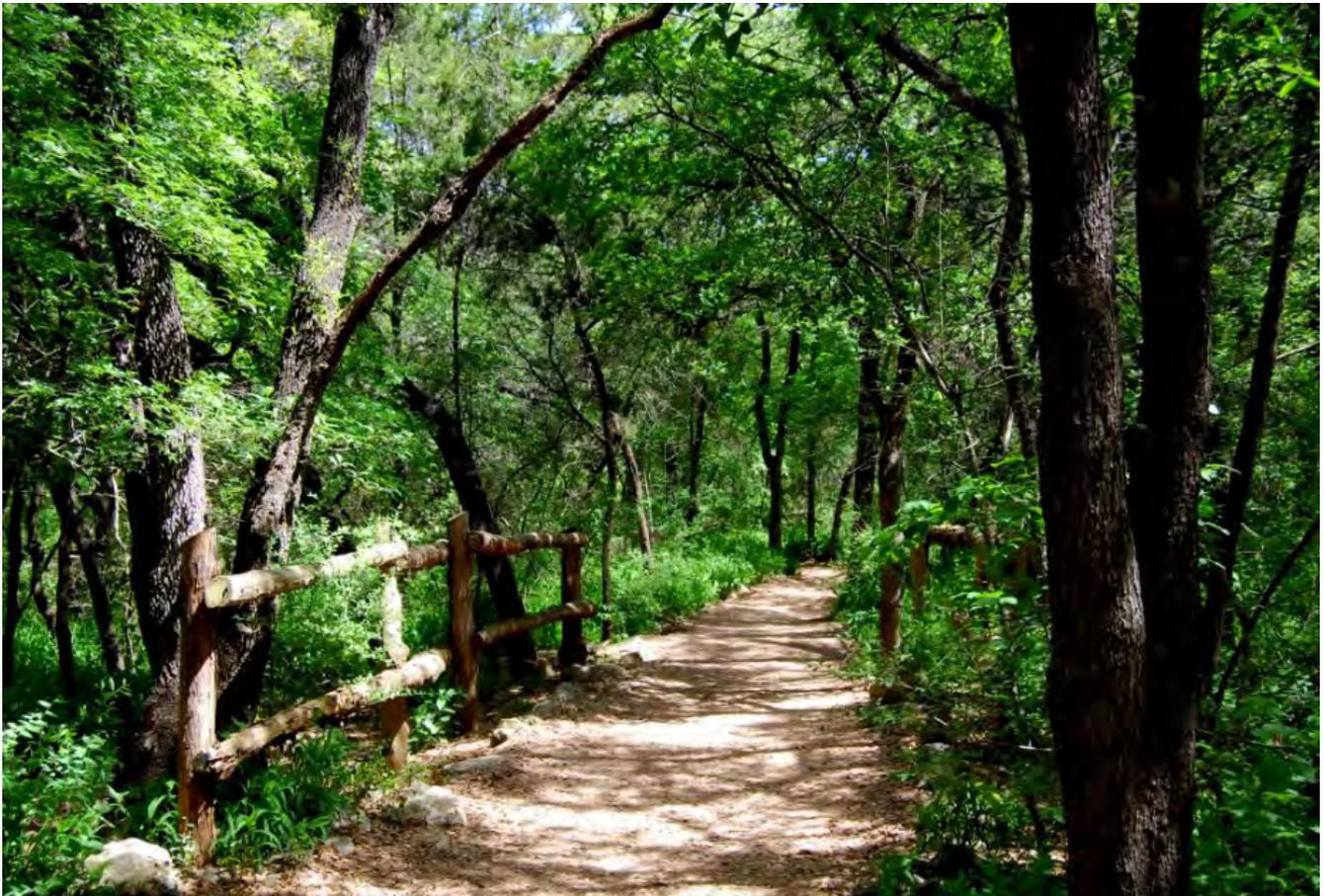
Existing Plans and Projects

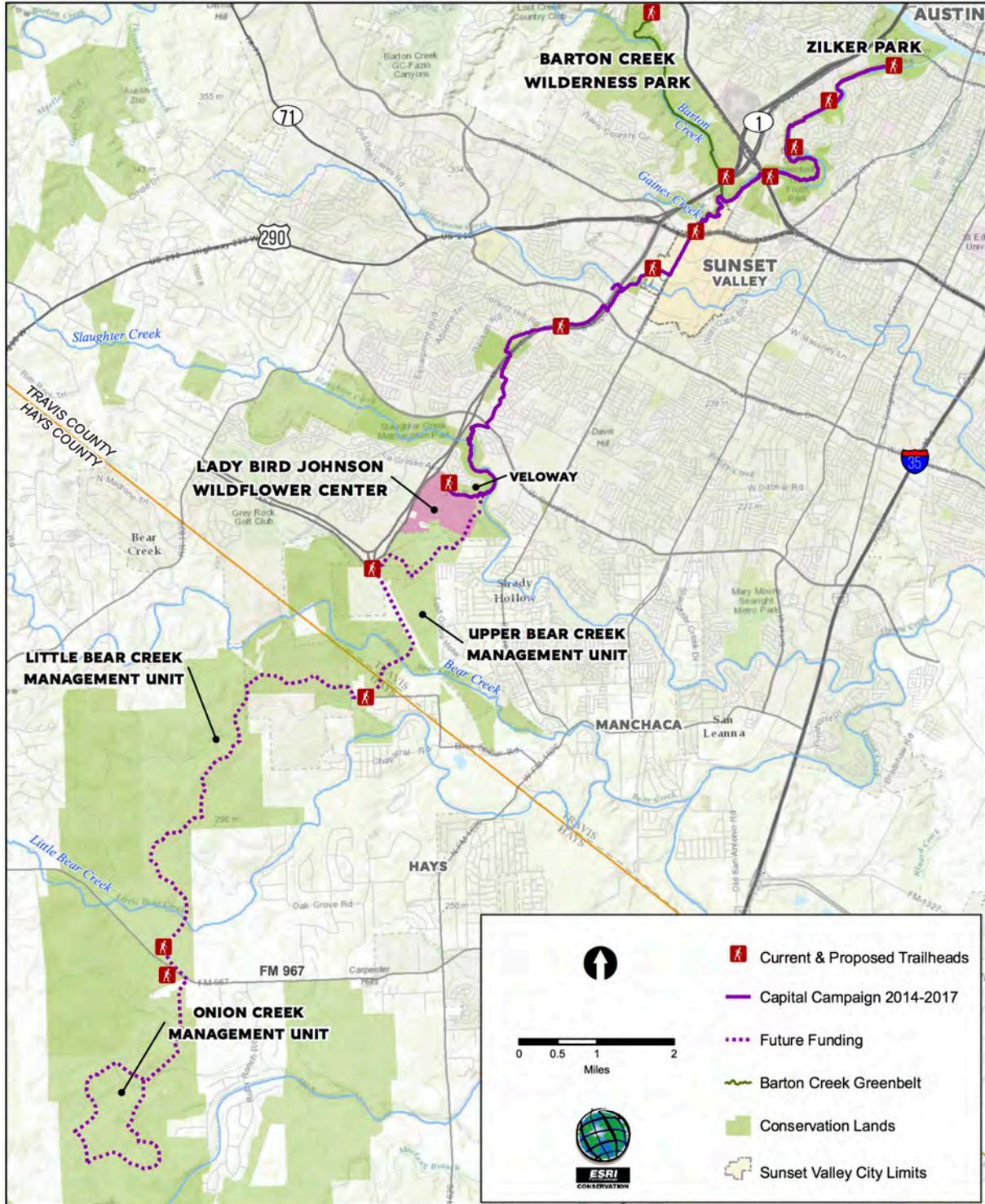
VIOLET CROWN TRAIL

The Violet Crown Trail is a 30-mile regional trail stretching from Barton Springs near downtown Austin to the Onion Creek Management Unit of the City of Austin's Watershed Protection Lands. Spearheaded by the non-profit Hill Country Conservancy, the trail will provide a unique recreational experience that connects neighborhoods, urban wildlands, and rural conservation lands from downtown Austin to rural Hays County. The Violet Crown Trail will be developed in three phases. Phase 1, which stretches from Barton Springs to US-290 near Brodie Lane, opened to the public in August 2015.

Phase 2, running from Sunset Valley to the Lady Bird Johnson Wildflower Center, is scheduled to open in 2019. Development of Phase 3, which runs from the Wildflower Center to the Onion Creek Management Unit, will begin in 2019.

The terminus of the Violet Crown Trail provides the perfect starting point for the Emerald Crown Trail in northern Hays County. Linking these two regional trails together provides the opportunity to create a 60+ mile regional trail stretching from Austin to San Marcos.





RELEVANT LOCAL PLANS

Buda Parks, Recreation, Trails, and Open Space Master Plan (2012)

Enhancing Our Opportunities for Play—the Buda Parks, Recreation, Trails, and Open Space Master Plan—lays out a vision for future park and trail development in the City of Buda. The document identifies three categories of trails—urban trail/sidepath, neighborhood trail, and natural corridor trails—and sets standards for trail development. It also highlights a number of recommended future trails that correspond with the proposed route of the Emerald Crown Trail. These include trails along Garlic Creek, FM 2001, Main Street, and through City Park.

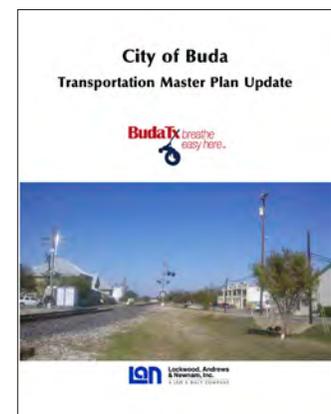
<https://www.ci.buda.tx.us/DocumentCenter/View/1499/Master-Parks-and-Trails-Plan-2012?bidId=>



Buda Transportation Master Plan (2013)

The Buda Transportation Master Plan Update guides the city in determining how long range transportation needs will be met for all modes of travel. The update includes several recommendations and projects germane to the Emerald Crown Trail. It recommends that trails located next to roads be incorporated into roadway projects and constructed as multiuse sidepaths. It also identifies several high and medium priority projects that align with the Emerald Crown Trail, including sidewalks along FM 2001 and FM 967, and development of the Garlic Creek Trail.

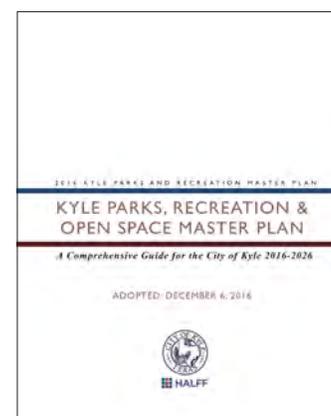
<https://www.ci.buda.tx.us/DocumentCenter/View/1498/MTP-Ordinance-and-attachment?bidId=>



Kyle Parks, Recreation, and Open Space Master Plan (2016)

The Kyle Parks, Recreation & Open Space Master Plan assesses the city's current park system, examines the future land use plan for the city, and helps guide the development of new parks to meet the city's future needs. The plan shows strong support for trails, with 85% of survey respondents requesting more trails near where they live. The plan includes several recommended trails that correspond with the proposed route of the Emerald Crown Trail, including trails along the Andrews Branch, Plum Creek, and the Blanco River.

https://www.cityofkyle.com/sites/default/files/fileattachments/parks_and_recreation/page/1368/final_pdf-1.pdf

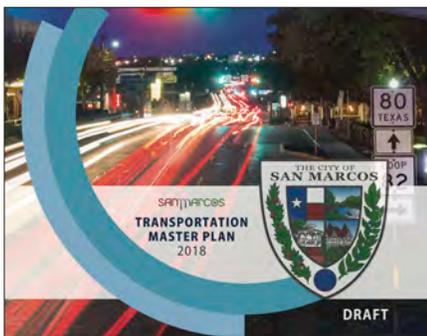




San Marcos Parks, Recreation, and Open Space Master Plan (2018)

The San Marcos Parks, Recreation, and Open Space Master Plan provides recommendations to sustain and enhance the San Marcos park system for a growing city. A citywide survey conducted as part of the planning process showed strong support for close-to-home trails and trails that provide alternative transportation routes. The plan includes a recommendation to collaborate with local and regional partners in order to define and establish the Emerald Crown Trail. It also highlights proposed trails or bike routes along the Blanco and San Marcos Rivers, Purgatory Creek, and Post Road.

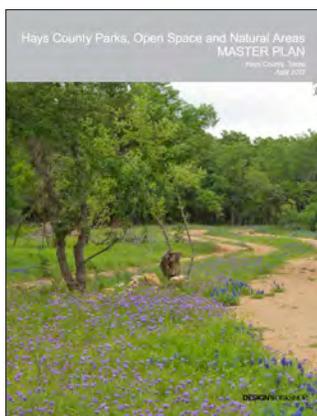
<https://www.sanmarcostx.gov/DocumentCenter/View/11538/Draft-Parks-Recreation-and-Open-Space-Master-Plan>



San Marcos Transportation Master Plan (2018)

The San Marcos Transportation Master Plan seeks to enhance transportation safety, minimize congestion, preserve local character, and protect San Marcos' environment. The plan calls for an expansion of the city's Greenways system to increase opportunities for recreation and alternative transportation. It includes design concepts for shared use paths and split-use greenways, as well as recommendations on greenway materials. Several routes corresponding to the Emerald Crown Trail are prioritized for short-term (0-10 years) development.

<https://sanmarcostx.gov/DocumentCenter/View/10825/Transportation-Master-Plan---Adopted---121218>



Hays County Parks, Open Space and Natural Areas Master Plan (2012)

The Hays County Parks, Open Space and Natural Areas Master Plan guides the county's decisions regarding parks and open space programs and facilities. The plan identifies multi-use trails as a top priority, second only to river and creek access. Five Mile Dam Park—a key location along the proposed Emerald Crown Trail route—is owned and managed by Hays County.

http://www.co.hays.tx.us/Data/Sites/1/pdf/departments/plans.policiesandreports/ParksMasterPlan_April2012.pdf

Planning Process

Overview

The Emerald Crown Trail developed out of a desire among a variety of stakeholders to create a connected regional trail system in Hays County. The planning process for the trail sought to organize these stakeholders; gather input from Hays County residents; identify feasible route options, trailheads, and trail amenities; and package these proposals into a cohesive trail plan.



Regional Trail Work Group

The San Marcos Greenbelt Alliance organized the Regional Trail Work Group to guide planning for the Emerald Crown Trail. The Work Group is made up of a diverse cross section of trail stakeholders, including governmental representatives, non-profit partners, and community supporters. By including each of the relevant governmental entities along with other key partners, it was hoped that the Work Group would be able to develop a broadly supported, feasible vision for the Emerald Crown Trail. The Work Group operates by consensus and has guided community engagement, route planning, and development of this plan since July 2017.

The Work Group includes representatives from the following groups:

- Hays County
- City of Buda
- City of Kyle
- City of San Marcos
- San Marcos Greenbelt Alliance
- Texas State University, Department of Geography
- Hill Country Conservancy
- Guadalupe-Blanco Trust
- Meadows Center for Water and the Environment
- San Marcos River Foundation
- Take-a-Hike San Marcos

Information Gathering

PUBLIC PRESENTATIONS

At the outset of the planning process, Regional Trail Work Group representatives made presentations to elected and appointed boards throughout the study area. The goal of these presentations was to introduce the Emerald Crown Trail concept, outline the potential planning process, and gather general feedback. Presentations were held for the following boards and commissions:

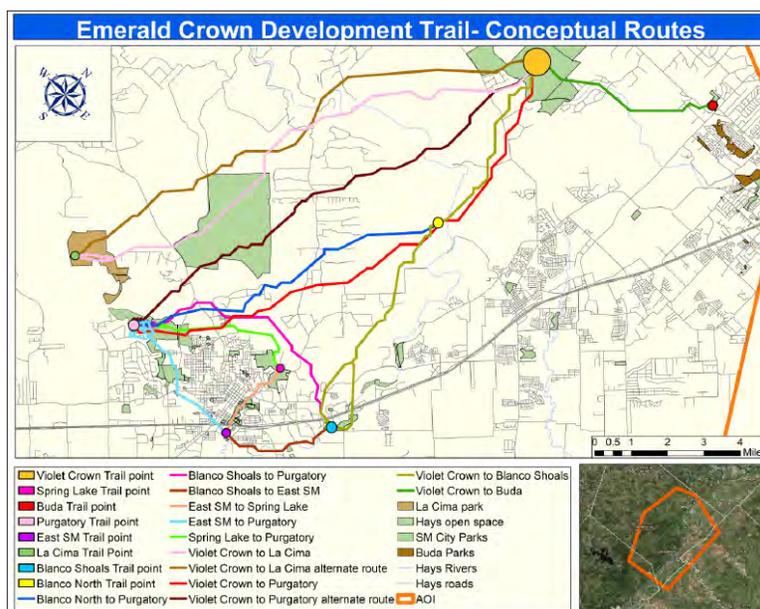
- Kyle Parks and Recreation Board – May 2017
- Hays County Commissioners Court – January 2018
- San Marcos City Council – January 2018
- Kyle City Council – February 2018
- Buda City Council – February 2018



TEXAS STATE GIS CLASS

In the fall of 2017, the Regional Trail Work Group contracted with a Texas State University Geographic Information Systems class to conduct a preliminary analysis of potential trail routes. Students were given several factors to consider, including potential destinations, land cover, slopes, and soils. The class developed a map of 12 conceptual routes that considered these factors, and assessed land ownership over each of these routes.

While extremely conceptual in nature, this exercise provided valuable information about the impact of land cover and slope on route selection, as well as a better understanding of the number of properties that a future trail could abut. The process informed further community engagement and more detailed route planning.



Public Workshops

PARTICIPATION

On March 27, 28, and 29, 2018, the Regional Trail Work Group held three public workshops to discuss the Emerald Crown Trail concept. Each workshop included a brief presentation about the trail, followed by an open house with a number of activities that sought input on the proposal.

Approximately 160 members of the public attended the three meetings.

San Marcos Workshop	March 27	~75 attendees
Buda Workshop	March 28	~45 attendees
Kyle Workshop	March 29	~40 attendees



PUBLIC INPUT TOPICS

The open house portion of each workshop was divided into six input stations:



General Comments

Participants reviewed information about the project and completed a comment form with general feedback.



Trail Activities

Participants identified activities they hope to engage in on a future Emerald Crown Trail.



Trail Design

Participants reviewed five different trail designs, voted on their favorites, and provided comments.



Trailhead Design and Amenities

Participants reviewed three different trailhead designs and five different trailhead amenities. They then voted on their favorites and provided comments.



Issues, Challenges, Solutions

Participants identified issues and concerns with the proposal and suggested potential solutions.



Destinations, Opportunities

On a large map, participants identified potential trailheads, destinations, and opportunities. They also provided general comments.

TRAIL ACTIVITIES

Participants were asked to identify the types of activities they would like to engage in on the future Emerald Crown Trail. Most participants cited the desire to engage in active recreational pursuits such as hiking, biking, walking, and running. Many other active recreational pursuits were cited, including mountain biking, horseback riding, and walking pets.

Nature-centered activities were also popular among the participants. Activities identified included enjoying nature, camping, birdwatching, and learning about plants and wildlife.

Some participants felt that the future trail would provide a valuable commuting option, linking the three communities together. Lastly, several participants gave input about the experience and amenities they would like to see along the Emerald Crown Trail. These participants recommended that different trail uses be separated, and that there be restrooms, water fountains, and other amenities along the trail.

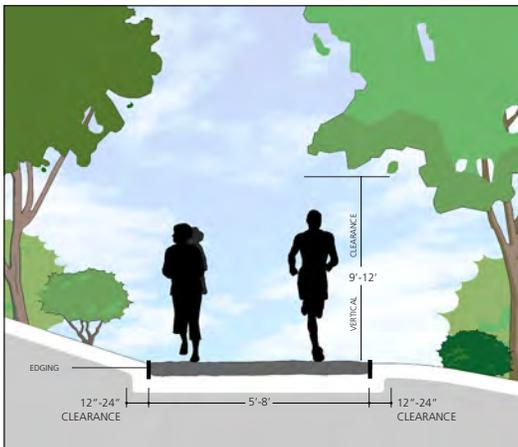
PREFERRED TRAIL ACTIVITIES



Active Recreational Pursuits



Nature-Centered Activities



FAMILY-FRIENDLY TRAIL DESIGN

TRAIL DESIGN

Participants were asked to select between five distinct trail designs, ranging in intensity from a narrow, natural-surface hiking trail to a wide, paved multi-use trail with an adjacent crushed granite sidepath.

Participants largely preferred two trail types: wide, stable-surfaced family-friendly trails which can range in width from five to eight feet (31% of votes), and narrow nature trails with tread widths ranging from 18 to 30 inches (30% of votes). Specially designed trails, such as those for equestrian and mountain bike use, were also popular (20% of votes). The least popular choices were wide multi-use paved trails (10% of votes) and wide paved trails with a parallel soft-surface trail (8% of votes).

TRAILHEAD DESIGN AND AMENITIES

Participants were asked to vote for one of three trailhead designs, ranging in size from a small, neighborhood trailhead to a large, regional trailhead. Participants largely preferred medium-sized trailheads with some park amenities and fewer than ten parking spaces (49% of votes). Participants also supported larger “trailhead parks” with ample parking and varied park amenities, and small community trailheads with no parking or amenities, but at lower levels (27% and 24% of votes, respectively). Several participants cited the need for a range of trailhead sizes based on location and projected demand.

Participants were also asked about potential amenities they would like to see at Emerald Crown Trail access points. The amenities identified as most important were trail information stations/kiosks (39% of votes) and restrooms (36% of votes). Drinking fountains (listed as an additional idea at all three meetings), parking (15% of votes), and bike racks (listed at two meetings) were also deemed important. Participants were least interested in seeing seating and children’s play areas at the trailheads.



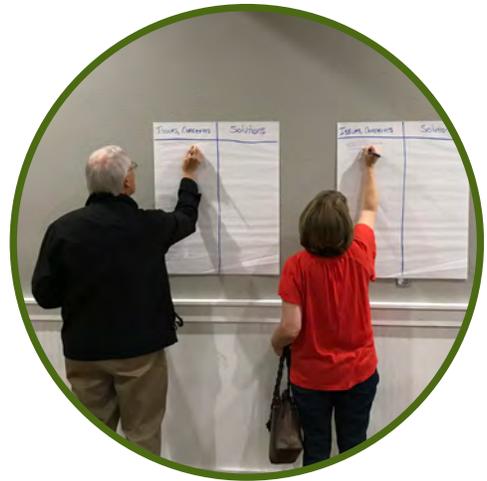
PREFERRED AMENITIES

ISSUES, CHALLENGES, AND SOLUTIONS

Participants were asked to identify potential concerns or issues with the Emerald Crown Trail concept; they were also encouraged to brainstorm potential solutions to those concerns.

Several participants expressed concern about opposition from private landowners, with the suggested solutions of sticking to routes near existing rights-of-way, working with developers as the area is built out, and routing the trail away from several specific locations.

Other issues identified included the safety of hikers and cyclists, littering and waste, and trespassing. Participants provided a range of solutions to these issues.





GENERAL COMMENTS

Participants were asked three general questions: (1) “What do you like about this project?” (2) “Are there any things about this project that you dislike or cause you concern?” and (3) “Any additional comments?” The following summarize the key input received from these comments:

What Participants Like About the Proposal

- Connectivity between communities
- Connectivity to the Violet Crown Trail and Austin
- Provision of areas for hiking and biking
- Safety provided by off-road trails
- Ability to get outdoors and spend time in nature
- Provision of a car-free route
- Project team’s concern for public input
- Opportunity for conservation of areas around trail
- Benefits of trails: promote health and community involvement
- Cooperation of landowners; no use of eminent domain

Concerns about the Proposal

- Concerns associated with trail users: noise, crime, trash, ecological impacts, trespassing
- Access: East Side of San Marcos has little trail connectivity
- Potential hazards: heat, animals
- Difficulty of acquiring necessary land/ easements
- Funding the project
- Providing adequate safety and maintenance
- Trail routing across private property
- Development spurred by the trail
- Anti-trail groups can create roadblocks
- Trails increase land values

Other Comments

- Share more examples of what trails can look like and achieve
- Work closely with City of San Marcos
- Avoid publishing maps until analysis is more refined

DESTINATIONS AND POTENTIAL TRAILHEADS

Participants were also provided with a map of the Emerald Crown Trail study area, and asked for suggestions about potential destinations, trailheads, opportunities, and areas to avoid. On the map, participants identified 47 possible trailhead locations and 76 potential trail destinations. Many of the trailhead locations corresponded with local parks, natural areas, or key connections to residential neighborhoods. 33 comments providing general information or input were also received. These ranged from the serious (e.g., “Need connections to east side of I-35”) to the whimsical (e.g., “Water-powered zipline”). Comments also identified existing low-density residential areas where landowners did not want to see any trail development.



Local Trail Route Planning Meetings

Following the public workshops, route planning meetings were held in San Marcos, Kyle, and Buda during August 2018. Small groups of city staff and stakeholders in each community met to review input from the public workshops and identify feasible corridors for the future Emerald Crown Trail. Each meeting followed a similar process:



IDENTIFY **EXISTING ASSETS**

Each group began by identifying publicly owned lands, existing trails, utility easements, and other areas that could support public access. These properties are most-easily developed into a future trail, and are a key part of developing a feasible trail corridor.



IDENTIFY **NEAR-TERM OPPORTUNITIES**

The groups then identified upcoming opportunities that could support trail development. These included government projects like new park or trail development, new residential or commercial developments that could support or include trails, and transportation projects that would include bicycle and pedestrian infrastructure.



DETERMINE **KEY TRAILHEADS AND DESTINATIONS**

Each group also identified five to seven major trailheads, access points, or destinations. By identifying these major “control points,” each group ensured that the Emerald Crown Trail would access key sites in their community.



REVIEW AND REFINE **POTENTIAL TRAIL CORRIDORS**

Identifying existing assets, near-term opportunities, and key destinations allowed each group to highlight two to three possible trail corridors for further review. In most of the route planning meetings, small breakout groups then looked more closely at each corridor to determine a feasible route for the Emerald Crown Trail. The large group then reviewed these routes, provided further refinements, and selected one to two routes as the preferred option.

National Park Service staff then took these maps and digitized the proposed Emerald Crown Trail routes, using GIS data and aerial imagery to further refine the routes where needed.

Regional Trail Work Group Route Review

The Regional Trail Work Group convened in October 2018 to review and refine the proposed routes. In reviewing the routes, the Work Group identified a number of challenging segments, sections that might consider alternate routes, and areas where further research was needed. An ad hoc work group was formed (including representatives from all four government entities) in order to review and address these concerns. This ad hoc group presented the final proposed trail alignment to the Regional Trail Work Group in December 2018.

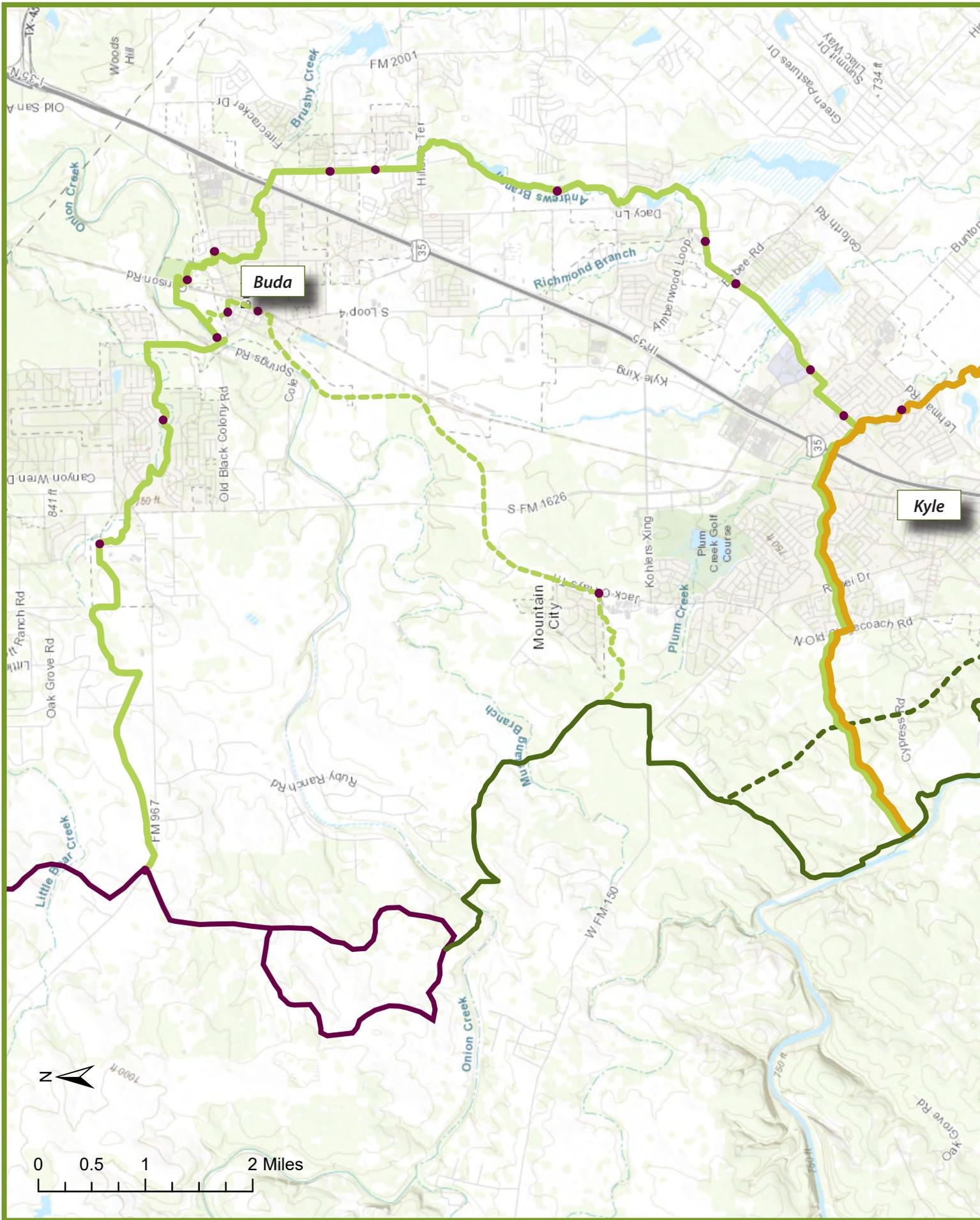


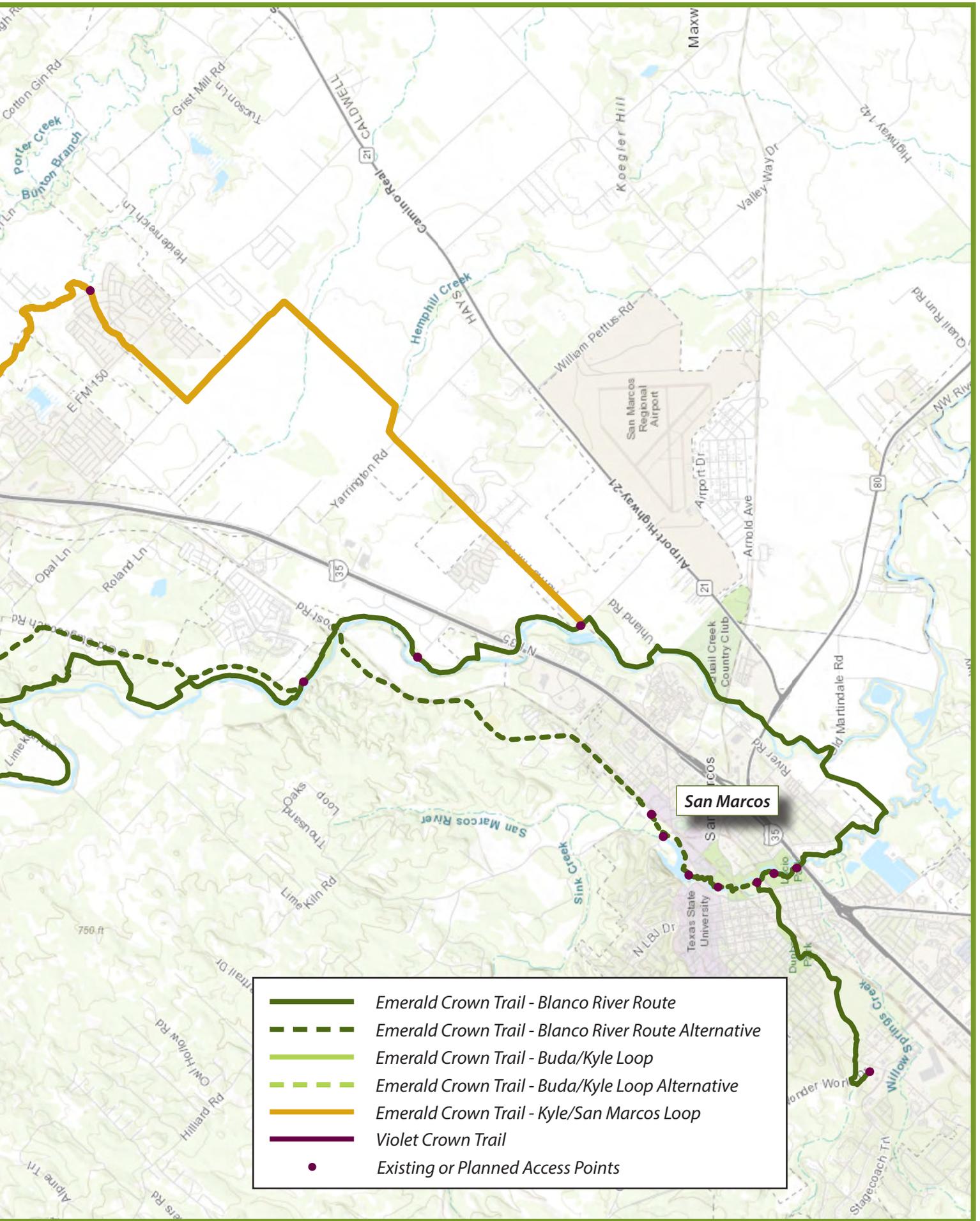


Trail Alignment

OVERVIEW

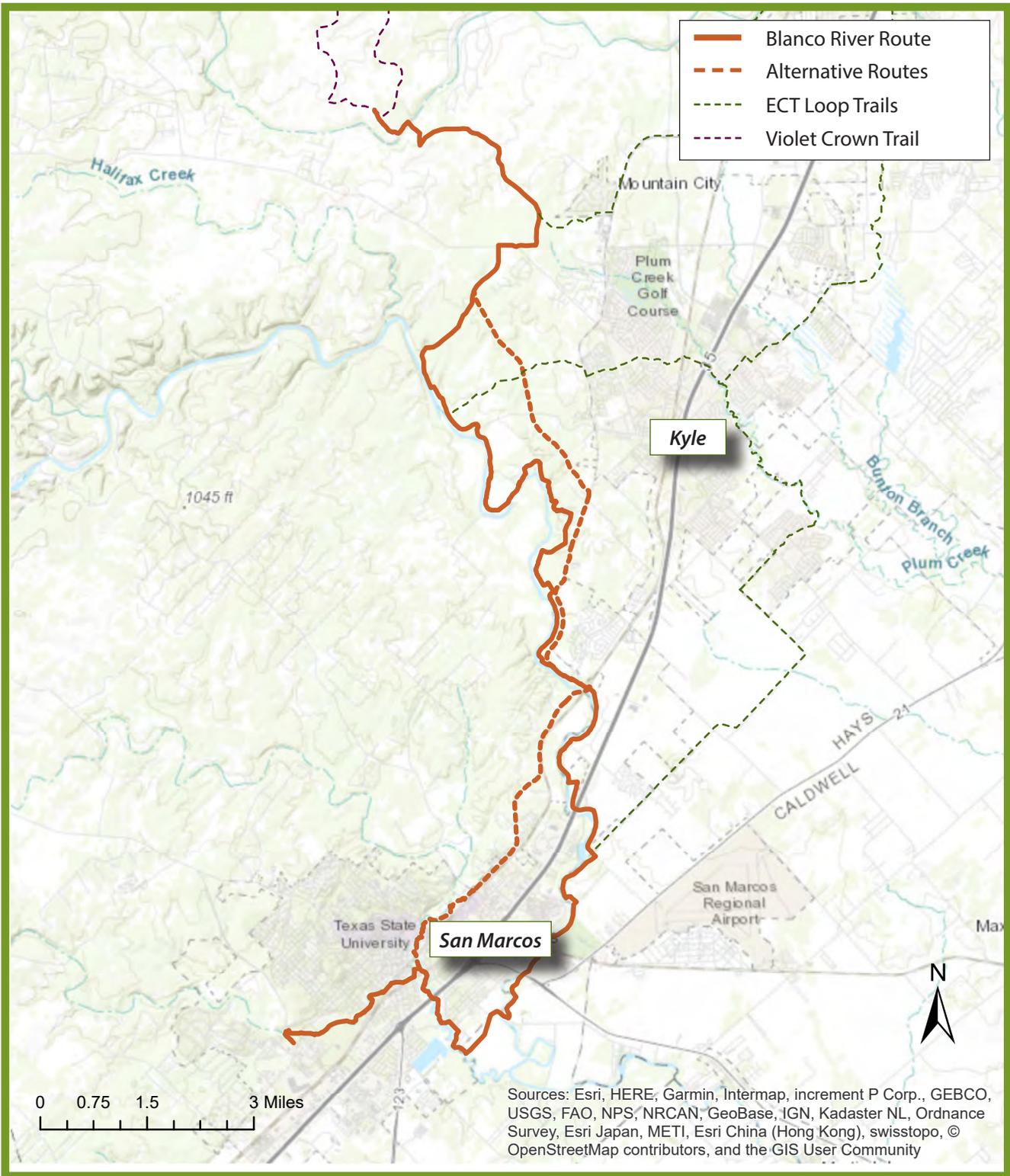
The Emerald Crown Trail alignment included on the following pages provides a detailed concept for a trail linking the communities of eastern Hays County. While detailed, the route is meant to be a starting point for planning and discussion with landowners, stakeholders, and governmental representatives. As each segment is investigated further, the suggested routes may change—adapting to on-the-ground circumstances and new opportunities. This plan includes three distinct segments: a “Blanco River Route” that parallels the Blanco from the Violet Crown Trail to San Marcos, and two loops that provide access east of IH-35 and to residential areas of Buda and Kyle. Governmental entities along the route are encouraged to pursue all of these route segments with equal priority, with the goal of creating a true recreational and alternative transportation asset for Hays County.





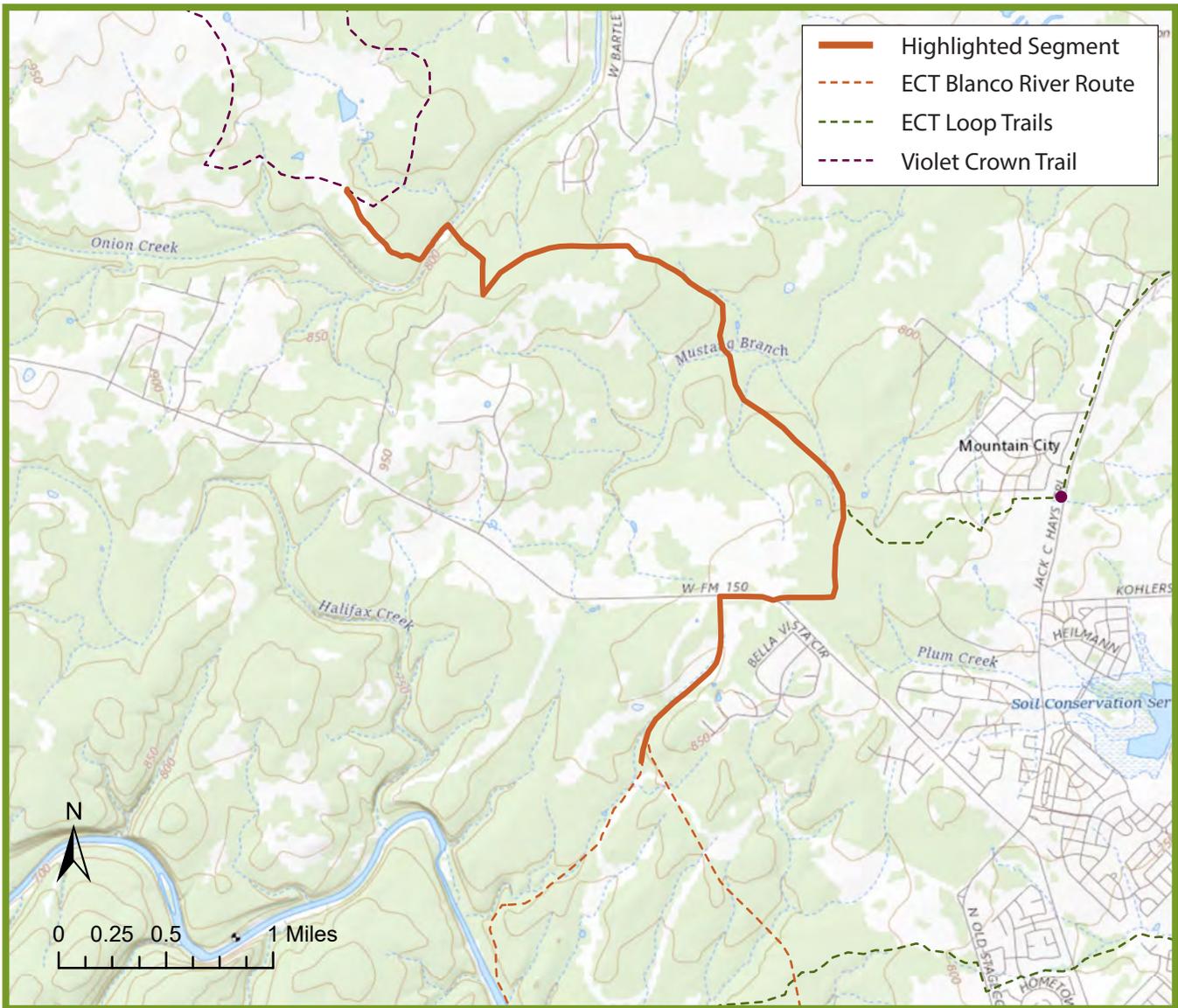
-  Emerald Crown Trail - Blanco River Route
-  Emerald Crown Trail - Blanco River Route Alternative
-  Emerald Crown Trail - Buda/Kyle Loop
-  Emerald Crown Trail - Buda/Kyle Loop Alternative
-  Emerald Crown Trail - Kyle/San Marcos Loop
-  Violet Crown Trail
-  Existing or Planned Access Points

BLANCO RIVER ROUTE



VIOLET CROWN TRAIL TO FM 150

This section of the trail connects with the terminus of the Violet Crown Trail north of Onion Creek on City of Austin Water Quality Protection Lands. The route runs through the proposed Anthem development before intersecting with FM 150 and continuing south along the route of the proposed FM 150 realignment.

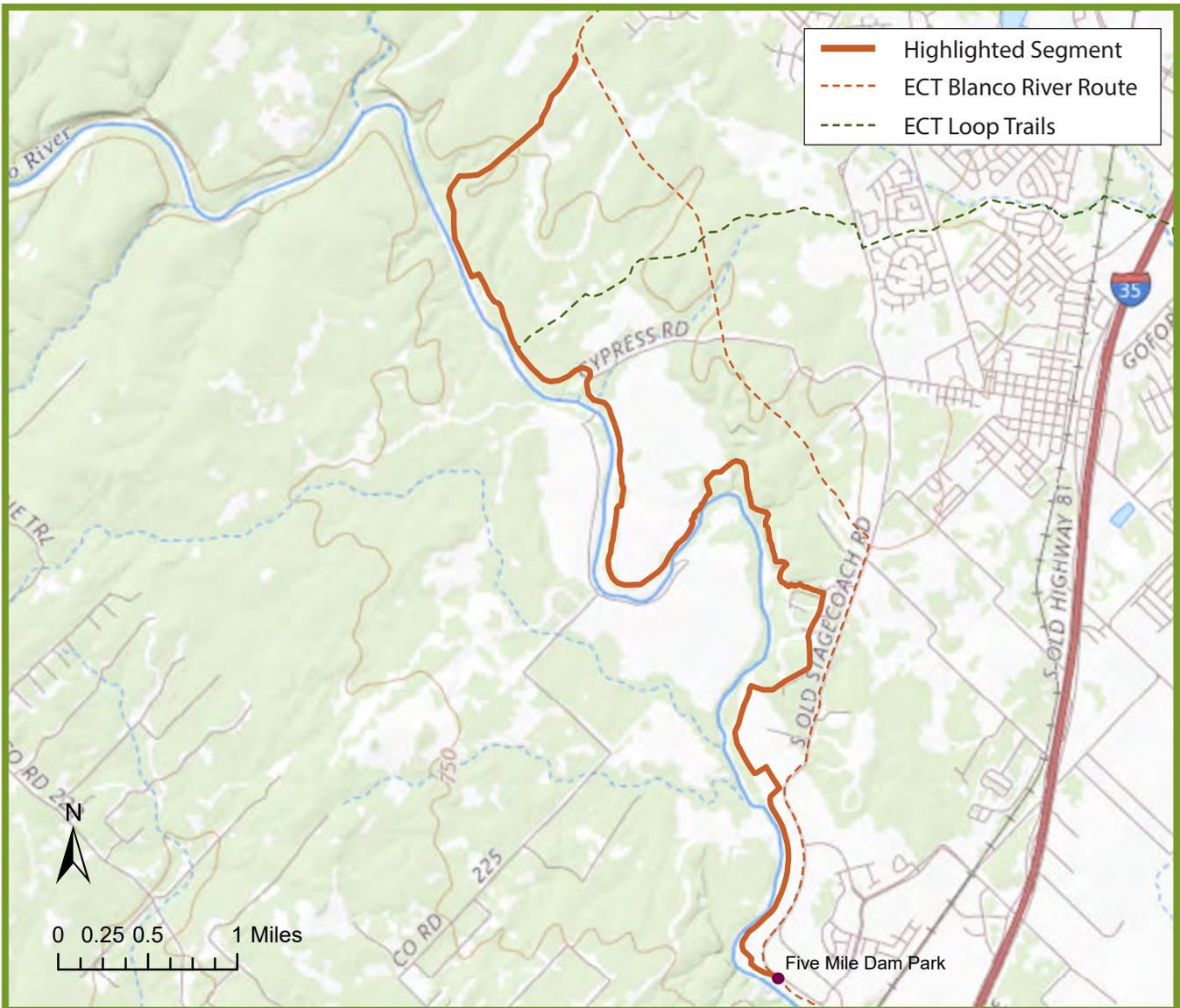


5.5 miles

- DESTINATIONS**
- Violet Crown Trail
 - Austin Water Quality Protection Lands
 - Onion Creek

FM 150 TO FIVE MILE DAM PARK

This section of the trail continues southwest until reaching the Blanco River and then parallels the Blanco to Five Mile Dam Park. The route meanders to address steep topography and residential development adjacent to the river. Portions of this route are currently being developed.



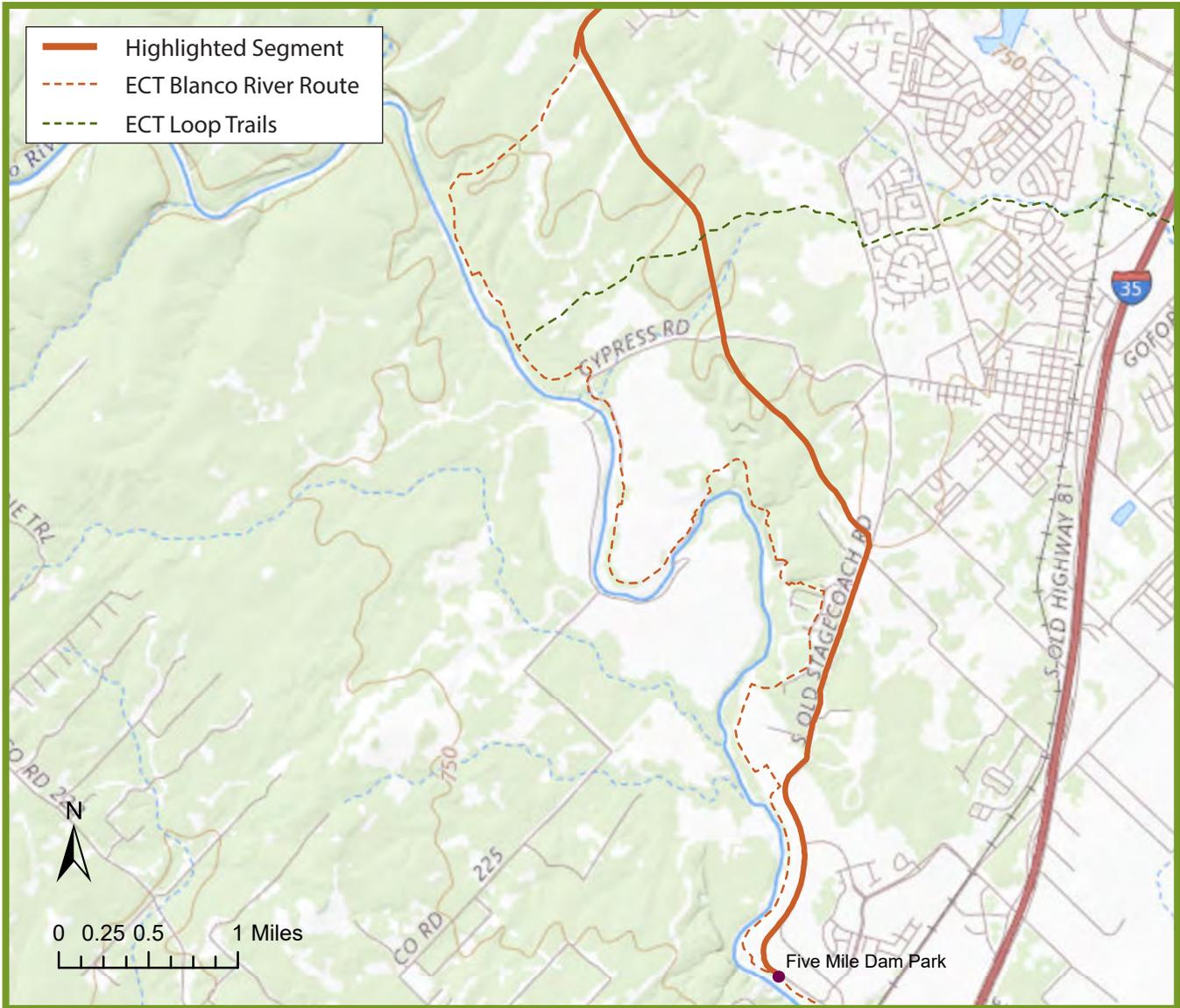
9.0 miles

DESTINATIONS

- Blanco River
- Claiborne Kyle Log House
- Five Mile Dam Park

FM 150 ALTERNATIVE

Hays County and the Texas Department of Transportation are currently working on a realignment of FM 150 west of Kyle. Initial plans call for a four-lane roadway with adjacent bicycle and pedestrian facilities. This project provides a potential alternative to the section of the Emerald Crown Trail along the Blanco River. This route would utilize the sidepath along FM 150, turning south at the intersection of Old Stagecoach Road. The route would then continue along Old Stagecoach Road to Five Mile Dam Park.



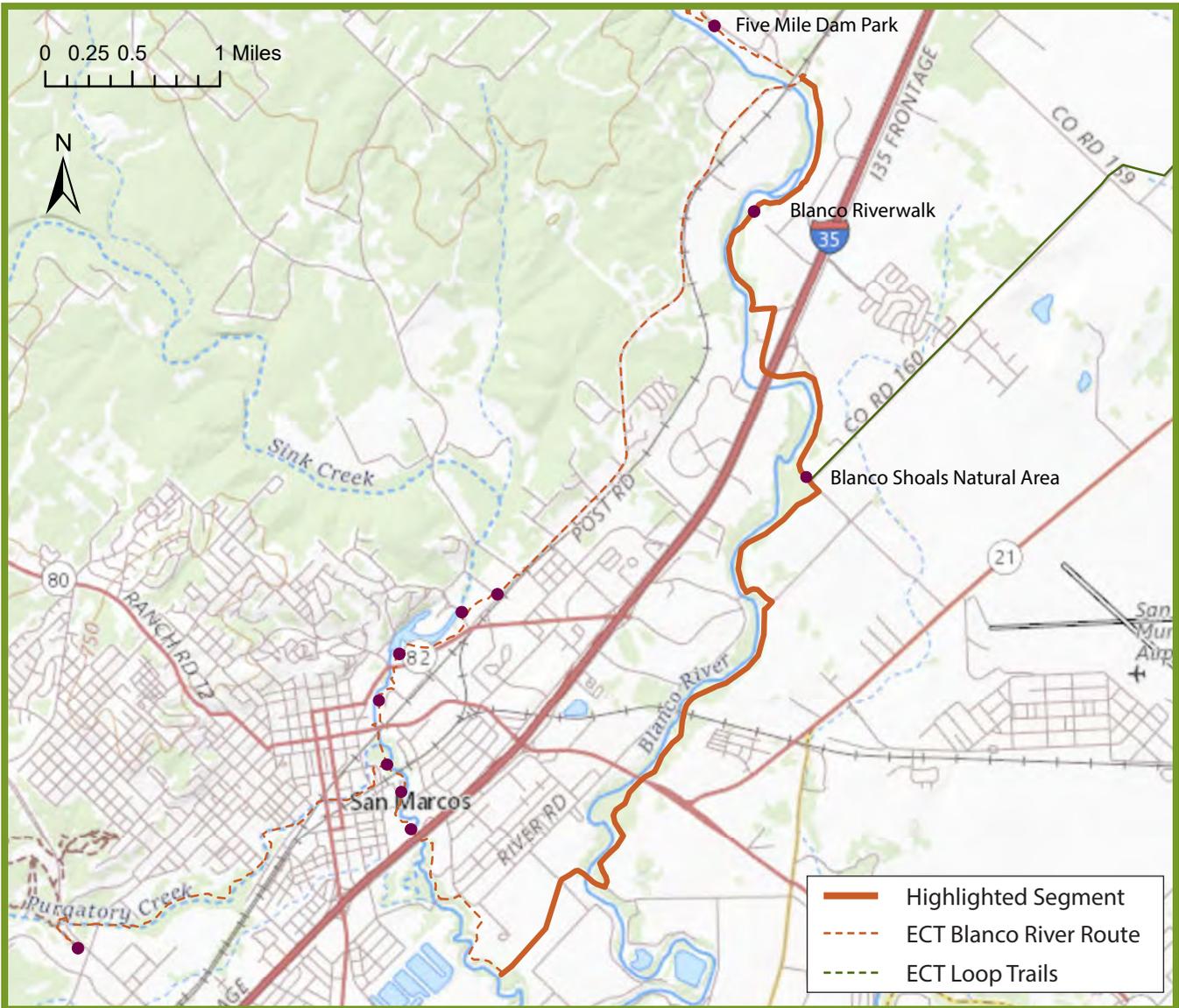
6.0 miles

DESTINATIONS

- Claiborne Kyle Log House
- Five Mile Dam Park
- Blanco River

FIVE MILE DAM PARK TO SAN MARCOS RIVER

This section of the trail continues along the east bank of the Blanco River, running through San Marcos' Blanco Riverwalk before crossing under IH-35 at an existing underpass. The route runs through Blanco Shoals Natural Area, continues under the railroad tracks, and then crosses to the west bank of the Blanco at Old Martindale Road. The route will continue south across City of San Marcos property to the banks of the San Marcos River.



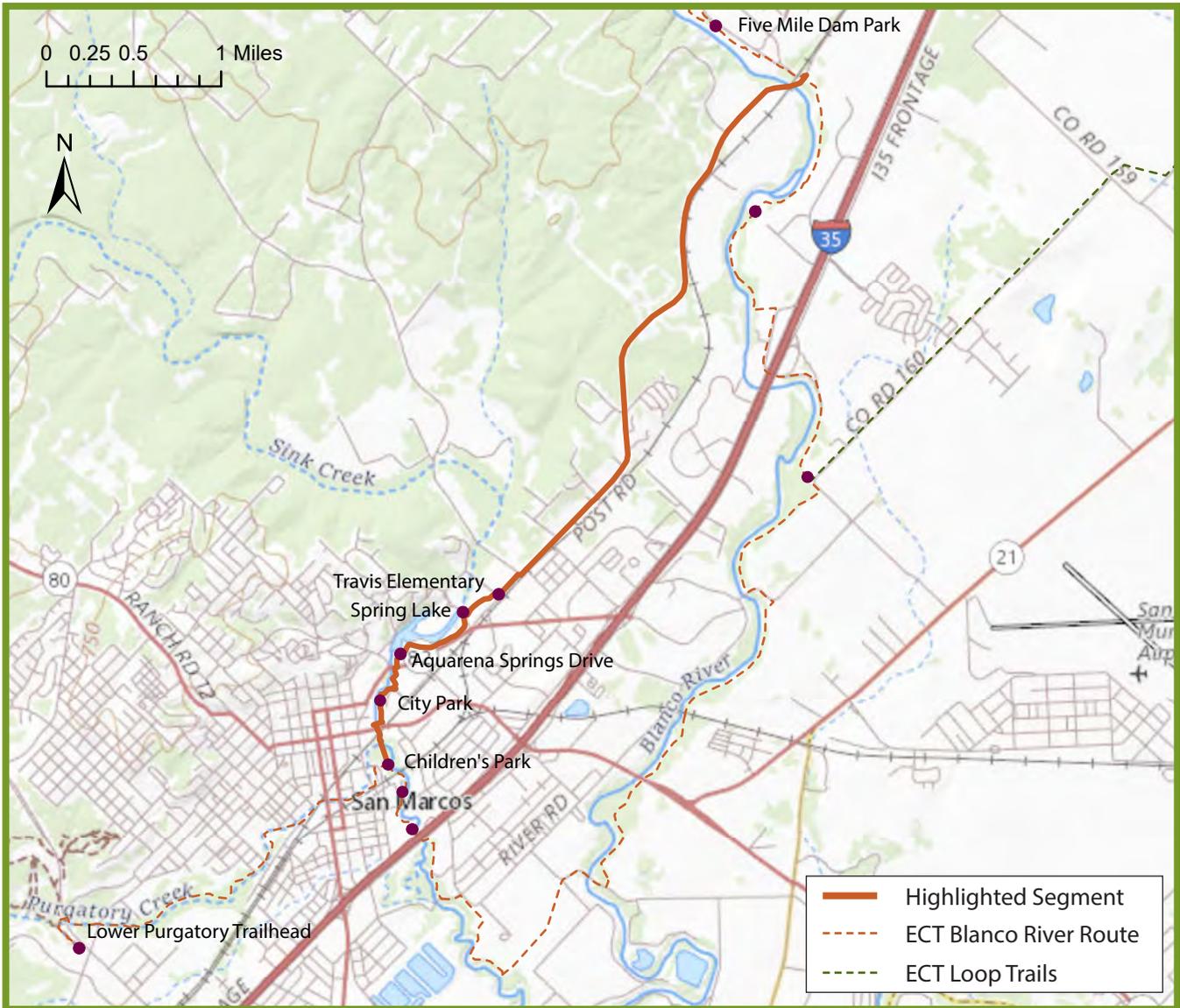
7.3 miles

DESTINATIONS

- Five Mile Dam Park
- Blanco River
- Blanco Riverwalk
- Blanco Shoals Natural Area
- San Marcos River

POST ROAD ALTERNATIVE

This western route in San Marcos would follow Post Road south from Five Mile Dam Park, following the route of El Camino Real de los Tejas National Historic Trail. The route would connect to Spring Lake and follow the north/east bank of the San Marcos River through City Park, crossing on the pedestrian bridge near Hopkins Street. The trail would then continue on existing trails to Children's Park.



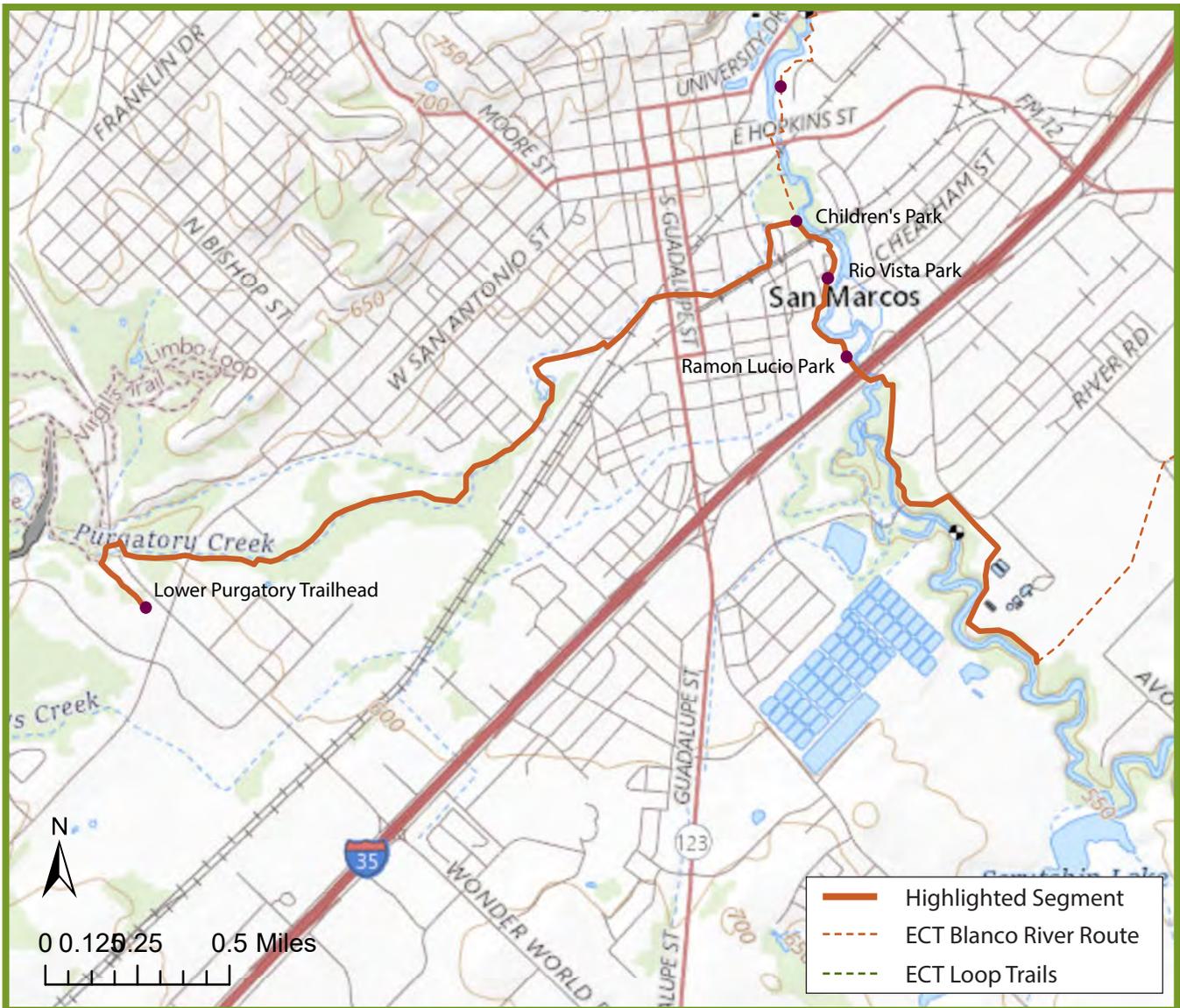
5.4 miles

DESTINATIONS

- Five Mile Dam Park
- Meadows Center/Spring Lake
- Sewell Park
- City Park
- Children's Park

SAN MARCOS RIVER TO PURGATORY CREEK NATURAL AREA

This section of the trail follows the San Marcos River west, crosses under IH-35, and continues largely along existing trails to Children's Park. From Children's Park, the route runs west along Purgatory Creek, crossing under Wonder World Drive before terminating at the Lower Purgatory Trailhead.

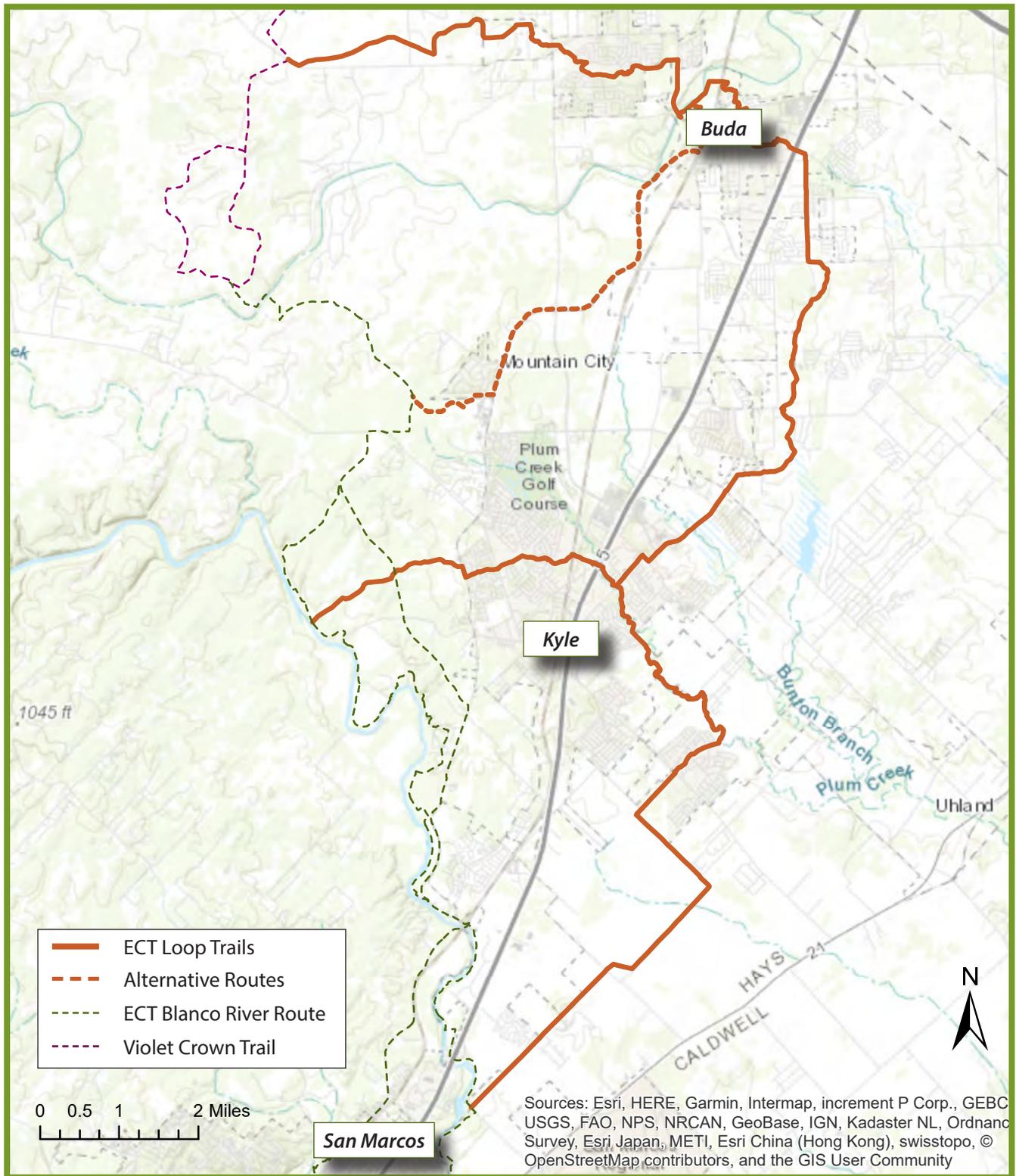


4.5 miles

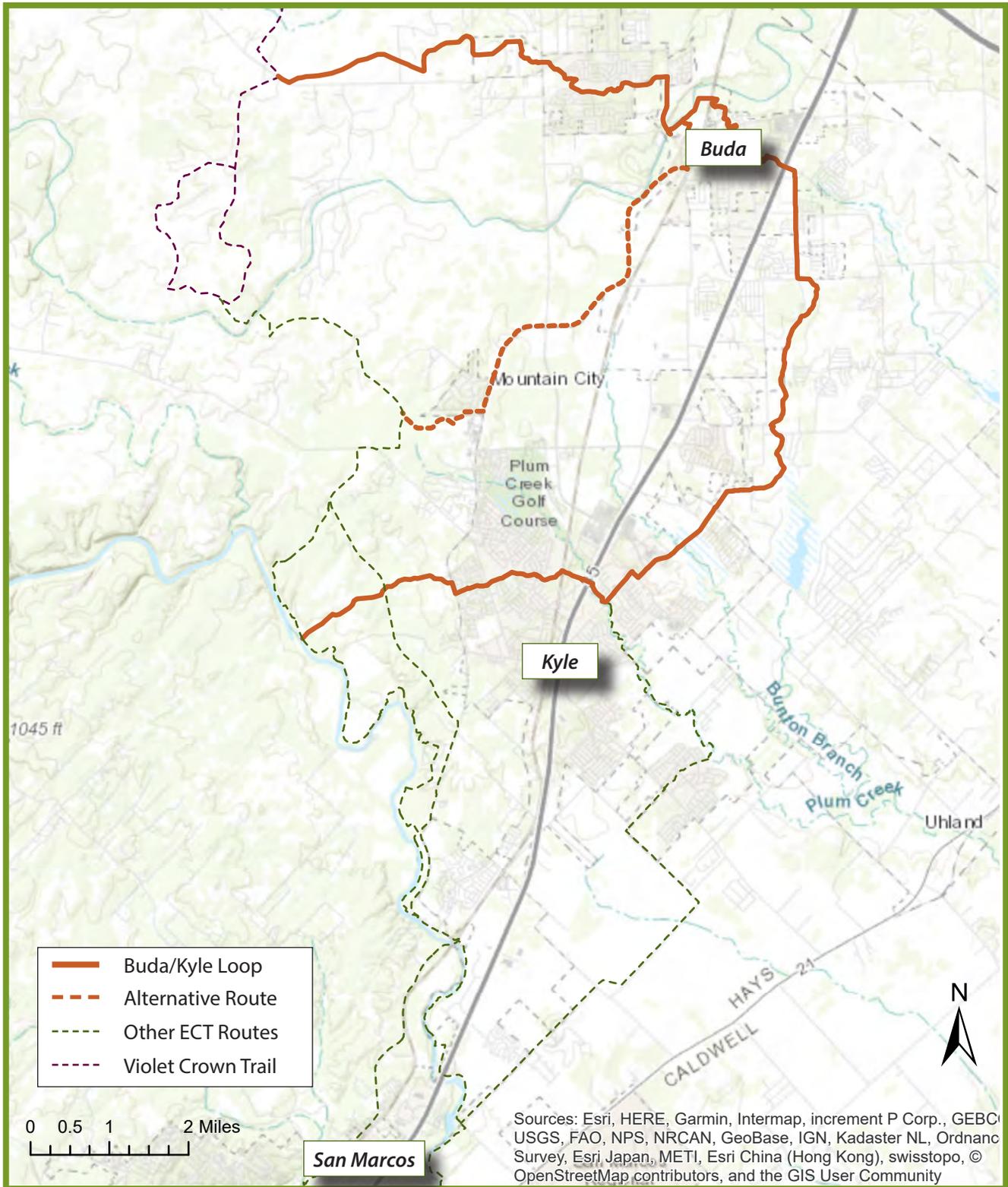
DESTINATIONS

- San Marcos River
- Ramon Lucio Park
- Rio Vista Park
- Children's Park
- Purgatory Creek Natural Area

Loop Trails

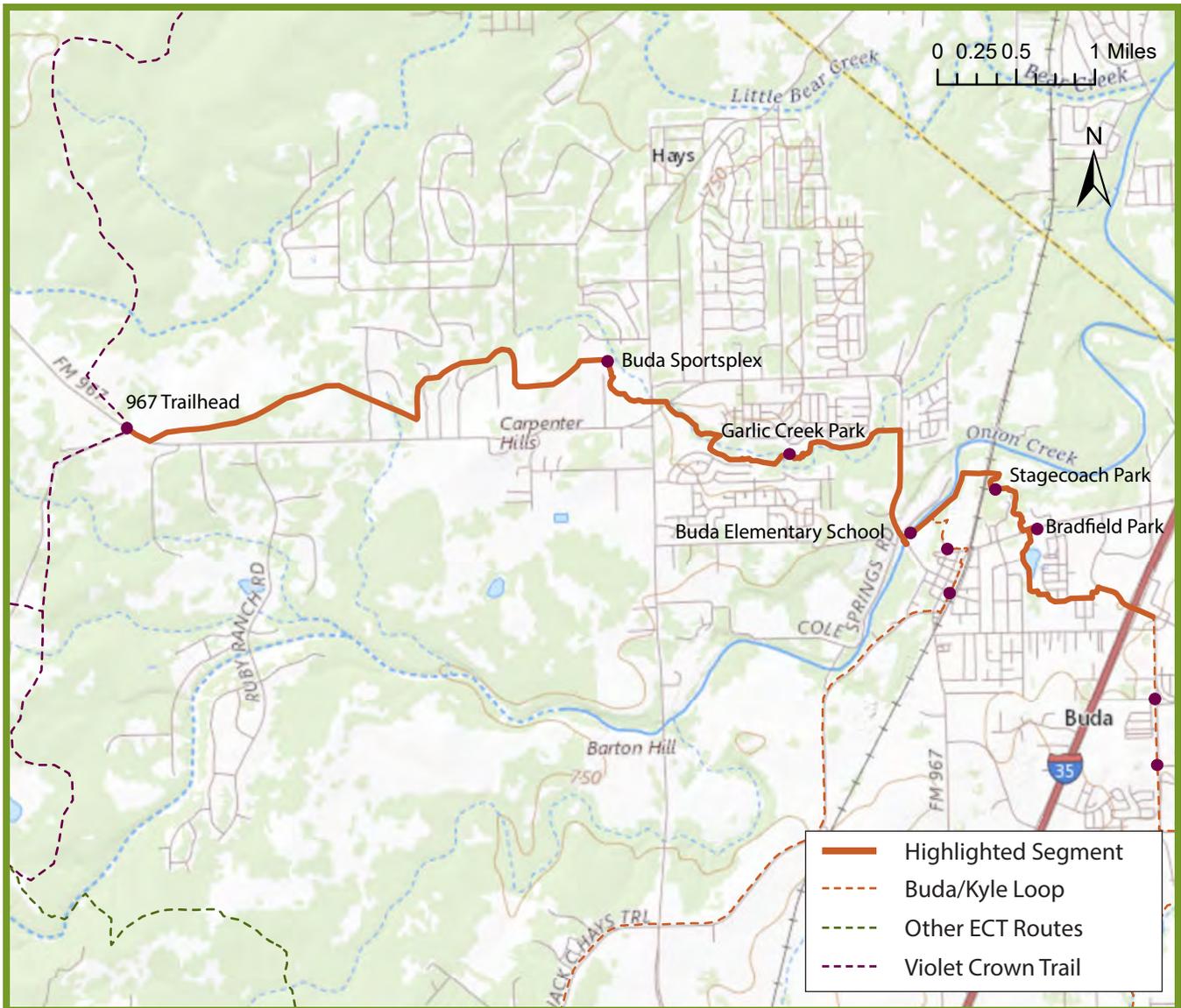


BUDA/KYLE LOOP



Violet Crown Trail to IH-35

This section of the trail begins at the Violet Crown Trail on Austin Water Quality Protection Lands and continues east along a power line easement to the site of Hays CISD's new high school. From there, the trail connects to the Buda Sportsplex before following Garlic Creek and FM 967 to Onion Creek. It then follows Onion Creek through City Park and connects to existing trails in Stagecoach and Bradfield Parks. The trail crosses IH-35 at the Cabelas Drive/White Wing Trail overpass.

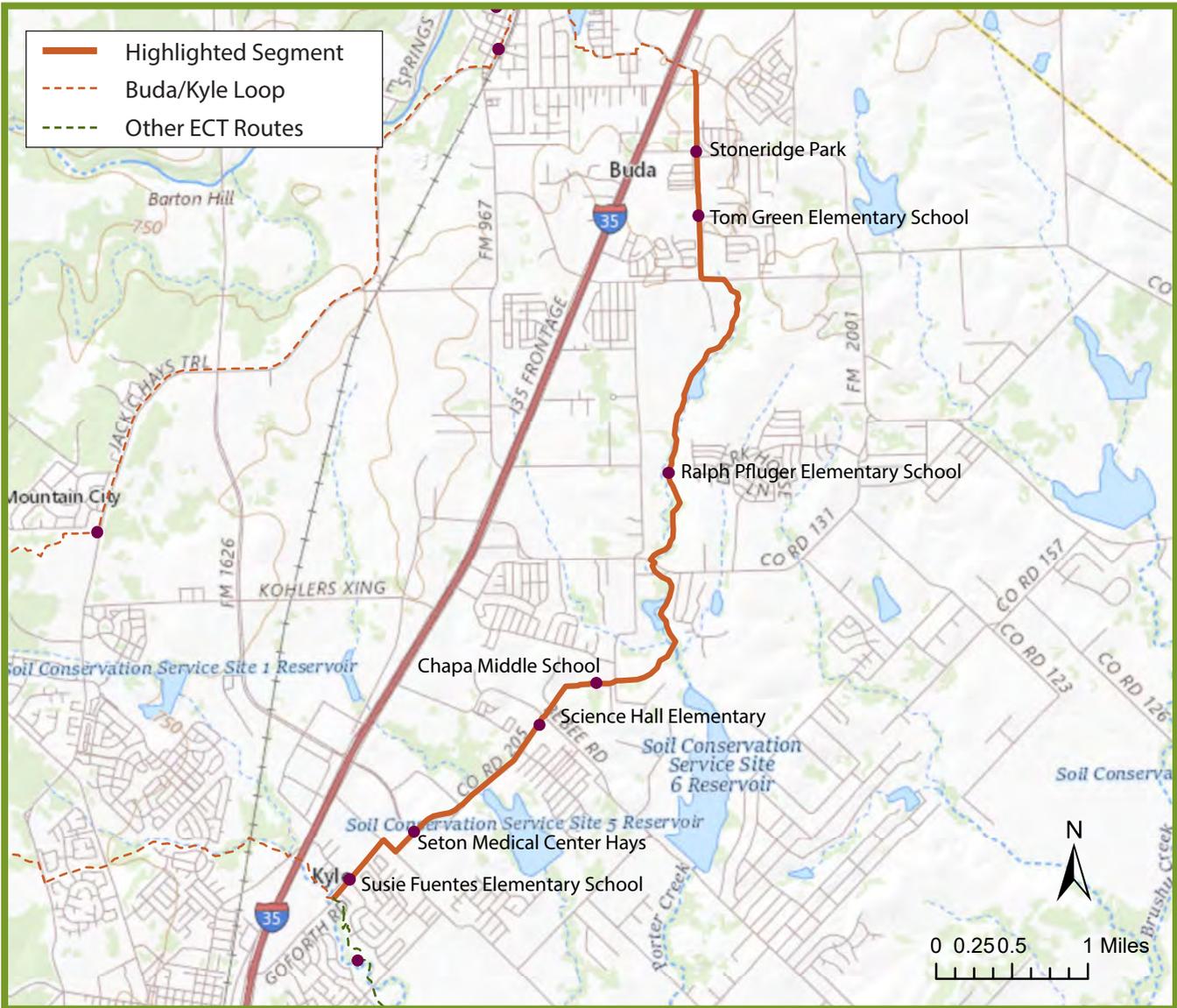


10.0 miles

DESTINATIONS	Violet Crown Trail	Garlic Creek	City Park
	Hays CISD High School	Garlic Creek Park	Stagecoach Park
		Onion Creek	Bradfield Park

FM 2001 to Plum Creek

This section of the loop follows FM 2001 south and then connects with the Andrews Branch. It parallels the Andrews Branch south to Ralph Pfluger Elementary School before connecting with Dacy Lane at Chapa Middle School. It then continues south along Dacy Lane and Philomena Drive to Plum Creek.



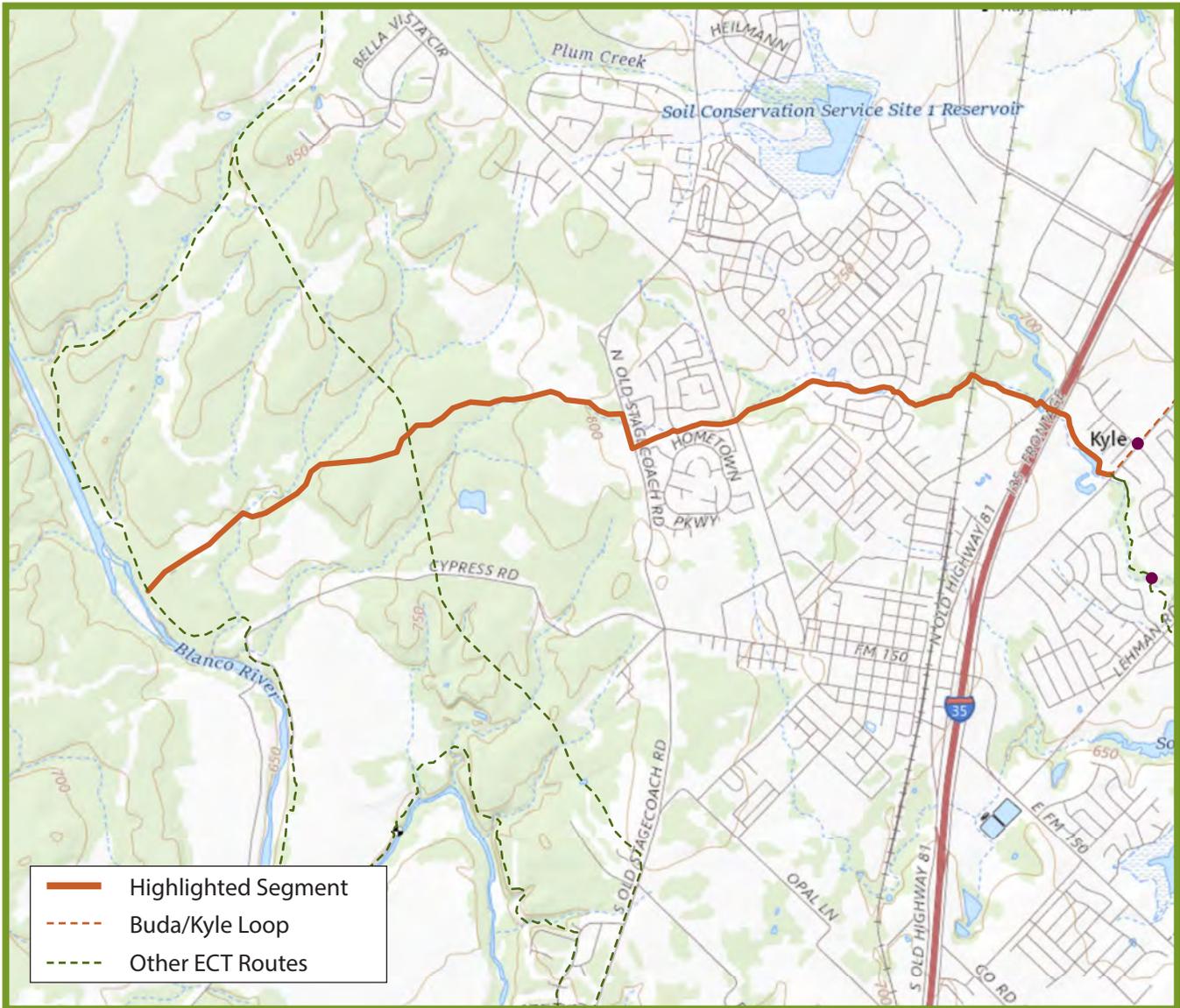
7.4 miles

DESTINATIONS

- Tom Green Elementary
- McCormick Middle School
- Andrews Branch
- Ralph Pfluger Elementary School
- Chapa Middle School
- Science Hall Elementary
- Kyle Vista Park
- Seton Medical Center
- Susie Fuentes Elementary School

Plum Creek to Blanco River

This section follows Plum Creek west, crossing under IH-35 and then continuing through residential neighborhoods to Old Stagecoach Road. From there, the trail continues across rural ranchland, intersecting with the new FM 150 alignment before reaching the Blanco River Route.

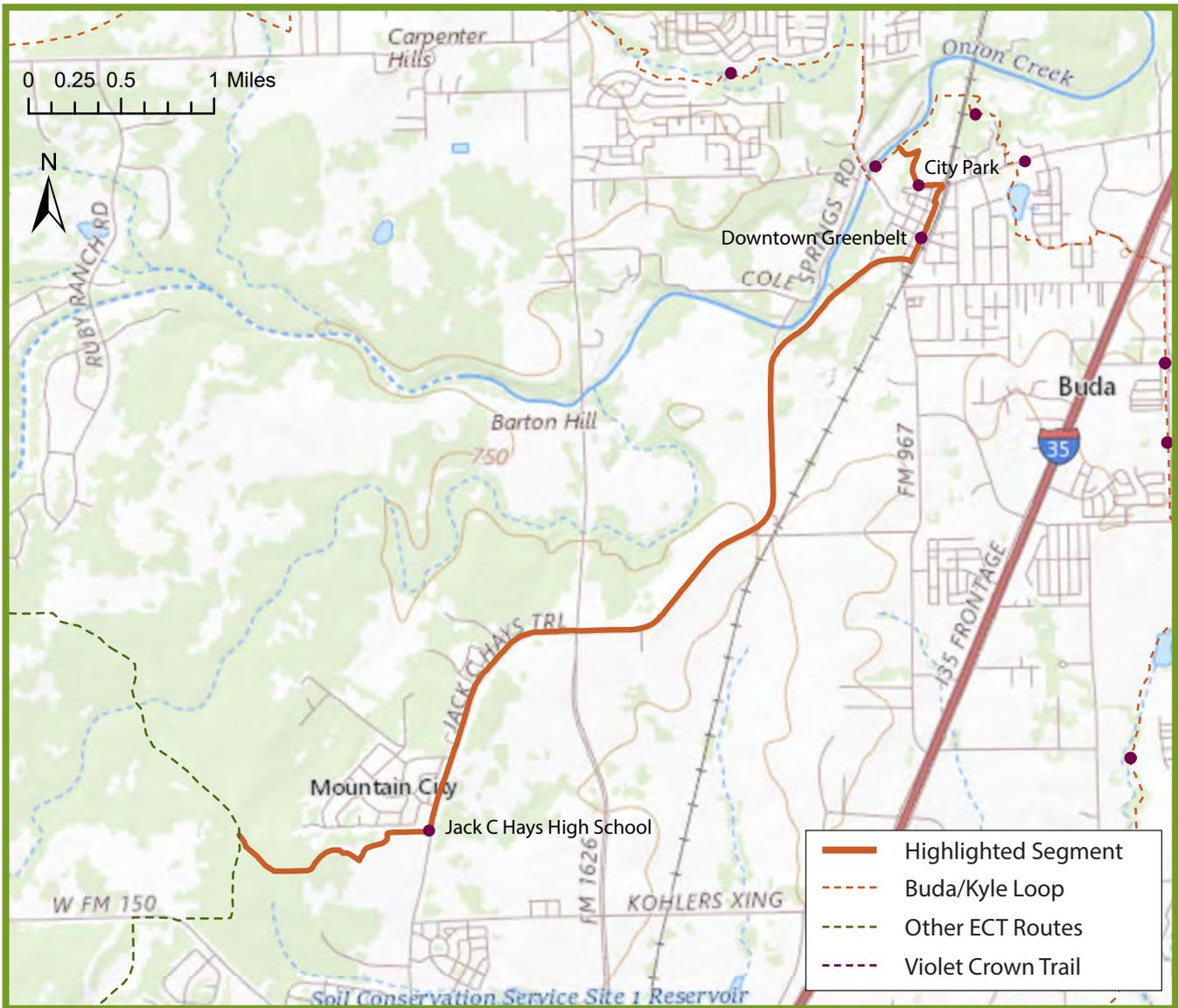


4.6 miles

DESTINATIONS
Plum Creek
Blanco River

Jack C Hays Trail Alternative

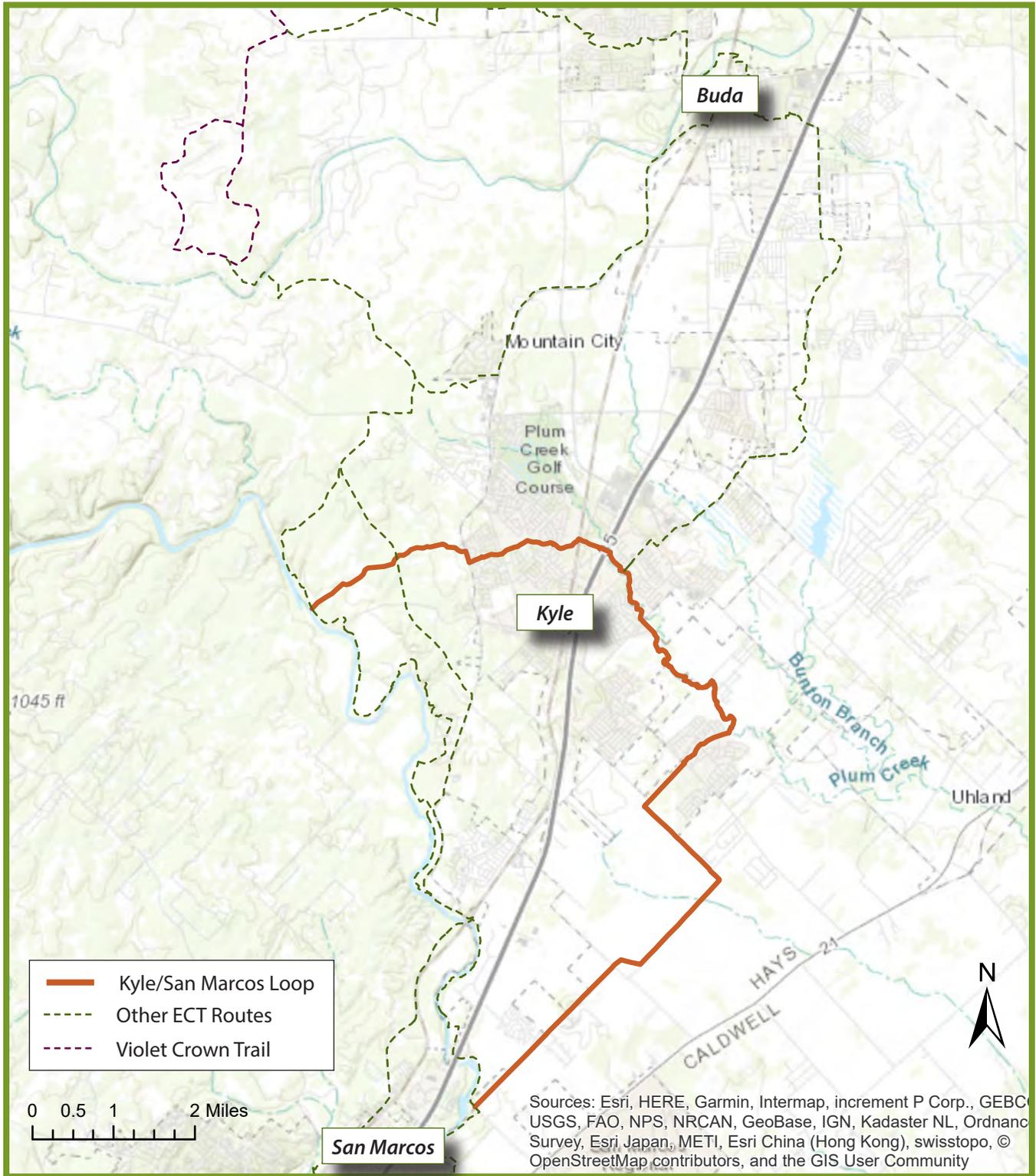
From City Park in downtown Buda, this alternative route follows the Downtown Greenbelt south to Jack C Hays Trail. From there, it follows Jack C Hays Trail to Mountain City and Jack C Hays High School. It then runs west through Hays CISD property to the proposed Anthem Development and the Blanco River Route.



6.8 miles

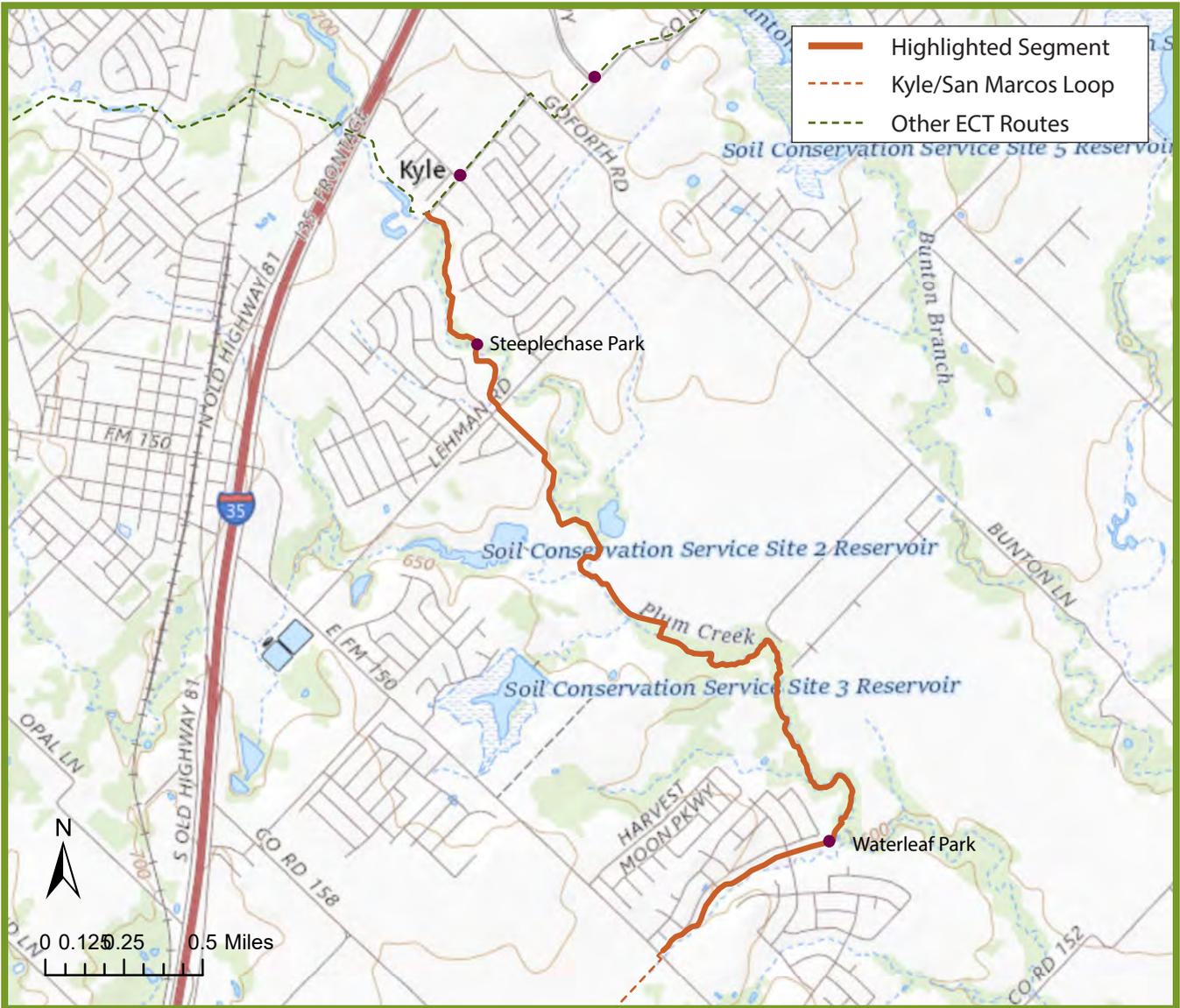
DESTINATIONS	Onion Creek	Onion Creek Senior Center	Live Oak Academy High School
	Buda City Park	Jack C Hays High School	Barton Middle School
	Downtown Buda		

KYLE/SAN MARCOS LOOP



Plum Creek to Cool Springs

This segment of the loop follows Plum Creek east from Philomena Drive through Steeplechase Park and the Lake Kyle and Plum Creek Preserve. It continues along Plum Creek to the Cool Springs development, where it turns south and intersects with FM 150.

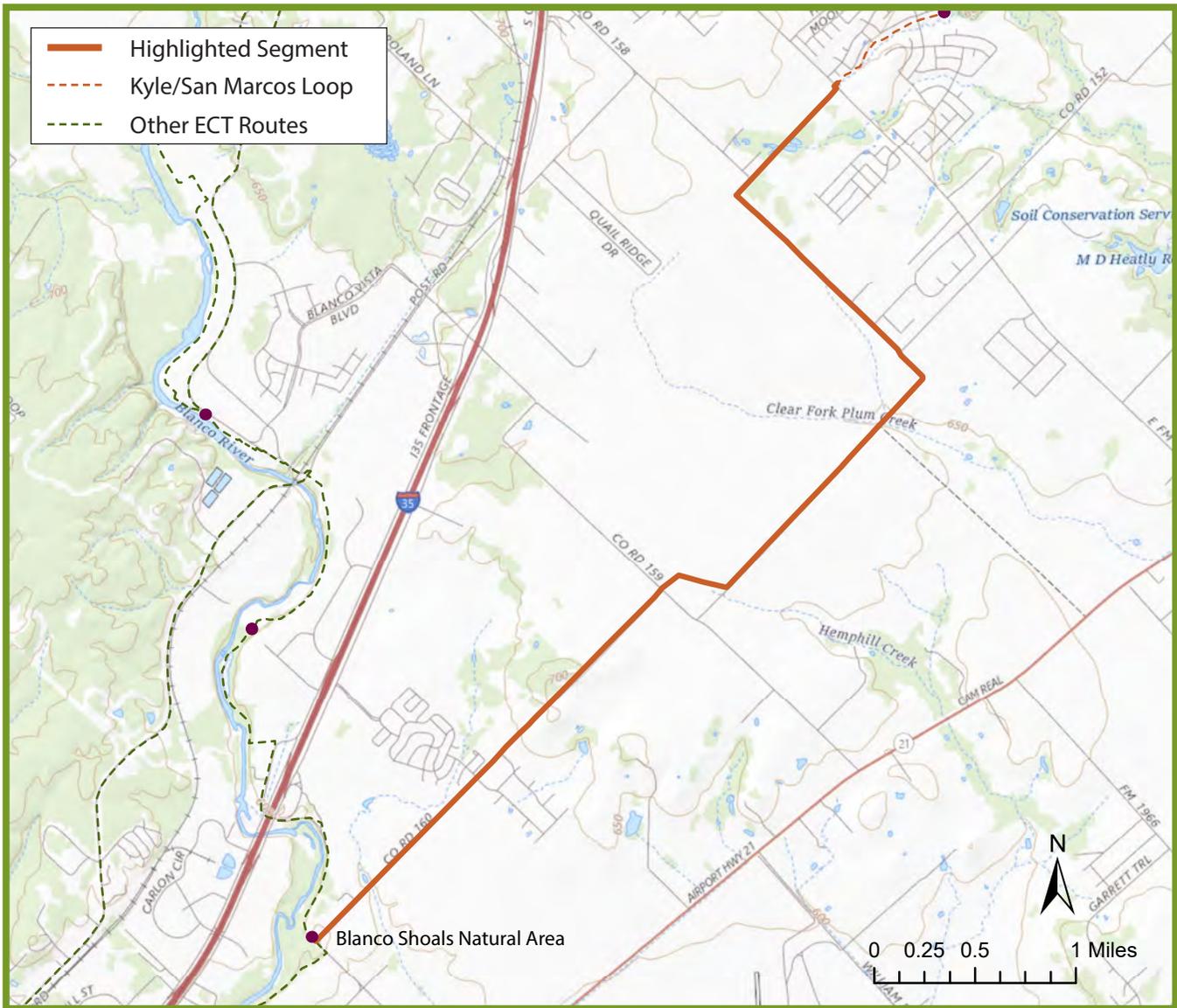


3.9 miles

- DESTINATIONS**
- Plum Creek Preserve
 - Steeplechase Park Waterleaf Park
 - Lake Kyle and Plum Creek

Cool Springs to Blanco Shoals Natural Area

This section of the loop continues south to County Road 158, then follows 158 as it heads east and then turns south. The route then intersects with County Road 160 and follows it south to the Blanco River Route at Blanco Shoals Natural Area.



6.3 miles

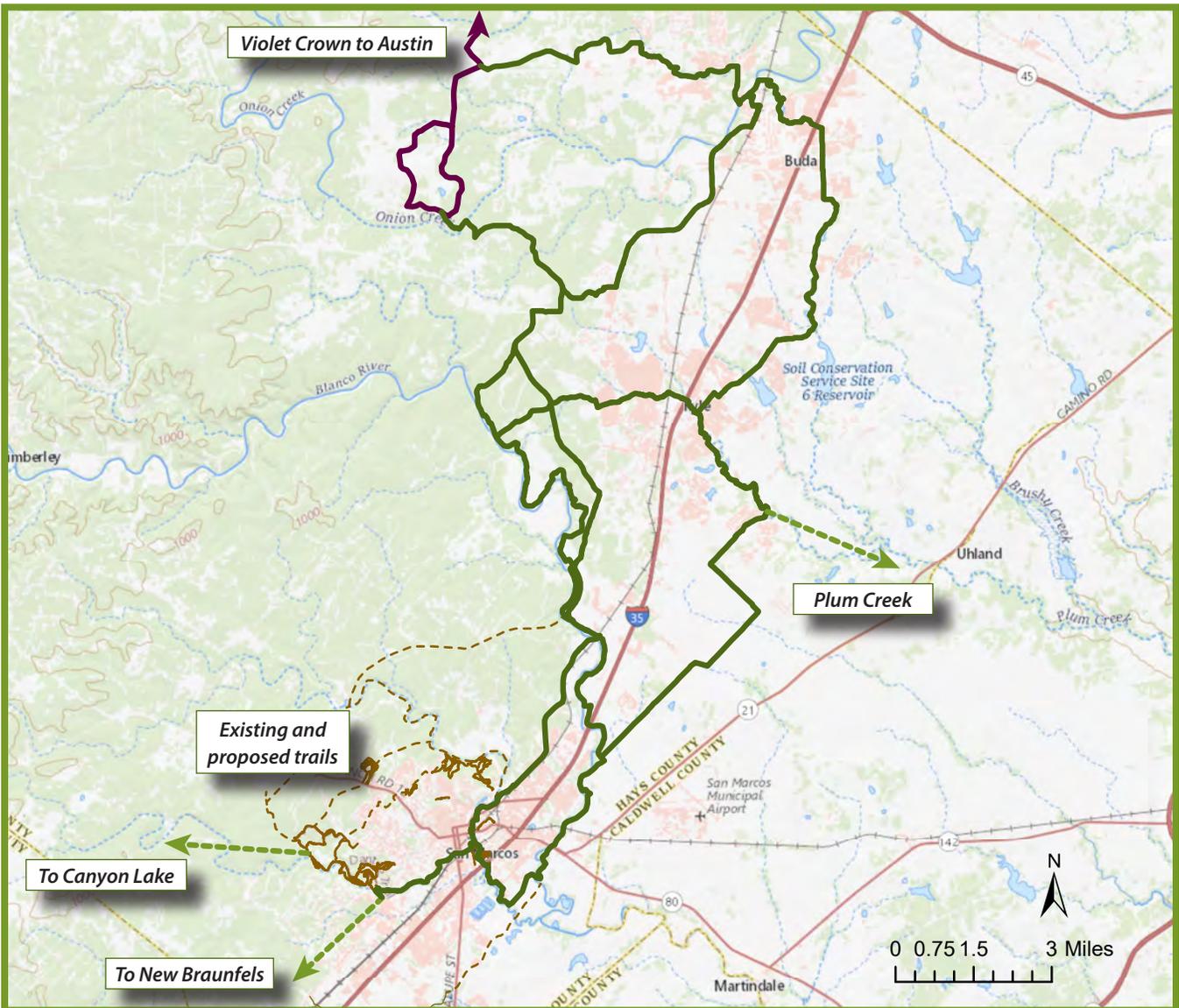
DESTINATIONS

- Cool Springs development
- Blanco Shoals Natural Area
- Blanco River

CONNECTIVITY

The Emerald Crown Trail is intended to serve as a “spine” trail that will tie together both existing and new trail segments in Hays County. The hope is that governmental entities, private developers, and others will work to link existing and proposed trails to this regional route. Doing so will create a diverse set of trail opportunities, from primitive natural experiences to convenient, suburban alternative transportation routes. It will also expand the reach of the Emerald Crown Trail, allowing more residents of Hays County to reach the trail without need for a car.

In addition to connections with local trails, the Regional Trail Work Group also envisions a future connection with a regional trail in Comal County. This effort—currently being discussed—would create an opportunity to link San Marcos with New Braunfels. Ultimately, the Violet Crown Trail, Emerald Crown Trail, and “Sapphire Crown” Trail could lead to a true regional trail linking Austin and San Antonio.



Trail Design

TRAIL DESIGN GUIDELINES

The design of the Emerald Crown Trail will depend greatly on the context of each segment, the projected level and type of use, and other factors. Because of this, the Emerald Crown Trail will likely look different in different locations, ranging from a primitive natural surface trail to a concrete multi-use sidepath. The following trail design guidelines provide a menu of options for governmental entities as they construct segments of the proposed Emerald Crown Trail route.





Preferred: Crushed Stone Trails

Participants at the Emerald Crown Trail public meetings showed a strong preference for trail designs that blended with the landscape and provided a more natural experience. Among the options provided, accessible crushed stone trails were prioritized most highly.

These trails provide a stable, firm, crushed stone surface and minimal slopes. They can accommodate a wide range of trail uses and users, and provide variable widths depending on the level and type of trail use.

General Trail Guidelines

Crushed stone trails must be designed with close attention to issues of drainage and erosion management. Minimal grades and adequate cross slopes should be employed to ensure proper drainage, limit erosion, and reduce long-term maintenance needs. In areas prone to erosion, such as low areas and/or stream crossings, the trail should be hardened or concrete trails should be utilized. Crushed stone trails should not be placed in areas prone to frequent inundation. Alignments under tree canopy should be used wherever possible to increase comfort for trail users, decrease erosive effects of direct rainfall, and minimize ground vegetation maintenance.

Easement Width

An easement width of at least 15 feet is recommended.

Trail Width

These trails should have a trail surface between 5 - 8 feet in most locations. However, in areas with significant pedestrian/bicycle traffic, crushed stone trails may be up to 12 feet wide to minimize user conflicts.

Shoulders (Recovery Zone)

These trails should have shoulders of at least 12 inches on both sides, and up to 24 inches (2 feet) of separation from signage and/or other obstacles to ensure a safe recovery zone for users.

Grade

Crushed stone trails should maintain the most gradual slope possible at all times to prevent erosion and improve accessibility. Trail alignment should be perpendicular to the natural slope to the greatest extent possible. The larger the watershed that drains across a trail section, the greater the need to minimize trail slope. Trail grades will naturally vary, yet a sustained running grade should be 3% or less, and should never exceed 5%. Sections of the trail that have grades between 5% and 10% should be limited to less than 30 feet, and will need to be hardened..

Cross Slope

Cross slopes should be limited to 2-3%.

Speed Reduction Techniques

Trails with moderate to high usage should employ speed reduction techniques to ensure safety. Crushed stone trail surface material will minimize the speed of bicycles, but additional trail signage and limitations on sustained grades or straightaways should also be implemented to reduce bicycle speed.

Sight Distance

These trails should maintain a minimum sight distance of 75-100 feet, with 100 feet approaching turns to ensure safety for trail users.

Vertical Clearance

A minimum vertical clearance of 9 feet (trees and limbs) is recommended for hiking use; 12 feet for equestrian and/or bicycling use.

Trail Surface

Crushed stone trails may be made of a variety of stable materials that promote accessibility for all trail users. Preferred surface material includes four inches crushed fines with added stabilizer over a compacted aggregate base course and a 90% compacted subgrade. To the extent possible, natural soil should be excavated so that added surface material aligns with the natural surface grade. Backfilled topsoil may be used to limit spread of the surface material. Trail edging, when used, should not impede sheet flow of surface water off of the trail during heavy rain events.





Alternative 1: Paved Multi-Use Trails

Paved multi-use trails serve a valuable function in certain contexts: they can easily stand up to heavy use, they resist erosion in areas prone to inundation, and they require minimal maintenance. While not preferred by participants in the Emerald Crown Trail public meetings, paved multi-use trails will be necessary in certain segments of the

proposed route.

These trails are designed to accommodate a wide variety of uses and users, with paved, wide surfaces, easy slopes, and complete handicap accessibility. Paved multi-use trails can accommodate heavy use, and are best situated in developed areas and along transportation corridors.

Easement Width

An easement width of at least 30 feet is recommended. Fifty feet is the preferred width, to allow room for a meandering trail, an optional adjacent running/pedestrian path, and sufficient buffer from roadways.

Trail Width

A 10-foot wide trail is recommended in areas where:

- Bicycle traffic is expected to be low, even on peak days and during peak hours
- The trail alignment provides safe and frequent passing opportunities

A trail width between 12-14 feet is recommended in areas where the trail experiences:

- High percentage of pedestrians (up to 30% of total pathway volume)
- High user volumes (up to 300 total users in the peak hour)

Where feasible, a separate natural surface or crushed stone path is recommended adjacent to the paved trail to provide an option for runners and pedestrians.

Shoulders (Recovery Zone)

Paved multi-use trails should have shoulders of at least two to three feet on both sides to provide clearance from lateral obstructions such as bushes, bridge piers, abutments, and poles. In areas where the trail is adjacent to water hazards or downward slopes exceeding 3:1, a 5-foot separation from the edge of the path to the top of the slope is preferred. In hazard situations, a 54-inch handrail height next to the trail is recommended.

Curve Radii

Paved multi-use trails should avoid sharp corners where possible, and achieve a pleasant horizontal flow instead. Trail curves should employ a minimum curve radius of 100 feet. A minimum 40' centerline radius should be employed for any necessary sharp turns.

Speed Reduction Techniques

Paved multi-use trails must consider speed reduction techniques due to surface material, trail width, and grade. Some important speed reduction techniques include limited trail straightaways through use of curves, grade changes, etc.; varying surface types (rumble strips, textured concrete/brick pavers, decomposed granite) in areas susceptible to high speeds; and trail striping to separate pedestrian and bicycle traffic in high-conflict areas.

Grade

Paved multi-use trails should employ the most gradual slope possible at all times. A running grade should not exceed 5% where possible. In sections that may require a higher grade due to topography, it is recommended that the lengths of these sections are minimized and are free of other access barriers, such as steep cross slopes.

To maximize accessibility, it is recommended that grades should be limited as follows:

- 5% maximum for any distance
- 8.3% maximum for up to 200 feet
- 10% maximum for up to 30 feet
- 12.5% for up to 10 feet

Cross Slope

A cross slope of no more than 2% is recommended. An ideal cross slope is between 1.5-2%.

Sight Distance

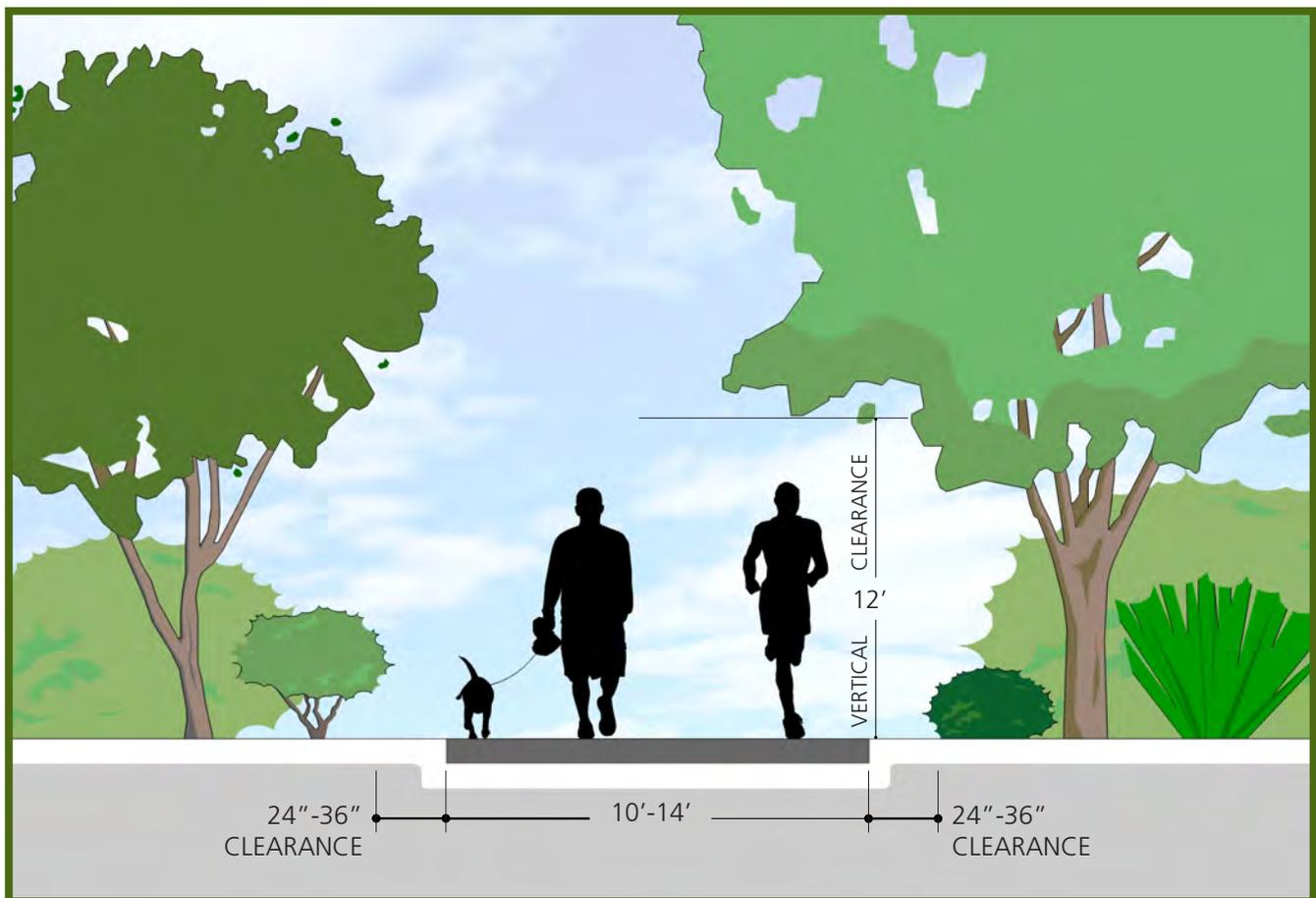
Paved multi-use trails should maintain minimum sightlines of 150 to 200 feet, depending on grade. Trail buffers should be cleared/mowed to maintain adequate sightlines around curves.

Vertical Clearance

At least 12 feet of vertical clearance is recommended.

Trail Surface

Paved multi-use trails can be constructed either with reinforced concrete paving, permeable pavers/paving, or asphalt over a compacted aggregate base course and subgrade. When properly maintained, concrete trails have a lifespan of 25 years or more and require minimal ongoing maintenance. Asphalt trail surfaces have lower cost, but also require regular, minor ongoing maintenance and have a lifespan of only 7-15 years.





Alternative 2: Natural Surface Trails

Participants at the Emerald Crown Trail public meetings strongly preferred trail designs that would provide a “natural” trail experience. Because of this, planners should consider opportunities to integrate natural surface trails along appropriate sections of the proposed Emerald Crown Trail routes.

Natural surface trails typically are best-suited for trail

segments with the lowest volumes of trail users. These trails have a narrow trail tread and can cross widely varying terrain. Providing a more primitive, close-to-nature experience, they can include mountain bike or equestrian-specific trails that are designed to minimize trail erosion and provide a suitable recreational experience.

General Trail Guidelines

Natural surface trails should be developed with a close attention to trail alignments, trail grades, and site slopes; these trails should, to the greatest extent possible, respond to existing site conditions and minimize the use of grading or other mechanized means of trail development. Natural surface trails should be designed with close attention to potential changes to tread shape due to trail compaction, displacement, and erosion. Frequent maintenance is needed to ensure effective trail drainage. As with crushed stone trails, alignments under tree canopy should be used wherever possible to increase comfort for trail users, decrease erosive effects of direct rainfall, and minimize ground vegetation maintenance.

Easement Width

An easement width of at least 6 feet is recommended when only used as hiking trails; up to 12 feet is recommended for trails with heavy hiking use, mountain biking, or equestrian use. In laying out easements, careful consideration should be given to trail alignment to avoid difficult slopes and to allow for rolling grades which require the trail to meander. Consideration should also be given to whether a different surface may ultimately be used for the trail, necessitating a wider easement.

Trail Width

The trail width can vary between 18 inches and 6 feet in width, depending on projected use and preferred user experience. Wilderness hiking trails with low use should employ narrow trail tread from 18-30 inches; moderate use trails should employ trail tread from 36-72 inches (3-6 feet); trails with equestrian use should have tread widths between 60-72 inches (5-6 feet); and trails with projected mountain bike use (with no other use intended) should employ trail treads from 12-36 inches (1-3 feet).

Shoulders (Recovery Zone)

N/A

Grade

As with crushed stone trails, trail alignment should be perpendicular to the natural slope to the greatest extent possible. The larger the watershed that drains across a trail section, the greater the need to minimize trail slope. Natural surface trails should maintain a target grade of no more than 5%. Trail grades will naturally vary, yet trail grades less than 5% are least susceptible to erosion and therefore preferred. Trail grades greater than 5% can be accommodated for short distances with close attention to tread compaction, tread width, and trail design in order

to limit susceptibility to erosion. In general, trail grade should be less than 1/4 - 1/3 of the side slope.

Natural surface trails should employ a “rolling grade” wherever possible. A rolling grade includes a series of grade reversals — dips, crests, climbs, and drainage crossings to break the trail tread into a series of segments for better drainage control. A rolling grade is used to manage water flows down or across the trail, ensuring adequate drainage while minimizing erosion. A thorough evaluation of the watershed above the trail should be completed to determine the frequency of grade reversals and the need for armored crossings, culverts or small foot bridges.

Cross Slope

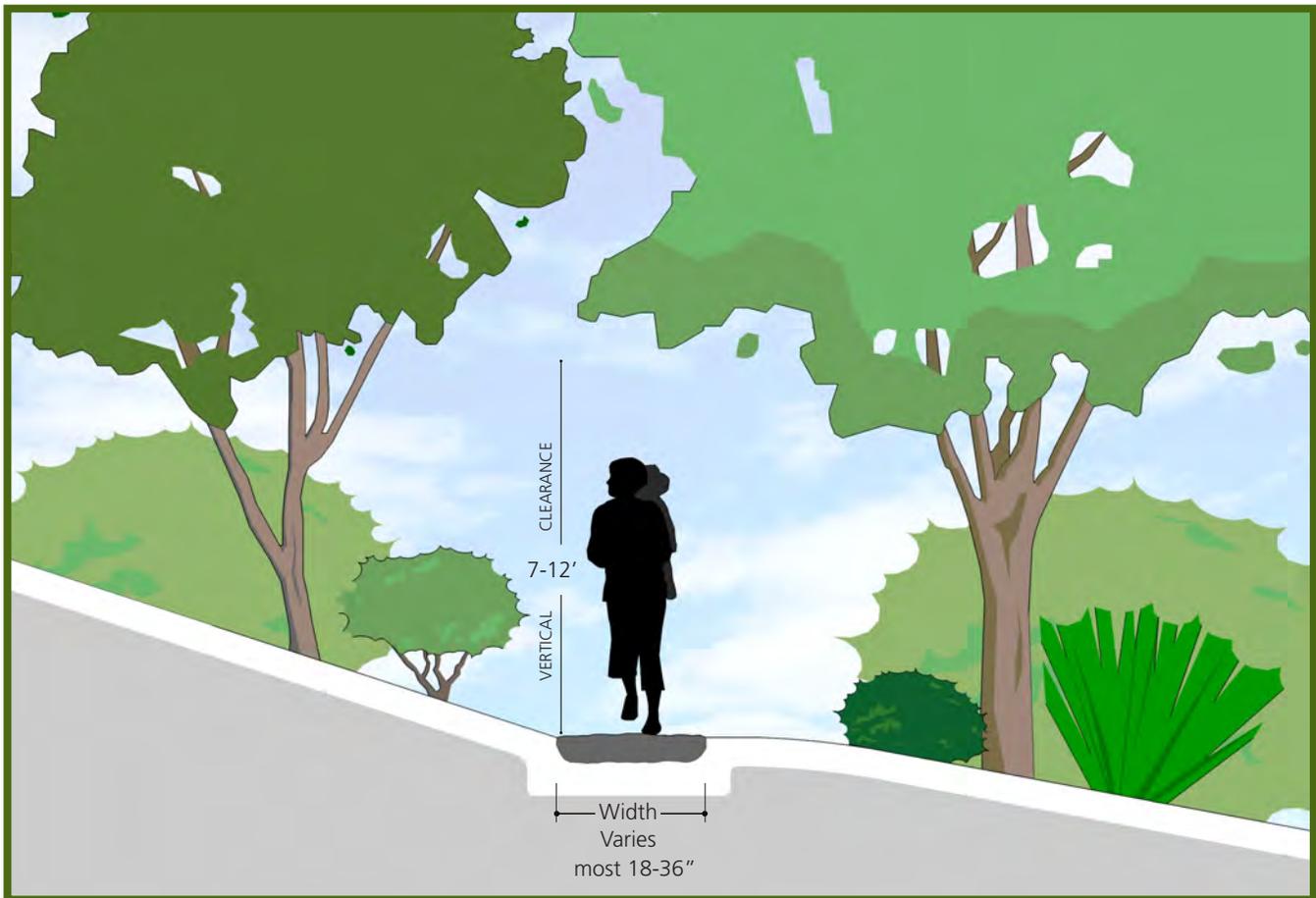
Natural surface trails should limit cross slope to between 1-2%, with a maximum cross slope of 3%.

Vertical Clearance

A minimum of 7 feet vertical clearance is recommended for hiking trails; 12 feet for equestrian and/or bicycling use.

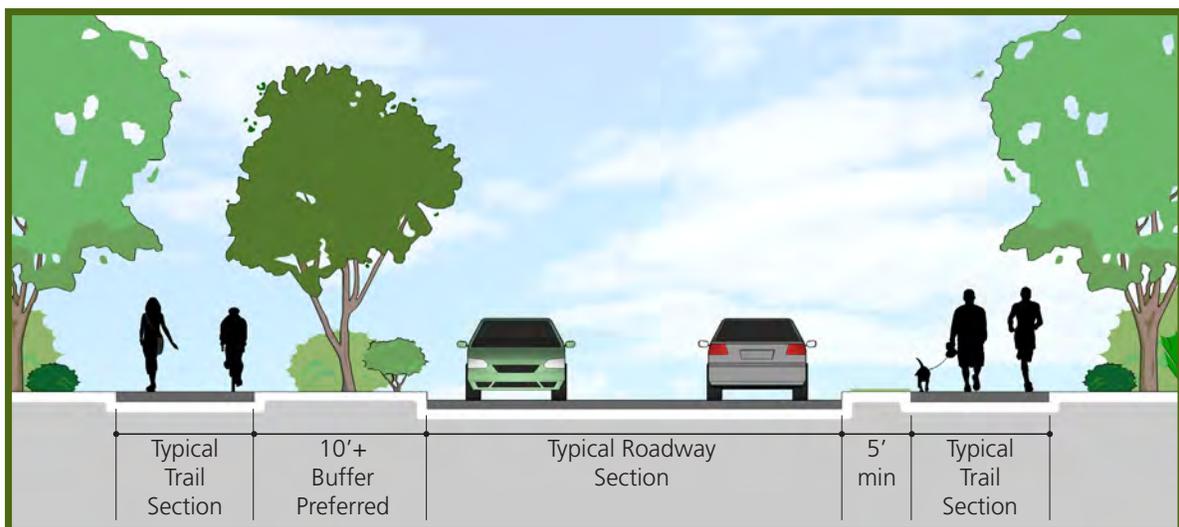
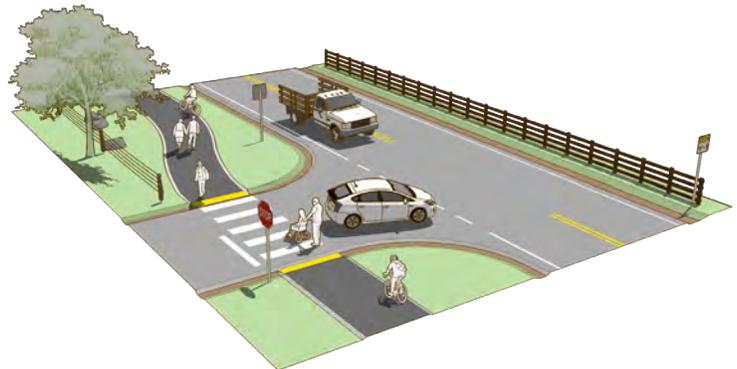
Trail Surface

Natural surface trails should consist of natural materials with a mix of soil textures that exhibit high stability, become firm and stable when compacted, hold shape when wet, and have sufficient drainage to prevent saturation. Trail protrusions (roots, rocks, etc.) should be less than 6 inches and steps should be avoided wherever possible.



TRAIL ALIGNMENT AND BUFFERS

- The Emerald Crown Trail should be designed to provide a pleasant recreational user experience. If at all possible, trails located along roadways should employ a 10-foot or greater vegetated buffer from the road. Wherever possible, trails should utilize grade separation and/or vegetative screening between the trail and the roadway to improve the user experience.
- Where trails must be located adjacent to backyards or private areas in residential areas, adequate buffers and natural screening should be provided to ensure privacy.
- In Central Texas, shade from trees is critical to a pleasant trail experience. In addition, trees also serve as wildlife habitat, act as a natural buffer for adjacent land uses, and minimize growth of grasses and shrubs that otherwise require regular maintenance and might impede the trail. When planting new trees or developing the trail near existing trees, it is important to provide some distance from the trail to avoid future maintenance problems involving roots or trail obstructions. Trail construction should avoid the critical root zone of trees whenever practicable.
- Trail design should take advantage of landscape features and include landscape anchors, edges, gateways, and terminus points/destinations. Landscape anchors—such as trees, rocks, signs, structures, hills, ridges, valleys, or other vertical features—help integrate a trail into its site. Edges are borders between landscaped features or transitions between ecological systems. Gateways are created when clearances are constrained and noticeable, such as two trees close to the trail. Terminus points/destinations are distinct landscape features that have their own appeal and provide an attraction or endpoint for a trail user or visitor. It is important to provide a diversity of vistas, ecosystems, and routes to enhance the experience of the trail users and encourage them to return as often as possible.



ENVIRONMENTAL SENSITIVITY

Some guiding principles for ecologically sustainable trails include:

- Trail placement should avoid high quality and/or sensitive habitat areas to the greatest extent practicable. Trail segments should loosely follow habitat edges where possible and should avoid fragmenting undisturbed habitat blocks. The number of wetland, stream, and other water crossings should be minimized; these crossings should use existing infrastructure (roads, bridges, utility crossings) wherever feasible. Trail alignment should seek to minimize the removal of native vegetation.
- Avoid sensitive ecological areas and critical habitat. Examples include rare ecosystems, habitats for species at risk, and areas that are easily disturbed by human activities. Wetlands, lakes, and sensitive riparian zones; public water supplies; and steep slopes are also considered sensitive ecological areas.
- Develop trails in areas already influenced by human activity. These include areas that have already been impacted by some development, such as existing trails, parks, roads, utility and power line easements, or railroad corridors. In choosing these corridors, trail development will build off of existing infrastructure and will minimize cumulative environmental impact.
- Provide buffers to avoid and protect sensitive ecological and hydrologic systems.
- Recommended buffer widths for sensitive features vary between 50-200 feet depending on local conditions, such as degree of sensitivity of the area being impacted, the type of trail design being proposed and its anticipated impact, the extent of the greenway corridor being traversed, grade and soil types, and the desired trail experience.
- Use natural infiltration and best practices for stormwater management when addressing runoff from trail development. Vegetated swales and rain gardens offer advantages over engineered stormwater control structures such as storm drains and catch basins.
- Provide ongoing stewardship of the trails and adjoining natural systems.
- Ensure that trails remain sustainable. Conditions that make trails sustainable include: trail tread that is stable and compacted, minimal displacement of soils from the trail tread, tread drains well with minimal signs of ongoing erosion, tread does not restrict site hydrology and impact surface or ground-water quality, and impacts to surrounding ecological systems are limited.
- Formally decommission and restore unsustainable trail corridors. Closing a trail involves regrading the trail ends to their original slope, replacing eroded soil, and planting native plants at trail ends.



TRAIL INTERSECTION SAFETY

In order to maximize the safety and accessibility of trail-to-street intersections, the following trail design considerations are recommended:

Two-Lane Road Crossings

ADT/Speed (85%)	< 2,000	2,000-4,999	5,000-9,999	10,000+
≤ 25 mph	Yield with traffic calming or Stop sign calming optional	Stop sign calming optional	Stop sign with added traffic calming	Consider Signal
	Yield refuge not needed	Yield or Stop refuge optional	Stop sign with refuge area or Signal	
30-35 mph	Stop sign calming optional	Stop sign with added traffic calming	Stop sign with refuge area or Signal	Consider Signal
	Yield or Stop refuge optional	Stop sign with refuge area		
40-45 mph	Stop sign refuge optional	Stop sign with refuge area	Stop sign with refuge area or Signal	Consider Signal
50 mph	Stop sign refuge optional	Stop sign with refuge area	Consider signal	Consider Signal

Four (or more) Lane Road Crossings

ADT/Speed (85%)	<10,000	10,000-19,999	20,000+
≤35 mph	Refuge area, preferably protected	Protected refuge or Signal	Signal or grade separated
≥40 mph	Protected refuge or Signal	Signal	Signal or grade separated

Other Trail Intersection Guidance

- The trail should intersect streets at a 90-degree angle;
- Trail width should be increased at some intersections to reduce user conflicts. This is most important for trails that are heavily used; widening the trail a few feet at intersections can alleviate some of the potential problems.
- Good sight lines should be provided for both motorists and trail users. Bicyclists brake reaction and perception time has been found to be about 2.5 seconds. The following formula calculates the required minimum stopping sight distance for bicyclists:

$$S = \frac{V^2}{30(f \pm G)} + 3.67V$$

Where:

S = Stopping sight distance (ft)

V = Design speed (mph)

G = Grade (ft/ft)

f = Coefficient of friction (use 0.25)

- Provide signage to ensure that motorists are aware of the trail crossing;
- Signs, both on the road and the trail, should clearly indicate whether motorists or trail users have the right of way;
- Provide a visible crosswalk across the intersection to increase trail user and motorist awareness;
- Use curb ramps as required and include detectable warnings to ensure that trail users with vision impairments are aware of the street. (Federal Highway Administration)



GUIDELINES FOR DETERMINING ROADWAY CROSSING TREATMENT

The following table provides general guidelines for roadway crossings at intersections based on speeds, and vehicular volume. The "good" standard is recommended when the trail is used by a large number of children, seniors, or disabled people. Good is also recommended if the trail crossing is heavily used and if the trail is a main recreational corridor. Source: Mn/DOT's *Bikeway Facility Design Manual* (2006).

Posted Speed	Standard	Type of Crossing Depending on Speed and Volume of Traffic		
50+ mph		Grade Separated		
45 mph	Good	Grade Separated		
	Satisfactory	Traffic Signals		
40 mph	Good	Traffic Signals	Grade Separated	
	Satisfactory	Crosswalk + Median Refuge Island	Traffic Signals	
30 mph	Good	Crosswalk + Median Refuge Island	Traffic Signals	Grade Separated
	Satisfactory	Crosswalk	Crosswalk + Median Refuge Island	Traffic Signals

Vehicular Volume (Average Daily Traffic) 2,000 4,000 6,000 8,000 10,000 12,000

Notes:

- The type of crossing selected at an intersection between a main and secondary road is usually the same as for the main road.
- If more than three lanes are to be crossed, the intersection should have a refuge or median island. Where pedestrians or bicyclists wait at an island, a push button or bicycle-sensitive traffic detection device may be desirable.
- At large intersections of very busy roads, pedestrian and bicycle traffic should be separated by grade from both the main and secondary road, instead of using signals.
- Along main roads, crossings should be at intersections. If a midblock crossing is unavoidable, there must be good sight distances. If the speed limit is over 40 mph, consider lowering the speed limit through the crossing area to 40 mph.

Based on the above table, a grade-separated crossing is desirable once speeds reach 45 mph or when a combination of speed and average daily traffic (ADT) volumes reach the thresholds highlighted in the table.

SIGNAGE/WAYFINDING

Creating a Sign “System”

As a spine trail, signage along the Emerald Crown Trail is critical for helping establish the identity of the trail and connecting it to nearby trail systems. Signage will ultimately serve a variety of purposes: helping trail users navigate along the preferred route, providing directions to nearby destinations (or from nearby destinations to the trail), and offering information about the trail and its surroundings. A successful signage and wayfinding system provides a clear graphic identity for the trail, but will be adaptable in order to integrate with and incorporate other local trail networks and community destinations. A successful sign system includes the following components:



Identity (Network) Signage

Identity signage provides a visual brand for the trail. These markers include trail markers and other features that let trail users know that they are on the Emerald Crown Trail. Identification signage should be visible and legible from a distance. It should be present at all trailheads and trail intersections, and at intervals throughout the route.



Wayfinding/Directional Signage

Following a trail through urban and suburban areas that have a multitude of connecting trail systems can be difficult and confusing. It is, therefore, extremely important for the Emerald Crown Trail to develop adequate wayfinding or directional signage to guide trail users. This signage will help trail users follow the route of the Emerald Crown Trail, but also connect them to nearby access points and other destinations. Wayfinding or directional signage is most important at trail intersections or anywhere where the direction of the trail is not clear.



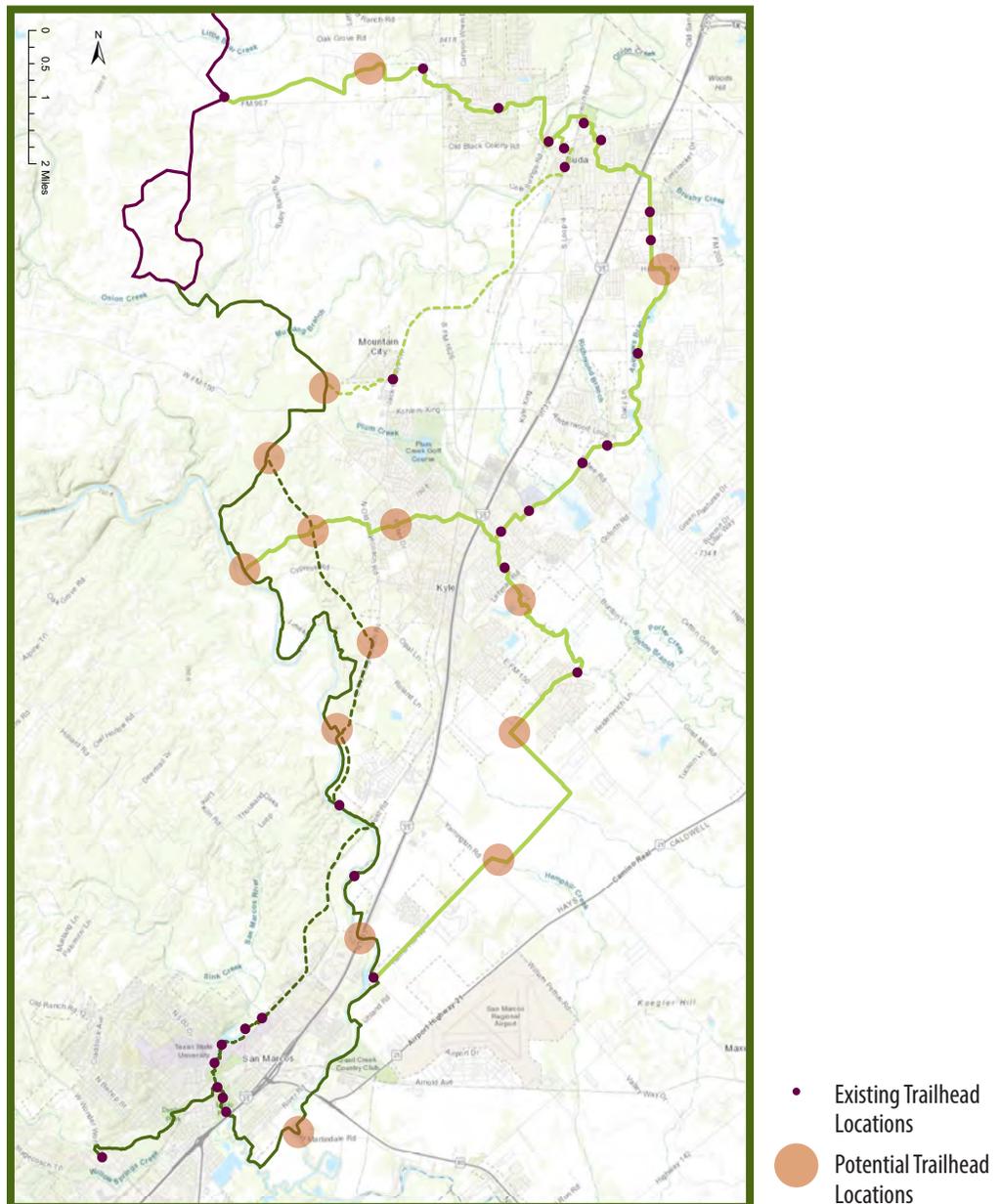
Informational and Interpretive Signage

Informational and interpretive signage provides trail users with important information about the Emerald Crown Trail and its surroundings. This signage can include trailhead kiosks, orientation maps, or interpretive waysides. It often provides information about travel times or directions, trail rules, and nearby amenities. This signage is important to include at major access points and at noteworthy locations along the route.

TRAILHEADS

The proposed Emerald Crown Trail routes highlighted in the previous section connect 27 locations that could serve as possible trailheads. These include existing parks, schools, and other publicly owned properties located directly along the route of the proposed trail. Amenities vary at these locations, but all include existing parking lots. As segments of the trail are completed, efforts should be undertaken to create welcoming Emerald Crown Trail “gateways” at these existing locations. Based on input provided at the public workshops in March, trail users are looking primarily for informational signage, restrooms, and other minimal amenities (water fountains, bike racks, etc.) at these sites.

There are still large segments of the proposed trail routes that lack suitable access points, however. As areas along the trail are developed, governmental partners should seek opportunities to develop trailhead facilities or connect the trail to suitable parks or other properties that can serve this purpose. Suggested areas for future trailhead development are included on the map below.





Implementation and Management

As a regional, multi-jurisdictional project, the Emerald Crown Trail presents an implementation challenge. Creating a destination trail will require continued coordination between jurisdictions, creative strategies for leveraging new development, and support from community groups, non-profits, and private funders. Therefore, the following multi-pronged approach to implementation and management is recommended:



A COUNTY-WIDE VISION

The *Emerald Crown Trail Master Plan* lays out a comprehensive vision for a regional trail: where it goes, what it looks like, and how people will use it. The Regional Trail Work Group hopes that this plan can serve as a guiding document for each of the jurisdictions along the trail route. To the extent practicable, this document will be adopted and integrated into local plans and policies. By doing so, these governmental entities will help codify a shared, county-wide vision for the Emerald Crown Trail.

SHARED STANDARDS

Included in this document is a set of shared standards for what the Emerald Crown Trail will look like on the ground. This set of standards will provide a toolkit for trail communities, allowing for seamless transitions between jurisdictions. The Emerald Crown Trail will likely look different in different contexts--ranging from a primitive track to a wide, paved pathway. By providing a set of shared standards, each community will ensure that they are providing a cohesive experience along the entire length of the Emerald Crown Trail.

LOCAL PROBLEM-SOLVING AND OWNERSHIP

The proposed Emerald Crown Trail passes through five different governmental jurisdictions. Each of these communities will take ownership of the planning, development, and management of the Emerald Crown Trail locally. Empowering each of these entities to “own” the trail will allow for unique local solutions that will speed implementation and sustain long-term maintenance. Governmental entities will leverage local funders, partnerships, development projects, and other strategies to build out the Emerald Crown Trail.

CONTINUED OUTSIDE SUPPORT

The Regional Trail Work Group and outside partners and stakeholders will play a critical role in the implementation of the Emerald Crown Trail. These partners can help advocate for the trail, raise awareness of the project, and secure necessary resources for on-the-ground development. Long-term, they will also likely help maintain and patrol the trail--making sure that each segment lives up to the high standards of a regional trail.

Image Credits

PHOTO	PAGES	SOURCE
Hays County Map	5	Texas Almanac: https://texasalmanac.com/sites/default/files/images/maps/2016-Hays.pdf
Blanco River	6	Wikimedia Commons User CBMJ: https://commons.wikimedia.org/wiki/File:Hays_-_Hill_Country_1.jpg
San Marcos River	5	Wikimedia Commons User WisdomFromIntrospect: https://commons.wikimedia.org/wiki/File:08-10-26_-_San_Marcos_River,_San_Marcos,_TX,_USA_-_downstream_from_the_headwaters.jpg
Hill Country	24	Flickr User Curtis Simmons: https://flic.kr/p/eardYe
Ranchland	6, Cover	Flickr User LANDTX: https://flic.kr/p/V8QRMy
Blackland Prairie		https://i2.wp.com/txmn.org/goodwater/files/2010/07/MG_9318bl.jpg
Residential Growth	7	CAMPO via hayscountybonds.com : http://www.hayscountybonds.com/growth/
Plum Creek Trail	8	City of Kyle: https://www.cityofkyle.com/recreation/plum-creek-preserves-nature-trail
San Marcos River Trail	8	Flickr User in_rainbows69: https://flic.kr/p/oQdrqM
VCT Route	10	Hill Country Conservancy: https://violetcrowntrail.com/wp-content/uploads/2016/01/2016-01-21_VCT_OverallRoute_CampaignPhases.pdf
Garlic Creek Trail	8	City of Buda: https://www.ci.buda.tx.us/DocumentCenter/View/1499/Master-Parks-and-Trails-Plan-2012?bidId=
Enhancing Our Opportunities for Play	11	City of Buda: https://www.ci.buda.tx.us/DocumentCenter/View/1499/Master-Parks-and-Trails-Plan-2012?bidId=
Buda Transportation Master Plan	11	City of Buda: https://www.ci.buda.tx.us/DocumentCenter/View/1498/MTP-Ordinance-and-attachment?bidId=
Kyle Parks, Recreation, Open Space Master Plan	11	City of Kyle: https://www.cityofkyle.com/sites/default/files/fileattachments/parks_and_recreation/page/1368/_final_pdf-1.pdf
San Marcos Parks, Recreation, and Open Space Master Plan	12	City of San Marcos: https://www.sanmarcostx.gov/DocumentCenter/View/9174/Parks-Recreation-Open-Space-Master-Plan-Draft-June-2018
San Marcos Transportation Master Plan	12	City of San Marcos: https://sanmarcostx.gov/DocumentCenter/View/10825/Transportation-Master-Plan---Adopted---121218
Hays County Parks, Open Space, and Natural Areas Master Plan	12	http://www.co.hays.tx.us/Data/Sites/1/pdf/departments/plans,policiesandreports/ParksMasterPlan_April2012.pdf

Public Presentations	14	Marie Albiges/Community Impact Newspaper: https://communityimpact.com/austin/san-marcos-buda-kyle/environment/2018/01/09/conceptual-routes-mapped-new-regional-trail-san-marcos-buda-kyle/
TX State GIS Class	14	Texas State/San Marcos Greenbelt Alliance: https://communityimpact.com/guides/austin/san-marcos-buda-kyle/news/city-county/2018/03/25/regional-trail-workshops-held-week-four-things-know-san-marcos-buda-kyle/
Purgatory Creek NA Map	8	San Marcos Greenbelt Alliance: http://smgreenbelt.org/wp-content/uploads/2018/03/Purgatory.pdf
VCT Austin	9	City of Austin: http://www.austintexas.gov/department/violet-crown-trail
Butler Trail	44, 45	Flickr User Wil C. Fry: https://flic.kr/p/Fwzv3e
Southern Walnut Creek Trail	44, 47	City of Austin: http://www.austintexas.gov/sites/default/files/images/Parks/Trails/SWCT_alignment.jpg
Purgatory Trail	44, 49	San Marcos Greenbelt Alliance: https://www.facebook.com/SMGreenbeltAlliance/photos/a.320212371360749/842371109144870/?type=3&theater
Rural Design Sidepath	51	Rural Design Guide: http://ruraldesignguide.com/physically-separated/sidepath
Minnesota Trail Design Intersection Guidance	53-54	<i>Trail Planning, Design, and Development Guidelines</i> by Minnesota Department of Natural Resources, Parks and Trails Division, 2007



