GREEN TO CEDAR RIVERS TRAIL FEASIBILITY STUDY

King County Department of Parks and
Natural Resources, Parks Division
In partnership with:

City of Black Diamond
City of Covington
City of Maple Valley

November 2012

King County

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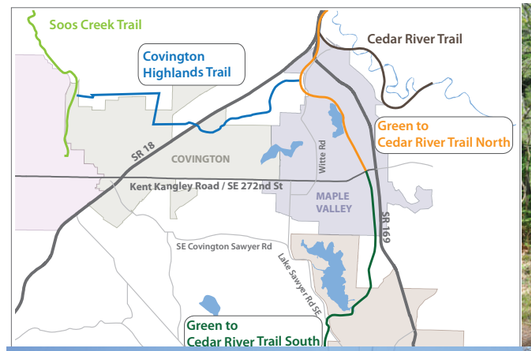
INTRODUCTION

Two trails, the Green to Cedar Rivers Trail and Covington Highlands Trail are proposed to connect from the Green River to the existing Cedar River Trail, and between the Soos Creek Trail and the Green to Cedar Rivers Trail. Together, these trails trails would make north-south and east-west connections that would weave through the best of an exceptional landscape–connecting rivers, lakes, creeks, and protected wildlands.

A portion of this trail corridor would be built on a historic railroad route—a contemporary reminder of the coal mining and transport heritage that began in Black Diamond and for a time spurred development of the whole region. Once completed, the Green to Cedar Rivers Trail system would provide improved access to Lake Wilderness Park, Lake Sawyer Park, Cedar Downs Park, Cedar Creek Park, Whitney Bridge Park, and undeveloped open space in the Black Diamond Natural Area. Many of these public open spaces are underused gems, and new access would enhance recreational and outdoor opportunities in the region. While the trail corridors would offer connections to surrounding neighborhoods and commercial areas, they would also be screened from them for most of the route, providing a trail experience that would be characterized much more by forest, stream, and meadow than by roads and buildings.

These new trail corridors would create a network providing some of the most pleasant trail experiences in King County by connecting the extensive wetlands and riparian landscape of the Soos Creek Trail with the open riverside of the Cedar River Trail. Completing these trail segments would improve the connectivity and service area for the regional trail system, providing easy access for thousands of households. In addition to providing regional connectivity, the proposed trails would also provide improved, safe, non-motorized access from residential neighborhoods to nearby destinations including parks, transit centers, and shopping/services. Although the trail system is not planned to continue south beyond the Green River at this time, Enumclaw is only 7.5 miles from the Green to Cedar Rivers Trail via on-road routes. From Enumclaw, the planned completion of Pierce County's Foothills Trail connects to Buckley, Orting, and Puyallup.

The completion of the Green to Cedar Rivers Trail system would be a significant benefit to the regional trail system, and provide new recreational and transportation amenities to southeast King County.



OVERVIEW OF THE FEASIBILITY STUDY

CONTEXT WITHIN THE REGIONAL TRAIL SYSTEM

The Green to Cedar Rivers Trail system consists of three main legs envisioned in King County's Regional Trail Needs Report:

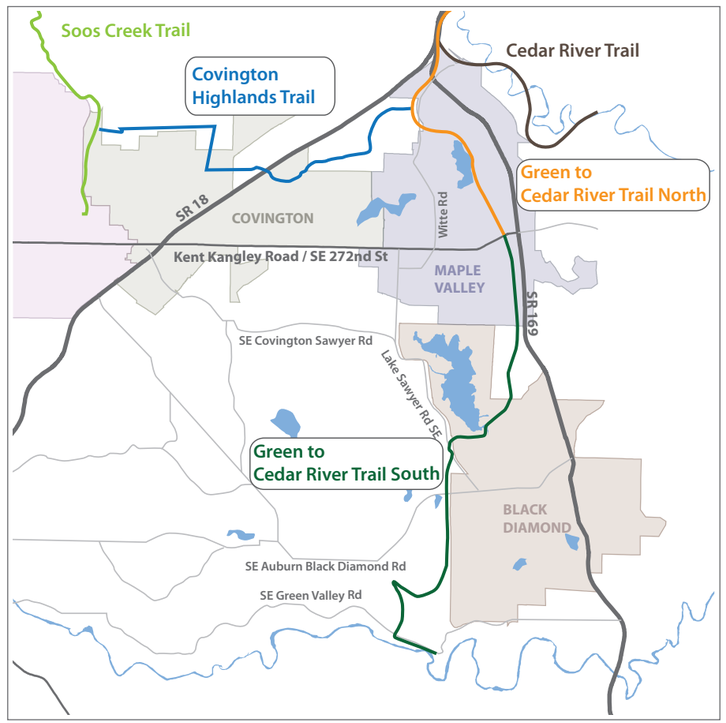
- GS-1—connecting along the historic railroad corridor from the paved portion of the Cedar River Trail to Kent Kangley Road.
- GS-2—continuing from Kent Kangley Road south to Flaming Geyser State Park.
- SR 18—connecting from the Soos Creek Trail to GS-1.

In this study, the Green to Cedar Rivers Trail encompasses the GS-1 and GS-2 connections. The Covington Highlands Trail provides the SR 18 connection.

This study focuses on two connected trails, one traveling north to south and the other east to west, which will connect existing King County regional trails and provide new recreational opportunities for residents of southeast King County. The Green to Cedar Rivers Trail corridor runs north to south, connecting the existing Cedar River Trail at the north to Flaming Geyser State Park at the south through the cities of Maple Valley and Black Diamond. The east-west corridor, called the SR 18 Trail in the King County Regional Trails Plan but referred to as the Covington Highlands Trail in this study, connects the Soos Creek Trail on the west with the Green to Cedar Rivers Trail to the east.

This feasibility study is a high level overview of these two corridors, intended to identify key considerations for future development of these trails. The study focuses on potential fatal flaws, as well as opportunities and constraints for trail development. Where multiple potential trail alignments are possible, the study identifies a preliminary preferred alignment, which at this point in the planning process appears to provide the best opportunity to successfully develop a trail.

The feasibility study begins with an overview of the two trails, a description of the planning process, and summary of the most significant feasibility considerations. Following the overview, the study provides a detailed discussion of the three main legs of these trails as described in the King County Regional Trail Needs Report. The first leg is the northernmost segment of the Green to Cedar Rivers Trail, from the junction with the Cedar River Trail to Kent Kangley Road. The second leg is the southern segment of the Green to Cedar Rivers Trail, from Kent Kangley Road to Flaming Geyser State Park. The third leg is the entire Covington Highlands Trail, connecting the Soos Creek Trail to the Green to Cedar Rivers Trail. Planning-level opinions of cost are included for these three main legs.



FOLLOWING THE ROUTES

From the Cedar River to Green River Valley, and Soos Creek to the Cedar River

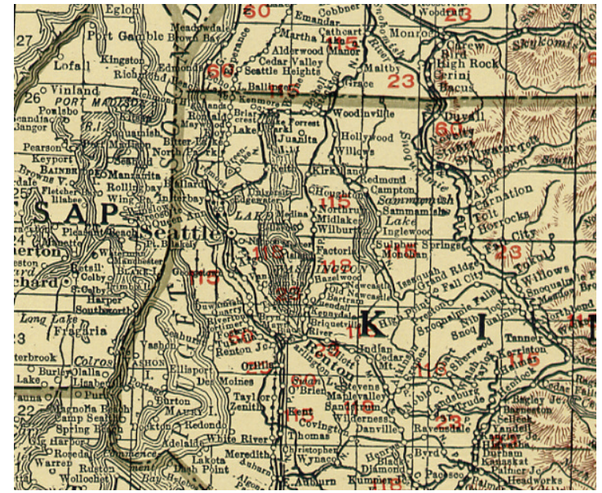
The Cedar River and Soos Creek trail systems are two of the primary regional trails in southeast King County, serving a growing population in the communities of Maple Valley, Covington, Black Diamond, Kent, and unincorporated King County. This feasibility study focuses on two trail corridors that will extend and connect the regional trail network in this part of the county. The Green to Cedar Rivers Trail (GS-1 and GS-2) will improve a section of existing soft-surface trail to a full standard shared-use trail, and extend it to Flaming Geyser State Park on the Green River. This trail will be over 11 miles long. The Covington Highlands Trail (SR 18) will connect the Soos Creek Trail to the Green to Cedar Rivers Trail, winding through the communities of Covington and Maple Valley. This trail will provide access to the regional trail system, which traverses a densely developed residential area of the county. This trail is approximately 6.5 miles long.

Originally the territory of the Duwamish tribal people near the Cedar River, and the Muckleshoot nearer Soos Creek and the Green River, the trail corridor passes through a landscape that would have richly supported Native American inhabitants for thousands of years. The Cedar and Green rivers, along with Soos Creek and its tributaries, would have been filled with salmon in season. Moreover, the region's forests, pothole lakes, and prairies would have provided easy access to terrestrial game and plant materials for food and fiber.

Covington, Maple Valley, and Black Diamond are tied together by a shared history of early railroad development. Covington was a stop on the Northern Pacific line (a major rail route) between Auburn and Tonasket, while Maple Valley and Black Diamond were connected to the short lines that carried coal north from mines in Black Diamond. A long segment of the Green to Cedar Rivers Trail follows one of these historic railroad lines between Maple Valley and Black Diamond.

The Green to Cedar Rivers Trail generally follows the historic railroad line from Maple Valley to Lake Sawyer Park in Black Diamond. From there the alignment heads south through future residential neighborhoods to the Green River and Flaming Geyser State Park. Along the way, the trail route passes by Lake Wilderness and Lake Sawyer, providing access to these two important regional parks.

The Covington Highlands Trail is a more complex alignment, linking together segments along existing power lines, street rights-of-way, and dedicated open space. This trail connects the Soos Creek Trail with the Green to Cedar Rivers Trail corridor. The route generally trends east and west, beginning at the northern edge of Covington, crossing over SR 18, and connecting to the Green to Cedar Rivers Trail near the Maple Valley Library and Maple Valley Community Center. The trail will provide improved access to several existing and planned City of Covington parks, including a safe non-motorized route connecting Covington to Maple Valley.



Maple Valley and Black Diamond were once connected by rail lines carrying coal to Seattle for distribution.

Currently, population in the general area of the two trails (Puget Sound Regional Council's Covington/Timberline, Maple Valley/Hobart, and Black Diamond/Lake Sawyer demographic units) was just under 60,000 in 2010, and is anticipated to grow by 25 percent to over 75,000 by 2030. This growth rate is similar to the prediction for the county overall, which is expected to grow by 22 percent by 2030.

GOALS

The goals for the Green to Cedar Rivers Trail and Covington Highlands Trail reflect the vision for new trail corridors that link communities, open spaces, and existing trails in the King County regional trail network. These corridors will:

- Connect the Soos Creek Trail, Cedar River Trail, and the Green River with two trail corridors as part of King County's regional trail system.
- Develop a regional shared-use trail appropriate to current and anticipated future user volumes.
- Provide a continuous equestrian facility in the two trail corridors.
- Facilitate future connections among the regional trail, local trails, and major destinations not accessible from the trail corridor.
- Develop new road crossings that meet current standards for safety, and improve existing crossings where necessary.

PLANNING PROCESS

The feasibility planning process is a high level overview of the significant opportunities and constraints for trail development in the identified corridors. As a predesign study, the feasibility plan is focused on identifying potential fatal flaws that could possibly prevent future trail development, and evaluating whether or not the project is likely to accomplish the overall goals described above.

To evaluate the trail options planners walked the trail routes where public access was available, and evaluated likely alignments in more detail through publicly available mapping of topography, ownership, sensitive areas, and other relevant planning factors.

Elements of the planning process including partner involvement, right-of-way, the alternative evaluation process, sensitive areas reconnaissance, and development of planning level opinions of cost are described below.

PARTNER INVOLVEMENT

The planning process included coordination with the cities of Maple Valley, Covington, and Black Diamond—the three underlying jurisdictions who have supported the development of the trail corridor and who manage many of the public parks and open spaces that the trail corridors rely on for access and services. Prior to this study, the three local jurisdiction partners had completed a concept route covering the majority of the trail corridor—the Tri-City Regional Trail Mapbook. The Mapbook was a valuable starting point for the feasibility study, and the trail routes shown here are similar to the alignments planned in that document. This feasibility study also considered the parks, transportation, and land use elements in the cities' planning documents when evaluating potential trail corridors.

SENSITIVE AREAS

While walking the different alignments and segments, planners noted areas that could be wetlands, streams, or associated buffers. In a few areas, planners were joined by a wetland ecologist to identify alignments that best avoided sensitive areas. These areas included the vicinity of the connection to Soos Creek Trail, Cedar Downs Park, and Lake Sawyer Park. However, sensitive areas were not delineated or surveyed.

The trail alignments traverse four local jurisdictions: unincorporated King County and the cities of Covington, Maple Valley, and Black Diamond. It is important to understand the critical area code for each. For example, in most jurisdictions, the construction of new trails is currently not allowed in wetlands, but conditionally allowed as far landward as possible in wetland buffers.

Future planning and design, including delineation of sensitive areas, will inform the specific alignment, ensure code compliance, and clarify potential compensatory mitigation.

RIGHT-OF-WAY

Right-of-way acquisition is often the most challenging constraint for development of a new trail. The Green to Cedar Rivers Trail alignment, connecting north and south between the Cedar River Trail and Flaming Geyser State Park, will not require significant acquisitions to secure a continuous right-of-way along the proposed trail route. The Covington Highlands Trail, which connects east to west from Maple Valley to the Soos Creek Trail, will require significant acquisition of property or easements from underlying landowners.

For the purposes of the feasibility study, trail alignments through privately owned properties were selected to minimize the number of properties where easements or other agreements would be required. In addition, a trail corridor was preferred when it could be located where it would have the least likely impact on the area of the property that could be considered developable or which is clearly in use. The trail corridor generally avoids sensitive areas where practical and follows dedicated open space parcels or portions of properties that are already under an easement for power lines or other utilities.

In some locations properties selected for the trail route have a high potential for redevelopment and may have flexibility in the future for accommodating a trail corridor. No contact was made with underlying landowners to evaluate their opinions on potential acquisitions. Although a single preferred corridor is generally shown for the Covington Highlands Trail and Green to Cedar Rivers Trail alignments, the development process will need to include a flexible strategy to evaluate potential route variations based on available right-of-way.

ALTERNATIVE EVALUATIONS

Several alternatives were evaluated for specific segments of the trail. Although individual site-specific considerations were involved in some of the decisions, general criteria for selection included:

- Available public right-of-way—alignments that required fewer acquisitions, or acquisitions of large parcels anticipated to be redeveloped, were preferred over alignments requiring acquisition from many private property owners.

- Physical or engineering constraints—alignments that included steep slopes, required additional structural sections of trail, or had other physical constraints that would have substantially increased cost were avoided where possible.

- Sensitive areas—alignments that avoided impacts on sensitive areas were preferred over alignments with potentially more impacts.

- User conflicts—alignments through existing or planned parks were developed to avoid potential conflicts with other park users. Regional trail corridors were located to retain flexibility for future park development, and to avoid the regional trail serving as primary internal circulation routes for parks.

- Trail experience—alignments that provided a positive trail experience, including separation from roads and developed areas, visual access to outstanding natural areas, and connection to desirable destinations, were preferred.

- Safety—trail alignments were preferred that allowed the development of the trail to the full standards, met standards for road crossings, and provided regular opportunities for emergency vehicle access or escape from the trail corridor.

ROAD CROSSING CONSIDERATIONS

There are many road crossings in the trail corridor, discussed in more detail later in the document. Mid-block crossings are the most challenging safety concerns for trail users. At this level of planning, the analysis of mid-block crossings was focused on whether the trail alignment needed to be relocated to provide a safe crossing, or whether a signalized crossing may be appropriate. In some cases, grade-separated crossings may also be appropriate for crossings of high-volume roads, however the cost of grade-separation is typically very high.

The planning-level analysis typically considered posted speed limits on the road, observed volume of traffic on the road, the number of lanes to cross, the distance to the nearest intersection, and sight distances. In the future, the trail design will include more detailed evaluations of existing and future conditions to develop specific crossing treatments and to determine which facility (the trail or the roadway) should have priority.

Regional trails often have higher user volumes and more diverse user types than typical sidewalk crossings. Typically, Class I trail crossings are developed to a higher standard than regular crosswalks in recognition of these differences. Mid-block trail crossings can be enhanced with both passive and active design elements. Passive design elements function with or without the presence of trail users in the crossing, and may include additional signing, improved overhead lighting, median island refuges, and curb extensions. Active crossing enhancements range from warning lights to a full signal, and are activated by trail users at the time they wish to cross. In the past, active crossing enhancements were always initiated by trail users pushing a button for activation; some newer technologies respond to the presence of trail users and activate the crossing treatment automatically. Crossing treatments at mid-block crossings are generally expected to follow the guidelines developed by the American Association of State Highway Officials (AASHTO). Each local jurisdiction and the Washington Department of Transportation also has guidelines for selection of crossing treatments based on specific roadway and trail characteristics.

PLANNING LEVEL OPINION OF COST

Planning-level opinions of costs are provided for constructing each of the three main legs of trail: the northern portion of the Green to Cedar Rivers Trail (GS-1), the southern portion of the Green to Cedar Rivers Trail (GS-2) and the Covington Highlands Trail (SR-18). These opinions of costs are preliminary and for planning purposes only. They should not be relied upon for contracting because they are not based on a trail design and they do not include all project costs (e.g., future planning, right-of-way acquisition, design, permitting, and owner administration). As an example, the right-of-way acquisition costs for the Covington Highlands Trail could be a substantial portion of the overall project costs but they are not included in this study. Instead, the estimated costs represent a comparative analysis between segments and a sense of scale for future budgeting. To account for the inherent uncertainty at this planning phase of development, each opinion of costs incorporates a miscellaneous item allowance in design (i.e., contingency) of 40 percent.

Three approaches were used to estimate construction cost:

- Estimated quantities spreadsheets were prepared.
- Unit prices from similar projects were applied.
- WSDOT Planning Level Cost Estimate software was used.

The opinion of costs for the northern leg of the Green to Cedar Rivers Trail (to Kent Kangley Road) is likely to be more accurate than the estimates for the other two main legs given that construction costs relate to the improvement of an existing gravel trail. Easy public access facilitated the data collection that informed the cost assumptions. These areas facilitate quantity development and comparison with unit pricing for other recent similar projects. Estimated quantities are based on field observations and geographic information system (GIS) mapping, which included 5-foot contours. Few sensitive areas have been identified along this alignment. The cost estimate assumes that 1 acre of enhancement-type mitigation would be required at a typical construction cost of $100,000 per acre.

The stretch of trail, from Kent Kangley Road to SE 288th Street, also entails the widening and paving of an existing gravel trail, so a similar estimating approach was applied to this area. However, as the southern leg of the Green to Cedar Rivers Trail proceeds south, it quickly leaves the existing gravel corridor and continues across relatively unimproved and often forested areas. Through these undeveloped areas, the opinion of cost is primarily based on the WSDOT Planning Level Cost Estimate software. The software has been developed to estimate costs for varieties of roadway and bridge projects that are very conceptual, often with no design, or minimum design, and no site visits. The tool comes with default quantities per lane-mile and unit costs obtained from historical data of WSDOT's past projects. Parameter inputs such as area prices, terrain, ground conditions, and width of the typical sections are adjusted accordingly to account for the trail cross sections.

The results of the software analysis for this southern segment are supplemented with an opinion of railroad bridge replacement cost, based on costs from similar projects, and potential mitigation cost. Pockets of sensitive areas have been identified around Lake Sawyer and in the vicinity of the easements south of SE Auburn on Black Diamond Road. The opinion of costs assumes that 8 acres would be needed for compensatory mitigation. A typical mitigation construction cost would be $150,000 per acre to account for some creation or restoration in addition to enhancement. The opinion of costs also assumes 400 linear feet of boardwalk and one 30-foot-long pedestrian bridge to minimize impacts to sensitive areas.

The Covington Highlands Trail traverses unimproved and forested or wet areas in only a few stretches. Otherwise, the alignment traverses areas where the trail would be adjacent to a road, in proximity to developed areas, or along powerlines. Therefore, a similar methodology as applied for the northern leg of the Green to Cedar Rivers Trail is used to obtain cost assumptions. The quantities for construction items are estimated based on site visits, photographs, GIS topographic data, and similar experience from past trail projects constructed adjacent to roads and other developed features. The opinion of costs assumes 6.5 acres for compensatory mitigation at $150,000 per acre and 1,300 linear feet of boardwalk would be required.

As various segments are advanced for additional planning and design, topographic surveys, delineation of sensitive areas, and geotechnical investigations will improve the accuracy of subsequent cost estimates.

TRAIL STANDARDS

WHAT IS A REGIONAL TRAIL?

A regional trail is a shared-use path that serves as a component of an extensive network of off-road, non-motorized routes connecting all parts of King County. The regional trail system anticipates a wider variety of users, and higher volumes of trail users, than local trails would typically accommodate.

Individual trails are designed to safely accommodate non-motorized activities including walking, jogging, bicycling, rollerblading, skateboarding, and others. Many regional trails, although not all, also accommodate equestrian use.

Where possible, the regional trail system is built to high development standards, with limited grades, smooth trail surfaces, and wide paved surfaces to accommodate different users and reduce user conflicts.

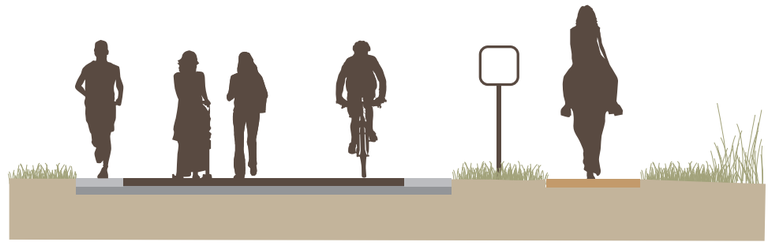
King County is currently responsible for over 175 miles of regional trails throughout the county. These trails include both paved and soft-surface trails; however, they all share common features of providing a safe and enjoyable trail experience for a variety of users.

This study is intended to evaluate the feasibility of developing a trail system to full King County regional trail standards along the identified corridors. The preferred standard for the Green to Cedar River and Covington Highlands Trails is to accommodate both a paved shared-use trail and an accessory soft-surface equestrian trail.

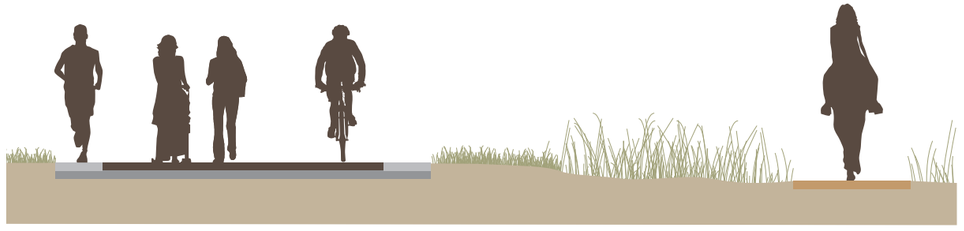
The trail widths, separations, and typical trail elements are intended to be consistent with the (draft) King County Regional Trails System Development Guidelines, February 2009. However, the study recommends an approach to developing the soft-surface component of the trail that is a modification of the regional trail standards. The differences in the sections are briefly described and depicted below. A detailed description of the soft-surface trail standards used for this study follows.

The primary differences between the King County preferred section and the preferred section shown in this study are 1) an additional foot of width for the soft-surface component of the trail, and 2) an emphasis on a wide enough separation between the shared-use and soft-surface trails to allow the soft-surface path to be developed with an independent line and grade. The additional foot of width for the soft-surface path is redcommended due to the variety of uses, including equestrian use, which will likely occur on it.

The independent line and grade is intended to provide an enhanced trail experience for users of the soft-surface trail, and to allow the overall trail corridor to more closely fit the underlying topography. While this concept is recognized in the regional trail standards and is similar to the way that accessory soft-surface paths have been developed in corridors like the Soos Creek Trail, the standards do not include a detailed discussion of the treatment of the soft-surface trail in this way. Importantly, the soft-surface trail is anticipated to allow development at a steeper longitudinal grade than the shared-use trail, and is not anticipated to be developed to meet Americans with Disabilities Act (ADA) requirements for paved trails. To clarify the approach used in the feasibility study, the soft-surface trail standards used for this study are described in detail below.



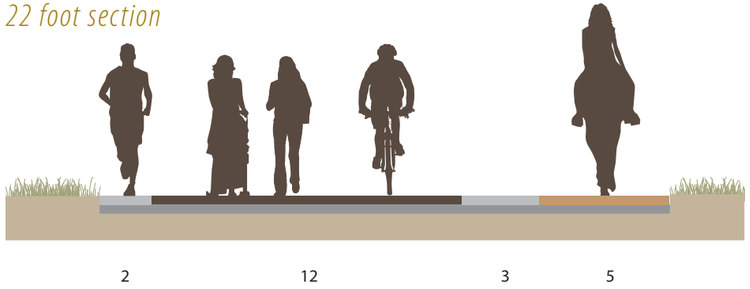
The King County standard section for regional trails with a soft-surface component. The cross-section includes a twelve foot paved trail with two foot gravel shoulders, and a four foot soft-surface trail separated from the paved trail by at least four feet.



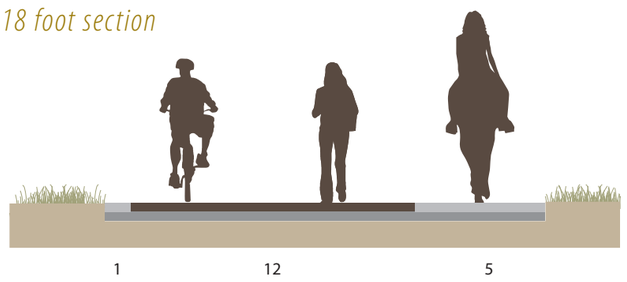
The standard section proposed for the Green to Cedar Rivers Trail is consistent with the guidelines shown above, but emphasizes the opportunity to develop the accessory soft surface trail with a separate line and grade from the paved trail. The soft surface trail is also recommended to include an extra foot of width to accomodate anticipated user volumes.

This preferred section is feasible in many areas; however, there are also fairly extensive lengths where the trail needs to accommodate the anticipated uses with a narrower width. In some areas with moderate constraints, the trail is shown with modified standards to reduce cost, environmental impact, or both. In the most typical reduced section, the shared-use trail and soft-surface trail maintain their preferred width, but they are developed adjacent to each other, with the soft-surface trail being developed as a significantly wider shoulder than the paved trail.

22 foot section

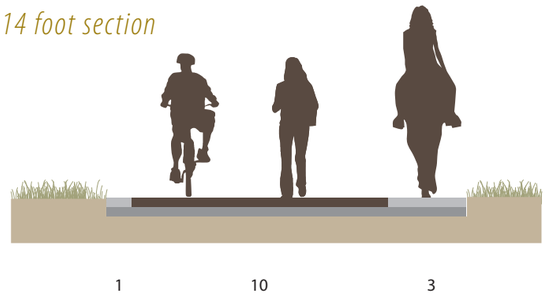


18 foot section

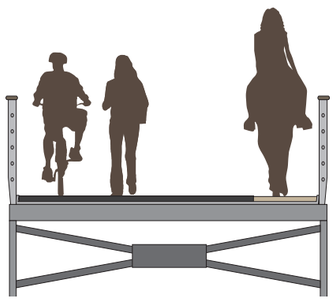


In a few areas, significant constraints exist in developing the trail to the full desired width; as a result, a substantially reduced trail standard is proposed. Locations where these standards are proposed are shown on the detailed trail maps that follow, along with accompanying narratives that describe the constraints in the trail segment.

14 foot section



14 foot raised trail section



Some structure types for raised trail segments may allow the use of a partial soft surface trail. The surfacing and structural design of raised trail segments will be evaluated in the design phase.

In locations where the trail is constrained by right-of-way, sensitive areas, or topography, the feasibility study recommends narrowing the standard cross section. The 22 foot section shown is preferred, and includes the full standard width for each of the trail elements except the buffer between the paved and soft surface trail. The other sections shown are also considered for areas where constraints are significant. Narrower cross sections make user conflicts more likely, and are only proposed for limited ditances along the trail.

In some cases a raised boardwalk may be necessary to avoid impacts to aquatic resources including small streams and wetlands. The cross-section shown here is the width of structure included in the feasibility study cost opinions.

SOFT SURFACE TRAIL CONSIDERATIONS

The soft-surface path for both the Green to Cedar Rivers Trail and the Covington Highlands Trail are intended to accommodate the full range of regional uses, including equestrian. To respond to the underlying topography of the trail corridors, there is also a benefit to allowing the soft-surface trail to be developed with a separate line and grade than the shared-use trail. This design approach would reduce the amount of grading and retaining structures necessary to meet the regional trail standards in the study corridors. This section describes the anticipated use of the soft-surface path, and the trail standards used to develop the preliminary feasibility and cost analysis.

The soft-surface trail can be designed with steeper grades than the shared-use trail, reducing the cost for grading and retaining structures.

ANTICIPATED USE OF THE SOFT-SURFACE PATH

The Green to Cedar Rivers Trail corridor is currently used by equestrians, both in the segment that is currently managed as a soft-surface trail and in the area near Lake Sawyer where riders use the network of informal paths maintained by user groups. Based on limited time walking the trail corridor and interviews with equestrian users on the trail, equestrian use of the trail corridor may be relatively high and current users indicated that the area surrounding the trail is an active equestrian area. There are several stables in the general area of the trail, and many individual residences with pastured horses.

With additional development of the trail, equestrian use may increase. However, other user groups such as bicyclists, walkers, inline skaters, and others would be expected to increase proportionally more than equestrians based on experience with other regional trail corridors. Increased use from all of these user groups leads to a higher risk of user conflict. The proposed standards for the soft-surface trail element of the Green to Cedar Rivers Trail are intended to reduce user conflicts and provide a positive trail experience for all trail users.

The soft-surface trail and shared-use trail are intended to function as a single trail corridor, meaning that there is good visual access between the trails, and the trails can be maintained and operated together. However, it creates a better trail experience for both soft-surface and people on the shared-use trail users if there is a generous separation between the two. Separation reduces the chance of conflict between people on the shared-use trail who may be moving quickly or have pets on the trail and equestrians whose horses may be intimidating to people on the shared-use trail or may threaten the safety of both riders and nearby trail users if they are startled.

Of course, equestrians are not the only trail users who will use the soft-surface trail. Many walkers and runners, and some mountain bike riders, also prefer a soft-surface option with some separation from the shared-use trail. Many walkers describe concern over using shared-use trails along with higher speed bicyclists. Because the equestrian user volumes are expected to be low compared to other uses, significant user conflict is unlikely with other types of users making use of the soft-surface path. The soft-surface path is not intended to meet American Association of State Highway Transportation Officials (AASHTO) guidance for bicycle use, or ADA requirements for pedestrian routes. Monitoring trail usage will aid in developing management policies to reduce conflict between user groups and establishingh appropriate expectations for users based on the observed types and volumes of use.

SEPARATION BETWEEN THE SHARED-USE TRAIL AND SOFT-SURFACE PATH

In the best case, the shared-use trail and soft-surface trail would be developed on truly separate lines and grades within the maximum 50- to 60-foot separation. The preferred separation for the majority of the trail would be between 20 and 30 feet. At this distance, there is good visibility between the two trails, and maintenance staff could identify most trail issues on the equestrian trail from the shared-use path. At times the soft-surface trail might be higher than the shared-use trail, at times lower. In many cases, the shared-use trail will follow the original fill prism or cut section developed for the railroad. It may be possible for the equestrian trail to meander either below the base of the fill prism or at the top of the cut slope, minimizing the grading that would be required if either the original fill prism or cut section needed to be widened to accommodate both trails on the same line and grade.

The design standards for the equestrian trail are less intensive than the design standards for the shared-use trail. Based on AASHTO guidance, the shared-use trail generally limits the longitudinal slope to 5 percent or less with occasional slopes up to 8 percent, and typically developed with long-radius horizontal curves. The soft-surface trail can be developed with steeper grades and shorter radius curves than the shared-use path.

Grades for the equestrian path are based on accepted standards developed by the US Forest Service and national equestrian groups for soft-surface trails in urban environments. The paved trail would provide ADA access, allowing the soft surface trail more design flexibility. In all cases the soft surface trail would be designed to promote a safe environment for trail users on foot, horse, or bicycle.

SOFT SURFACE TRAIL WIDTH

The width for the soft-surface trail is generally recommended to be 5 feet with a maximum cross-slope of 3 percent. An additional 3-foot width on each side of the trail should be maintained clear of brush or other significant impediments and barriers as much as possible. A 5-foot width provides a comfortable single-track width for riders, and also will allow riders to pass in most cases without leaving the trail surface. It would not typically accommodate two riders side by side, or comfortable passing at higher speeds. Where the trail can be built at the full 5-foot width with adequate maintained (cleared of brush) shoulders, passing pullouts should not be necessary.

In some locations the soft-surface and shared-use trails are shown in a constrained section. In most locations, the 5-foot tread should be maintained with a 3-foot separation between the soft-surface path and hard surface portion of the shared-use path. In some extremely challenging locations in the trail corridor, the soft-surface path is reduced to 3 feet, and is directly adjacent to the shared-use path.

VERTICAL CLEARANCE

A vertical clearance of 12 feet is recommended to safely accommodate equestrian use of the soft-surface trail.

BARRIERS

No physical barriers are recommended for separation between the soft-surface and shared-use components of the regional trail. Barriers between the soft-surface path and dangerous areas (such as drop-offs) should follow AASHTO requirements, and be located 3 feet or more from the edge of the equestrian path.

LONGITUDINAL GRADE

The soft-surface trail can be developed with steeper longitudinal grades than the shared-use trail where necessary. The additional flexibility available for the soft-surface trail provides the opportunity to reduce grading in areas with rolling or hilly underlying topography. Maximum grade standards are similar to shared-use path standards, where steeper grades are allowable for a certain distance. For the soft-surface trail, longitudinal grade standards are recommended to be limited to 15 percent for up to 200 feet, 10 percent for up to 500 feet, and 8 percent for up to 800 feet.

SURFACING

The recommended surfacing material for the trail is 3/8-inch crushed rock with a high proportion of fines.

OVERVIEW: Green to Cedar Rivers Trail, North

SEGMENT HIGHLIGHTS

- Connects the Cedar River Trail with the heart of Maple Valley—parks, library, community center, and commercial areas
- Provides an exceptional trail experience—a forested trail corridor with grade-separated road crossings, a segment through Maple Valley's signature public park, and a segment high over Lake Wilderness offering great views.
- Relatively easy to construct the regional trail along the existing soft-surface trail.

TRAIL OVERVIEW

Already developed as a soft-surface trail, this busy section of the Green-to-Cedar trail system connects the Cedar River Trail, important community facilities and neighborhoods in Maple Valley, and Lake Wilderness Park. An improved trail would serve this growing area of the County for recreation and non-motorized transportation. This segment of the trail connects neighborhoods to the Maple Valley Community Center, the Maple Valley Library, and local retail and services. Lake Wilderness Park is Maple Valley's largest and most popular open space, combining lakeside recreation, the developing arboretum, and preserved forestland. Regionally, an improved trail would provide a paved connection to the Cedar River Trail, and a continuous trail route from Maple Valley to Renton.

This segment of the trail offers an exceptional trail experience—a wooded corridor that winds through the heart of Maple Valley without street crossings, traffic concerns, or the distractions of urban development. The trail winds through busy sections of Maple Valley, but the wide, forested right-of-way

PLANNING-LEVEL OPINION OF COST

This leg of the trail would be constructed along a segment of the railroad grade that has already been improved as a soft-surface trail. There are limited sensitive areas in this leg, and costs related to avoidance or mitigation of sensitive areas impacts would be relatively low. The most challenging segment of trail traverses the steep hillside above Lake Wilderness. Even with a reduced cross-section this segment would require retaining structures along its entire length, increasing the cost of construction. No right-of-way acquisition is necessary in this leg.

All construction costs in the feasibility study are based on limited design information and should be used for planning purposes only. Right-of-way acquisition costs, where necessary, are not included in estimates. The estimates do not include permitting, survey, engineering, and administrative costs that would be part of an all-inclusive cost of construction. These additional costs would typically add another sixty percent or more to the bare construction cost shown below.

ESTIMATED TOTAL CONSTRUCTION COST

Trail construction:	$5,740,000
Sensitive Area Mitigation:	$100,000
Total:	$5,840,000
Total length, lf:	17,160
Cost/lf:	$340
Total length, miles:	3.25
Cost/mile:	$1,800,000

preserves a sense of separation and nature along the trail route. Walking, running, or riding along this section of the trail, you would never know that busy streets are only fifty feet away, at the top of the hill. It's a pleasant, protected natural experience. All of the major road crossings in this segment are grade-separated, with the trail passing under the intersecting roadways in a series of tunnels. Frequent opportunities for connecting paths, some already developed and some that could be developed in the final design, offer access to the trail and connections to local destinations.

The trail passes through Maple Valley's Lake Wilderness Park, providing access to the park's arboretum and connecting trails. Still within the park, a portion of the trail traverses a steep hillside overlooking Lake Wilderness, offering good views to the lake, but also creating an engineering challenge to fit a wider trail.

This segment ends at Kent Kangley Road and the growing commercial district developing at the intersection of Kent Kangley with SR 169. There are no publicly-owned facilities or amenities here that would provide parking or services.

Equestrian users already take advantage of this segment of the trail. A dedicated soft-surface path should maintain a positive equestrian experience, even while opening the trail for a variety of new users who are currently unable to manage the gravel surface. As more segments of the Green-to-Cedar Trail are completed, this segment of the trail is likely to see increased equestrian traffic connecting to the Cedar River Trail and other equestrian trail opportunities. For most of this segment there is an opportunity for the soft-surface path to be separated from the shared-use path, providing a good equestrian experience. The existing tunnels under the trail's cross-streets offer some challenges for equestrians, however they are not a major constraint for current users, and should also be adequate for future use.

POTENTIAL TRAIL AMENITIES

Parking for the trail could be available at the SR 18/SR169 Park and Ride near SE 231st St., and Lake Wilderness Park, which also provides restrooms. The surplus King County Sherriff facility on SE 231st St. could also be considered for a dedicated parking and trailhead facility that could serve both the Green-to-Cedar Trail and the Cedar River Trail. This facility has adequate space to provide parking for both individual vehicles and horse trailers, and has existing services for power and water for a restroom facility.

Along the trail, the intersection with the Cedar River Trail is an opportunity for a wayfinding kiosk and rest location. The section of trail above Lake Wilderness is located on a steep slope, but is also a possible location for a viewing deck that would provide a place to stop and leave the trail for a few minutes without causing conflicts with other trail users.

PERMITTING, OWNERSHIP AND ENGINEERING CONCERNS

- North of Lake Wilderness the trail system can meet desired design standards for nearly the entire section of trail, with the exception of a few pinch points at undercrossings and limited areas with steep sideslopes.
- This segment of the trail is free of serious sensitive areas concerns, with only a few wet ditches and trail side drainage issues.
- The portion of the trail located on a steep hillside above Lake Wilderness will require retaining walls on a steep slope to provide a minimum-width trail.
- The trail crossing at Kent-Kangley Road at the end of this segment is challenging. The County has secured right-of-way for a crossing at the existing location which allows for some improvements at the current unsignalized crossing, and accommodates planned changes in access for the adjacent retail development. This crossing could continue to be a concern in the future with increasing traffic and additional turning movements into and out of private businesses.

CEDAR RIVER TO LAKE WILDERNESS SEGMENT

SEGMENT 1

OVERVIEW

This segment of the trail follows a continuous rail grade from the intersection with the existing Cedar River Trail to the City of Maple Valley's Lake Wilderness Park, terminating near the existing access between the trail and Witte Road SE. The railroad grade has already been improved with a gravel surface for use as a trail, and is a popular recreational destination.

This segment of the railroad had been constructed below grade (in a cut section) for most of its run to allow grade-separated crossings with local surface streets. The typical width of the right-of-way is 100 feet. As a result, the trail feels nicely separated from its developed surroundings, buffered by the grade difference and forested right-of-way from the surrounding community.

SEGMENT 1

SHARED USE TRAIL

For most of this segment, the shared-use trail can be located on the same general line and grade as the existing gravel-surfaced path. In some of the cut sections the current path is too narrow to accommodate the desired width for the regional trail, and will need to be widened into the current cut slope. The character of the grading will be determined in the final design phase, but the feasibility study typically assumes that low walls will be used to accommodate the cut, rather than clearing the existing forested buffer on the established cut slope to extend a new slope uphill to catch existing grade.

At the north end, where the Green to Cedar Rivers Trail connects to the Cedar River Trail, the current grade on the connecting trail is steeper than preferred. The character of the grading will be determined in the final design phase, but the likely design would reduce the grade by extending some fill to a new connection location north of the current connection, and also cutting into the current grade further south where it levels off.

The shared-use trail can be developed to the desired width with the exception of a few road undercrossings where it will need to narrow to fit into existing tunnels. These locations are very short, and should not create unsafe situations

SOFT SURFACE TRAIL

For most of this segment the soft-surface path can be developed with a comfortable separation from the shared-use trail. Overall, the soft-surface trail is expected to meander through the forested right-of-way on the westerly side of the trail. In some locations the soft-surface trail would be located at the top of the cut slope, separated from the shared-use trail grade by up to ten feet of grade difference. The soft-surface trail would likely cross to the easterly side of the shared-use trail once, then cross back and be located on the westerly side of the trail as it transitions to Lake Wilderness Park.

The three tunnels in this segment are likely more of a concern for equestrian users than other trail users. The soft-surface path would be brought together into the same alignment as the shared-use trail for each undercrossing, but depending on the width and length, some horses may be hesitant to pass through. A landing with enough space for riders to dismount/mount should be provided in advance of tunnel crossings to allow riders space to survey the tunnel before they arrive at it, and dismount if they choose to walk their horse through.

SEGMENT 1

LEGEND

- *Public right-of-way, below 5% grade*
- *Requires right-of-way*
- *Public right-of-way, 5%-7% grade*
- *Public right-of-way, 8% grade*
- *Boardwalk (wetland or stream)*
- *Bridge*

CROSS-SECTIONS

Separated shared-use and soft-surface trail

Single line and grade, wide buffer

Single line and grade, constrained width

Boardwalk or structure

SEGMENT 1

SENSITIVE AREAS

No streams, wetlands, or other sensitive habitats have been identified immediately adjacent to the existing gravel trail in this segment. The County's GIS maps depict some sensitive areas in the vicinity of the junction with the Cedar River Trail, which is within unincorporated King County. Depending on the final design, the buffer could be affected to some extent by clearing, grading, and new pavement. King County's critical area regulations allow alteration of buffers if certain conditions are met (King County Code (KCC) 21A.24.045).

SUPPORT FACILITIES

(EMERGENCY ACCESS, TRAILHEADS, CONNECTING TRAILS, PARKING)

Ample right-of-way is available to accommodate trailhead features (e.g., kiosk, benches), where the Green to Cedar Rivers Trail connects to the Cedar River Trail, as well as at other access points along the segment.

There are no current parking or support areas along this segment of the trail. Public parking, restrooms, and other amenities are available on the segment just to the south of this one, at Maple Valley's Lake Wilderness Park. A park and ride lot is located near the northern end of this segment near the intersection of State Route (SR) 18 and SR 169. This lot could be used for trail access, although there are traffic concerns to make the connection between the parking lot and the trail corridor.

The King County Sheriff's Maple Valley Precinct 3 facility is located directly adjacent to the trail corridor. Sheriff staff previously located at this building moved to Covington in late 2011 and it is no longer in use by the Sheriff's office. This location could provide maintenance access for the trail, or be developed into public access with parking for both the Cedar River and Green to Cedar Rivers trails. A path would have to be developed, addressing the 20-foot different in elevation from the parking area down to the trails.

DESTINATIONS AND CONNECTIONS

In addition to the connection to the Cedar River Trail at the north end, there also may be an opportunity to create a connection from the trail up to SR 169. An existing rough path makes the connection north of the intersection of SR 169 and Witte Road SE; however, right-of-way acquisition would likely be required. An improved connection at this location would enable pedestrians and more advanced bicyclists to access the trail from the sidewalks and bike lanes above.

Further south, existing access is provided in several locations from Witte Road SE to the trail. These access points provide more localized access for businesses and residents in the immediate area, and also provide access to some of the community and recreation facilities described below.

Lake Wilderness Park is a popular recreation destination, and one of the larger public open spaces in the area. A small park with access to the trail has also been developed at St. George's Episcopal Church on Witte Road SE.

Near the southern end of this segment, the trail corridor is adjacent to the Maple Valley Community Center, which provides both organized and drop-in programs for children, teens, and older adults. The Maple Valley Historical Society also operates a museum on the community center grounds, although with very limited hours.

The trail corridor is also near the Maple Valley Library, which is located just across Witte Road SE from the Community Center.

LAKE WILDERNESS PARK SEGMENT

OVERVIEW

This segment of the trail includes a developed rail grade that travels through a forested park, then traverses a steep slope above Lake Wilderness. The rail grade has been developed as a soft-surface trail through this segment, although the graded area is very narrow in the area along the lake due to the steep cross-slope. This is likely the most challenging area of the trail for grade issues, and there may also be slope stability issues that should be evaluated during the design phase. A reduced trail section is recommended for a large part of this steep area, with the soft-surface trail located on a widened shoulder adjacent to the shared-use path.

Progressing south the slope eases, and the trail grade descends almost to the level of the lakeshore. The right-of-way narrows here to 30 feet, so a reduced section is maintained nearly to the south end of the lake.

SEGMENT 2

SHARED USE TRAIL

For this segment, the shared-use trail would be located on the same general line and grade as the existing gravel-surfaced path. As the trail passes through the Lake Wilderness Arboretum it is generally on a raised prism that is wide enough for the full-standard shared-use path, but is generally too narrow to also accommodate an equestrian facility. Currently, the Arboretum path system includes a low-volume path parallel to the regional trail. The design phase for the regional trail should include coordination with Maple Valley to simplify the trail connections to both the Arboretum and Forest Reserve, if possible.

As the shared-use trail leaves the Arboretum and begins to traverse the lake, the cross-slope steepens and the railbed becomes narrower. In this segment the improved railbed is not wide enough to accommodate the preferred width, and the adjacent slopes are too steep to re-grade without use of retaining walls.

Through this segment the feasibility study is assuming that the trail section will be narrowed to 10' paved width, with 1' gravel shoulder to the east and 3' gravel shoulder to the west . The shoulder on the west would accommodate equestrians through this constrained area of the trail alignment.

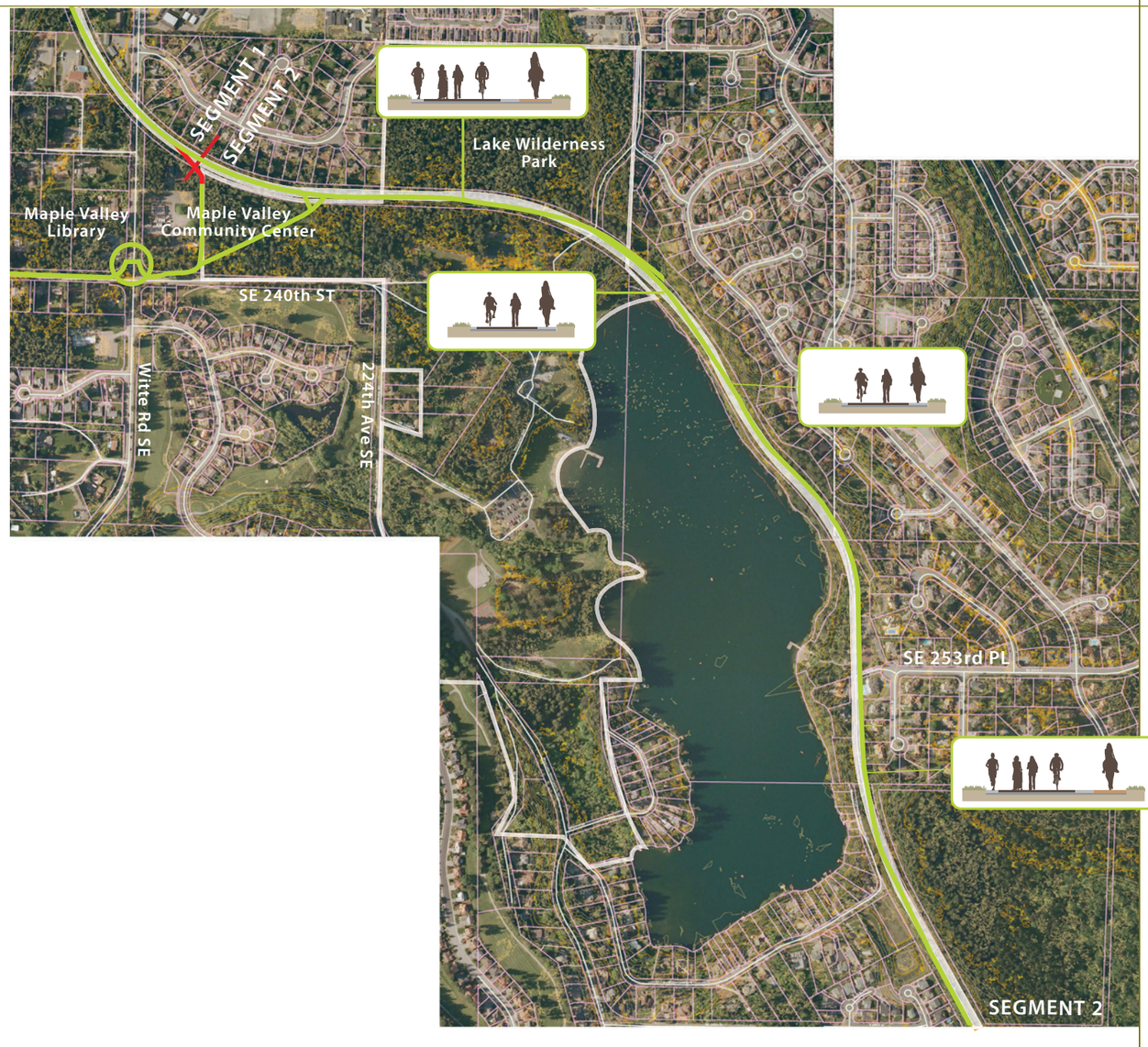
Once past the area with the steep cross-slope the trail is nearly at the level of the lakeshore, and the trail right-of-way is generally level. In this location, however, the right-of-way narrows to 30', and the proposed trail section remains somewhat reduced to allow some area for drainage/ grading buffer, signs, clear zone, and possible fencing between the trail tread and the edge of the County's ownership.

SOFT SURFACE TRAIL

In the segment of the trail through Lake Wilderness Park, there are opportunities to either develop the soft-surface trail in a separate line and grade from the shared-use path, or to develop the equestrian trail adjacent to the shared-use path on the top of the railroad prism. In general, the preferred trail section would be to develop the soft-surface trail on its own alignment to the west of the shared-use path. However, there may be concerns that an soft-surface trail located here would conflict with the circulation and future development of the Arboretum. For the purposes of the feasibility study, the soft-surface trail has been assumed to be located at the base of the railroad prism, and separated from the shared-use trail by a wide landscape buffer.

As the regional trail reaches the steep sideslopes above Lake Wilderness the soft-surface path joins the shared-use trail, first at full width, then transitioning to a reduced-width section to minimize the grading necessary to accommodate the trail. Once the grade eases, the soft-surface trail separates a bit from the shared-use path, but is still maintained in a widened shoulder to the west rather than a full width section to allow the regional trail to fit into the reduced right-of-way at the southern end of this segment.

SEGMENT 2

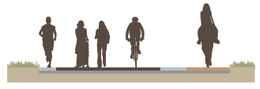


LEGEND

- *Public right-of-way, below 5% grade*
- *Requires right-of-way*
- *Public right-of-way, 5%-7% grade*
- *Public right-of-way, 8% grade*
- *Boardwalk (wetland or stream)*
- *Bridge*

CROSS-SECTIONS

Separated shared-use and soft-surface trail



Single line and grade, wide buffer

Single line and grade, constrained width

Boardwalk or structure

SEGMENT 2

SENSITIVE AREAS

There are no streams or wetlands have been identified in this segment of the trail. Portions of the trail right-of-way may be within the shoreline area for Lake Wilderness, so a shoreline permit would be required. The shoreline designation for the east side of Lake Wilderness is Conservancy. One of the purposes of the Conservancy shoreline is to provide recreational access; thus a trail meeting specified standards is allowed.

ROAD CROSSINGS

A very low volume road/shared driveway crosses the trail corridor.

SUPPORT FACILITIES

(EMERGENCY ACCESS, TRAILHEADS, CONNECTING TRAILS, PARKING)

Public parking, restrooms, and other amenities are available at Lake Wilderness Park. There is also a maintenance access road through the park that may be available for both maintenance and emergency access. Topography, narrowed right-of-way, and few access points limit the opportunities to incorporate trailhead amenities. However, benches could be located in a few areas outside the park.

DESTINATIONS AND CONNECTIONS

This segment of the trail passes through Lake Wilderness Park, owned and maintained by the City of Maple Valley. Lake Wilderness is the city's largest park, and includes a variety of recreational features. The area of the park to the south of the regional trail is the Lake Wilderness Arboretum; the area to the north is the Forest Reserve.

The Lake Wilderness Arboretum is a young botanical display garden that is maintained by a non-profit arboretum society in partnership with the City. In the long-term, the arboretum society envisions display gardens, an interpretive center, propagation facilities, and similar features that would support a public educational garden. The regional trail is recognized as an asset in their strategic plan, which includes as a goal to: "Develop the Arboretum so that it complements and integrates with Lake Wilderness Park, the regional trail system, and other community assets."

The Forest Reserve is an undeveloped area intended to provide a natural experience in the park.

Potential opportunities for additional access points occur at the southern end of this segment. On the east side, access could be provided through unopened right-of-way and parcels owned by the City of Maple Valley. On the west side, a connection could be made to SE Lake Wilderness Drive South.

RIGHT-OF-WAY

Right-of-way is continuous in this section. The narrow right-of-way section is a constraint; however additional acquisition in this area seems unlikely.

LAKE WILDERNESS PARK TO KENT-KANGLEY ROAD SEGMENT

SEGMENT 3

OVERVIEW

At the south end of Lake Wilderness the trail right-of-way widens again to approximately 100 feet. As it progresses south, the trail grade become relatively flat, and is located between residential development to the west and commercial development to the east. In the vicinity of SE 263rd Street, the railroad was constructed below grade (in a cut section) to allow for a grade-separated crossing with this local surface streets. This segment of the trail is relatively straightforward, requiring either no walls or low walls, but also includes a crossing of a high-volume roadway at Kent-Kangley Road.

SEGMENT 3

SHARED USE TRAIL

For most of this segment, the shared-use path would likely be located on the same line and grade as the existing gravel-surfaced path. One constraint to the specific alignment is the presence of underground utilities (i.e., a sewer line) within or very close to the existing rail grade. More retaining walls will likely be required if the trail alignment is shifted to avoid having a manhole in the paved surface. There is also some room for gentle curves in the alignment to provide some interest to the trail experience, but they would likely be minor.

SENSITIVE AREAS

No streams or wetlands have been identified in this segment of the trail. The northern end of the trail right-of-way is within the shoreline area for Lake Wilderness, so a shoreline permit would be required. The shoreline designation for the east side of Lake Wilderness is Conservancy. One of the purposes of the Conservancy shoreline is to provide recreational access; thus a trail meeting specified standards is allowed.

SOFT SURFACE TRAIL

The soft-surface path would follow a separate line and grade from the shared-use trail, staying on the western side of the right-of-way. In this segment the soft-surface trail would feel very connected to the shared-use trail, with open sightlines and relatively narrow landscape buffer between the two paths. The soft-surface path would join the shared-use trail at the crossing of Kent-Kangley Road.

DESTINATIONS AND CONNECTIONS

Existing access points occur in the vicinity of SE 260th Court. To the west, a path connects to the residential neighborhoods. To the east, a path connects to SE 260th Street, which currently lacks nonmotorized facilities and traverses an area with multi-use and commercial development. Existing access is also provided between the gravel trail and adjacent local surface streets in the vicinity of SE 263rd Street.

At the southern end of this segment, the trail is adjacent to the Summit Estates Park Area, and public access is provided from 236th Place SE to the trail. Kent-Kangley Road provides the regional access point and also provides access to retail, dining, and service businesses.

SEGMENT 3

LEGEND

- *Public right-of-way, below 5% grade*
- *Requires right-of-way*
- *Public right-of-way, 5%-7% grade*
- *Public right-of-way, 8% grade*
- *Boardwalk (wetland or stream)*
- *Bridge*

CROSS-SECTIONS

Separated shared-use and soft-surface trail

Single line and grade, wide buffer

Single line and grade, constrained width

Boardwalk or structure

SEGMENT 3

ROAD CROSSINGS

The only road crossing in this segment is a grade-separated undercrossing of SE 263rd St. The crossing at Kent Kangley Road is discussed in the next segment to the south.

RIGHT-OF-WAY

Right-of-way is continuous through this segment except at the Kent-Kangley Road crossing, where ownership has transferred to adjacent properties. Sufficient right-of-way has been secured to accommodate the trail crossing here.

SUPPORT FACILITIES

(EMERGENCY ACCESS, TRAILHEADS, CONNECTING TRAILS, PARKING)

The right-of-way in the immediate vicinity of Kent-Kangley Road is constrained by adjacent development. However, there are opportunities to incorporate trailhead amenities on the south side of the intersection or further north along the trail alignment. Additional trailhead amenities could be provided, as appropriate, at the more local access points provided to the north. There are no public parking or restroom facilities available.

OVERVIEW: Green to Cedar Rivers Trail, South

SEGMENT HIGHLIGHTS

- Exceptional trail experience as the corridor crosses Rock Creek and passes through Lake Sawyer Park.
- Provides a safe non-motorized route to traverse the slope connecting to the Green River Valley.
- Very good trail experience as the route passes through protected agricultural lands and Whitney Bridge Park in the Green River Valley.
- Provides strong non-motorized connections to future development in the City of Black Diamond.

TRAIL OVERVIEW

With the exception of a few blocks south of Kent Kangley Road where the trail corridor is directly adjacent to commercial buildings, this leg of the trail continues to provide a forested trail corridor and includes a segment through Lake Sawyer Park which may be the highlight of the entire trail. A short segment of this trail leg includes rail grade that has already been improved for use as a soft-surface trail, however, the majority is on unimproved right-of-way. For a short while, the trail continues to be a rail-to-trail conversion, with the planned shared-use trail following the alignment of the historic tracks. A new bridge to replace a historic crossing over the active BNSF railroad line reconnects the rail grade for trail use, and the trail follows traces of the railroad grade almost all the way to Lake Sawyer Park. As it nears the park, the trail corridor curves away from the railroad alignment and follows a new alignment over unimproved forestland.

PLANNING-LEVEL OPINION OF COST

A portion of this leg of the trail is constructed on existing railroad grade; however the majority would be built on unimproved right-of-way, increasing both the overall cost and the uncertainty for developing cost estimates. This leg includes a major structure to reestablish a bridge crossing over an existing BNSF line, which would raise the cost of the trail segment. This segment of the trail also includes alignment that passes near wetlands and streams, including two short stream crossings. Sensitive areas mitigation costs would likely be higher for this leg of the trail than for either the north leg of the Green to Cedar Rivers Trail, or the Jenkins Prairie Trail. A short section of trail in Lake Sawyer Park would likely require retaining walls as it traverses across a steep slope, and the hillside near the southern end of this leg that rises above the Green River Valley would require extensive retaining. A few easements would be required to complete the right-of-way for this trail leg. Right-of-way acquisition costs are not included in the planning level estimate.

All construction costs in the feasibility study are based on limited design information and should be used for planning purposes only. Right-of-way acquisition costs, where necessary, are not included in estimates. The estimates do not include permitting, survey, engineering, and administrative costs that would be part of an all-inclusive cost of construction. These additional costs would typically add another sixty percent or more to the bare construction cost shown below.

ESTIMATED TOTAL CONSTRUCTION COST

Trail construction:	$14,700,000
Sensitive Area Mitigation:	$1,200,000
New bridge over BNSF tracks:	$930,000
Total:	$16,830,000
Total length, lf:	42,768
Cost/lf:	$393
Total length, miles:	8.1
Cost/mile:	$2,080,000

Lake Sawyer Park is likely to eventually become an important regional recreation destination; combining preserved natural areas with a managed lakeshore recreation area and developed sports fields in the uplands. The trail will directly connect the park with the communities of Maple Valley and Covington, and planned new neighborhoods in Black Diamond. King County property directly across the street from Lake Sawyer Park will become a new trailhead facility, offering parking for both regular vehicles and horse trailers. It is anticipated that this trail head will be one of the most popular locations for equestrians to access the trail system.

South of Lake Sawyer Park, the trail corridor continues in a forested easement adjacent to large planned developments in the City of Black Diamond. Although currently undeveloped, the forested areas adjacent to the trail corridor are planned to become neighborhoods with several thousand homes and four school sites within easy walking or bicycling distance of the trail.

The southernmost segment of this trail leg includes a long, relatively steep connection to the Green River Valley, and a riverside connection to Flaming Geyser State Park. A segment of the trail alignment is located on the roadside for the challenging connection between the Black diamond plateau and the Green River Valley. Once in the valley, the trail follows the river through Whitney Bridge Park, eventually connecting to the iconic bridge that leads to Flaming Geyser State Park.

For most of this trail leg, the shared-use trail and soft-surface trail can be developed with good separation, taking their own way through the landscape with a wide buffer, and responding to the underlying topography and vegetation.

POTENTIAL TRAIL AMENITIES

This leg of the trail includes a new trailhead developed along Lake Sawyer Road, across the street from Lake Sawyer Park. Trail users would also be able to access the trail from Flaming Geyser State Park. Trailside benches, bike racks, viewpoints, and other amenities may be appropriate for development in coordination with the site planning for Lake Sawyer Park.

North of Lake Sawyer there is an opportunity to develop a viewing and interpretive side trail into an extensive peat bog. The regional trail avoids the bog to minimize potential wetland impacts, however the railroad corridor continues through the west end of the bog, and may provide an opportunity to provide managed access to an exceptional resource.

Whitney Bridge Park also provides opportunities for trailside viewpoints or other facilities along the along the Green River. However the intensity of demand for river access may also require management of non-trail uses in this segment of the trail.

PERMITTING, OWNERSHIP AND ENGINEERING CONCERNS

- The majority of the trail in this leg can be developed with the preferred standard section.
- This leg of the trail system includes two stream crossings, and is close to the Green River for a short distance. The trail alignment is also in the stream buffer for Rock Creek in a few locations.
- A new bridge is required to cross over the active BNSF railroad tracks, replacing a historic railroad bridge which has been removed. Coordination with BNSF for approval of the new bridge may be complex.
- The grade change from the Black diamond Plateau to the Green River Valley is challenging. Developing a new alignment that met AASHTO and ADA requirements for allowable grades and did not require extensive switchbacks would require extensive property acquisition, and would likely not be feasible. A connection to southeast Green Valley Road within current King county ownership is technically feasible, but would be expensive and potentially unsustainable, requiring substantial retaining walls built on a very steep slope. The preferred connection requires two short segments of right-of-way acquisition to provide a connected route to 218th Ave. SE, and then requires conversion of an accessory lane along that road into a non-motorized sidepath for the trail.

KENT-KANGLEY ROAD TO BNSF CROSSING SEGMENT

SEGMENT 4

OVERVIEW

This segment generally parallels SR 169, initially separated from the highway by a narrow strip of commercial development, then becoming directly adjacent to the highway right-of-way.

Green to Cedar Rivers Trail—SOUTH
KENT-KANGLEY ROAD TO BNSF CROSSING SEGMENT

SEGMENT 4

SHARED USE TRAIL

For most of this segment, the shared-use trail would likely be located on the same line and grade as the existing gravel-surfaced path. North of SE 276th St. the existing gravel trail is directly adjacent to the fenceline of the neighboring development to the east. Relocating the trail to allow the establishment of a buffer would improve the trail experience. Given the relatively flat, wide area through here, such a shift could likely be accommodated without introducing the needs for retaining walls. However, the extent of the shift should be balanced with the removal of mature trees that occur in pockets to the west.

South of SE 276th St. the right-of-way widens and the existing trail is bordered by forest on both sides. Here, the trail right-of-way is wide and relatively flat, allowing for some potential movement in the trail corridor, however following the existing improved trail would reduce both cost and clearing of attractive vegetation.

The trail would cross over the existing BNSF tracks on a new bridge connecting the existing railroad bridge abutments. The shared-use path and equestrian trail would both share the bridge, which would provide a sixteen foot wide surface to accommodate the joint use.

The trail would cross over the existing BNSF tracks on a new bridge connecting the existing railroad bridge abutments. Two alternative pedestrian bridge types were considered (TranTech 2012). For both, the structure was assumed to be a single span. One alternative was through-steel-truss with long-life protection; the other, pre-stressed precast concrete girder. Both alternatives provide a low maintenance and economical pedestrian overcrossing. However, the concrete girder is recommended, based on these considerations as well as constructability. The shared-use trail and soft-surface path would both share the bridge, which would provide a 16-foot-wide surface to accommodate the joint use.

SOFT SURFACE TRAIL

The soft-surface trail would follow an independent line and grade to the west of the shared-use trail throughout this segment. Separation between the trails would be limited north of SE 276th, and could be wider to the south.

SENSITIVE AREAS

No streams or wetlands have been identified in this segment of the trail. Drainage ditches associated with SR 169 at the eastern edge of the right-of-way may have wetland characteristics; however the trail alignment can easily avoid any areas of concern.

DESTINATIONS AND CONNECTIONS

There are no public facilities in this segment. The trail will provide access to private retail businesses and restaurants to the east and residential areas to the west. The corridor is near several schools.

SEGMENT 4

LEGEND

- *Public right-of-way, below 5% grade*
- *Requires right-of-way*
- *Public right-of-way, 5%-7% grade*
- *Public right-of-way, 8% grade*
- *Boardwalk (wetland or stream)*
- *Bridge*

CROSS-SECTIONS

Separated shared-use and soft-surface trail

Single line and grade, wide buffer

Single line and grade, constrained width

Boardwalk or structure

SEGMENT 4

ROAD CROSSINGS

Kent-Kangley Road is a relatively high volume arterial. It is generally two-lane, but includes a center turn lane near the current trail crossing. The existing mid-block crossing for the trail is located between 500' and 600' west of the intersection of Kent-Kangley and SR 169. The trail corridor is bordered by existing development in three of the four quadrants of the current crossing location, and relocation of the trail crossing would be impractical. Located on a curve, sight distance for the crossing location is adequate in both directions, although a utility pole obscures sight distance in one direction. Kent-Kangley Road is a WSDOT facility, and any improvements to the crossing will be subject to their review and approval process.

The current crossing has been enhanced with overhead passive signing and a median refuge. Some aspects of the current design, particularly the width of the ramps connecting the trail to the crossing, do not meet preferred design standards and should be modified when the trail is improved. In addition, several aspects of anticipated future conditions at the trail crossing are a concern, and will call for careful engineering design when the trail is built out to full standards at this location. First, turning movements to and from adjacent driveways create complex traffic patterns at the current crossing location. Second, traffic volumes at the crossing location may not provide adequate gaps to allow safe crossings for the range of users expected on the trail. Pending future detailed analysis, these conditions may warrant enhancement of the crossing with either an active warning light or a full user-activated signal.

The crossings at SE 276th and SE 280th streets are mid-block crossings very similar to each other. Neither of these streets are through streets, and both primarily serve residential developments. Volumes and speed are relatively low, however both roads are expected to see additional development and traffic volumes in the future. Intersection spacing from SR 169 and sight distance is adequate, but not optimal. At peak times cars waiting to turn onto SR 169 can back up to the current crossing locations. To improve sight distance and stacking capacity for traffic at both locations, the current crossings would be relocated to the west, near the western edge of the County right-of-way. No acquisition is anticipated to be required.

SUPPORT FACILITIES

(EMERGENCY ACCESS, TRAILHEADS, CONNECTING TRAILS, PARKING)

There is easy access to the trail corridor from Kent-Kangley Road and adjacent businesses along the right-of-way. Fencing is in place to define entries to the trail corridor and discourage vehicle access from adjacent parking and service areas. There are no public parking or restroom facilities available.

Future study could include the identification and treatment of breaks in the fencing, designed to accommodate access where desired and otherwise discourage it.

RIGHT-OF-WAY

Ownership is continuous throughout this segment.

BNSF CROSSING TO LAKE SAWYER SEGMENT

SEGMENT 5

OVERVIEW

South of the BNSF tracks there is limited improvement to the railgrade. From this segment and continuing south the trail alignment is often on unimproved right-of-way. This segment begins on the north crossing under massive high-voltage BPA powerlines and remnant forest to a crossing with 241s t Ave. SE. South of this crossing, the trail alignment traverses a beautiful and exciting area as it follows a raised embankment surrounded on both sides by the upper reaches of Ravensdale Creek and associated wetlands. As the rail corridor continues south of the creek it is located on a plateau with a grade break leading to the stream corridor on the west, and a large, high quality peat bog to the south and southeast. After passing the creek, the trail would leave the rail corridor, avoiding the peat bog and traversing west to begin following the edge of the plateau above the slope break.

SEGMENT 5

SHARED USE TRAIL

The shared use trail would generally follow the rail corridor for the short distance between the BNSF crossing and entering the BPA powerline right-of-way. Within the BPA right-of-way the railbed seems to have been regraded, and a new bench will need to be established for the trail. On the southern end of the BPA right-of-way the trail reconnects with the railbed, which begins to transition to a significant fill prims as it approaches 241st Ave. SE. It appears that the rail line originally was grade-separated at the 241st Ave. SE crossing, and some of that grading is still in place. To avoid a mid-block crossing, the shared-use trail traverses down from the railroad grade towards the intersection of 241st and SR 169, where a new crossing is recommended at the intersection.

South of 241st the trail traverses back up the slope to rejoin the rail grade, which has been developed as an informal trail. As the trail continues south the grade of the railbed stays level on a fill prism as the surrounding ground drops away to the Ravensdale Creek corridor. The elevated trail corridor offers views to the stream and wetlands below. To achieve the desired trail width, the trail profile could be lowered slightly. On the far side of the stream corridor the ground begins to rise again, and eventually the trail is at grade with a large level plateau with the stream to the west and significantly lower in elevation.

Approximately 1/8th of a mile south of 241st the trail leaves the rail grade and begins to follow the top of the slope separating the upland plateau from the stream and its broad associated riparian area. The trail follows the slope break to the boundary of Lake Sawyer Park.

SOFT SURFACE TRAIL

Throughout this segment opportunities to provide wide separation between the shared-use trail and the soft-surface trail alternate with segments where the two paths need to be developed on the same general grade. Where the trail is not on an existing railbed fill prism, the equestrian path would be separated from the shared-use trail on the west side. In areas with existing fill prisms, the two trail would be developed parallel to each other at the top of the grade, where lowering the profile and minor widening would generally be required to accommodate the necessary width of the trail section.

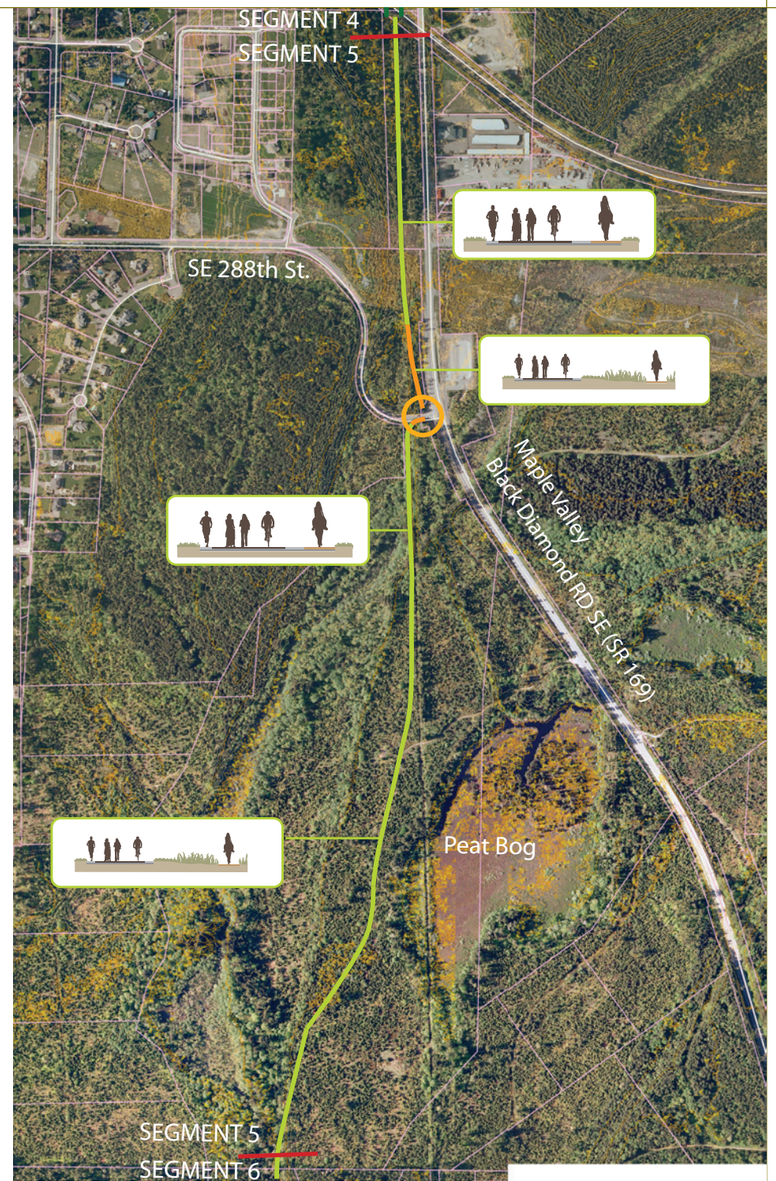
SENSITIVE AREAS

The trail crosses Rock Creek on an existing fill prism at an elevation 40-50 feet above the stream level. The trail is within the creek buffer, although well-separated from functional riparian habitat by the grade difference. Some grading and associated clearing may be necessary on top of the prism to accommodate the width needed for both the shared-use and soft-surface trails.

The peat bog at the south end of the segment is a high quality wetland, and the proposed trail alignment is outside the wetland buffer. Although the trail alignment is located off the railbed here to avoid wetland impacts, the fill prism for the railbed continues through the peat bog. There is an opportunity to develop an interpretive spur or loop that connects to the regional trail without the need for wetland fill. An interpretive trail would have buffer impacts if it is included as part of the project.

Given the sensitive areas that occur in this segment, subsequent study is necessary to inform the final alignment and design. Depending on delineated boundaries and the quality of the resources, changes may be appropriate to further minimize effects on sensitive areas.

SEGMENT 5



LEGEND

Public right-of-way, below 5% grade
Requires right-of-way
Public right-of-way, 5%-7% grade
Public right-of-way, 8% grade
Boardwalk (wetland or stream)
Bridge

CROSS-SECTIONS

Separated shared-use and soft-surface trail

Single line and grade, wide buffer

Single line and grade, constrained width

Boardwalk or structure

SEGMENT 5

DESTINATIONS AND CONNECTIONS

South of 241st Ave. SE, King County Parks owns over 150 acres, managed as open space. This area is threaded with rough paths used by pedestrians and mountain bikers. This segment of the Green to Cedar Rivers Trail provides access to these paths.

There are no improved parking facilities in this segment. Currently there is informal trail parking on the south side of 241st Ave. SE, however this location has poor sight distance on a corner, and is likely not appropriate for an improved parking location. Informal trails connect from this segment to SR 169, however there are no improved facilities or services on the highway in this location.

RIGHT-OF-WAY

Ownership is generally continuous throughout this segment. Permission from WSDOT will need to be secured to allow development of the new crossing at 241st Ave. SE.

ROAD CROSSINGS

The road crossing at 241st Ave. SE is the only crossing in this segment. The current location of the crossing has poor sight distance, and the proposed new crossing is relocated at the intersection with SR 169.

SUPPORT FACILITIES
(EMERGENCY ACCESS, TRAILHEADS, CONNECTING TRAILS, PARKING)

This segment has limited opportunities for access and amenities. An existing trail network connects from 241st Ave. SE south to Lake Sawyer Park generally to the west of the existing railroad grade. These trails provide a good pedestrian experience of the stream corridor and riparian wetlands; however they also traverse private property in some locations. As described above, there is an opportunity to develop an interpretive trail to the large peat bog at the southern end of this segment either as a spur or loop along the railroad grade.

LAKE SAWYER SEGMENT

OVERVIEW

This segment winds through Black Diamond's Lake Sawyer Park. In general the proposed alignment does not follow existing formal or informal trails in the park, instead developing a new alignment for the regional trail. Several potential alignments through the park were evaluated before selecting the preferred route. The proposed regional trail alignment was intended to minimize natural area disturbance, and maintain future flexibility for park planning. It is not recommended that the regional trail function as a primary internal circulation route for future park development, because there is potential for user conflict.

Originally acquired by King County, the park was transferred to the City of Black Diamond with the County retaining an easement for the regional trail. Black Diamond has completed modest improvements to the park, including a small gravel parking lot with portable toilets, and a gravel access trail connecting the parking area to the lakefront section of the park. From the lakefront area a network of informal trails weave throughout the park, with some eventually connecting to the regional trail alignment as it approaches 241st Ave. SE.

Although the park is generally undeveloped, future development is planned to include a mixture of developed sports fields, unstructured recreation areas, and preserved natural areas. Sports fields would likely be located in the western section of the park near the location of the current parking area; because effects on sensitive areas would be minimized. The lakefront section of the park is likely to be a fairly active location for picnicking and family recreation; and the more eastern sections of the park along Ravensdale Creek area would most likely be protected with only minor trail development. Plans for the park are still being discussed and could be modified in the future.

The southern terminus of this segment is on King County property, located west of Lake Sawyer Road and south of SE 312th Street.

SEGMENT 6

SHARED USE TRAIL

A defining topographic feature of Lake Sawyer Park is a grade break between a plateau bordering Rock Creek and its associated lowlands. The proposed alignment for the shared-use trail follows the top of this grade break, skirting the Rock Creek Corridor. The trail crosses a small tributary to the creek on a boardwalk, and then continues at the top of slope until it nears the lake. As the trail corridor approaches the southeast tip of Lake Sawyer it traverses down a forested hillside to the lake level and continues south to the channel connecting the lake to the adjacent open water marsh. Crossing the channel on a short new bridge, the trail then follows the lakeshore to the west before traversing back up a forested hillside and reaching Lake Sawyer Road on the west side of the park.

The trail crosses Lake Sawyer Road to a County-owned parcel west of the road, the location for a proposed trailhead and equestrian parking area. The County parcel is triangular, with its narrowest point to the north and widest to the south. The trail crossing connects to the site at its northernmost tip, while the parking and trailhead facilities are located further south where the site is less constrained. The trail generally follows the west side of the property .

DESTINATIONS AND CONNECTIONS

Lake Sawyer Park is an exceptional public open space, and will likely become one south King County's most important regional parks. The lakefront area of the park offers public access to a scenic shoreline area perfect for picnicking and possible water recreation, the forested stream corridor offers a high quality native forest and riparian habitat, and there is available space to develop ballfields or other active recreational opportunities in the park's uplands.

Although the scope and schedule for future development of the park are not set, it is likely that Lake Sawyer will be one of the most popular recreation destinations along the future trail route, and will also be used as a trailhead facility in conjunction with the planned King County trailhead located to the west of the park (described in segment 7.)

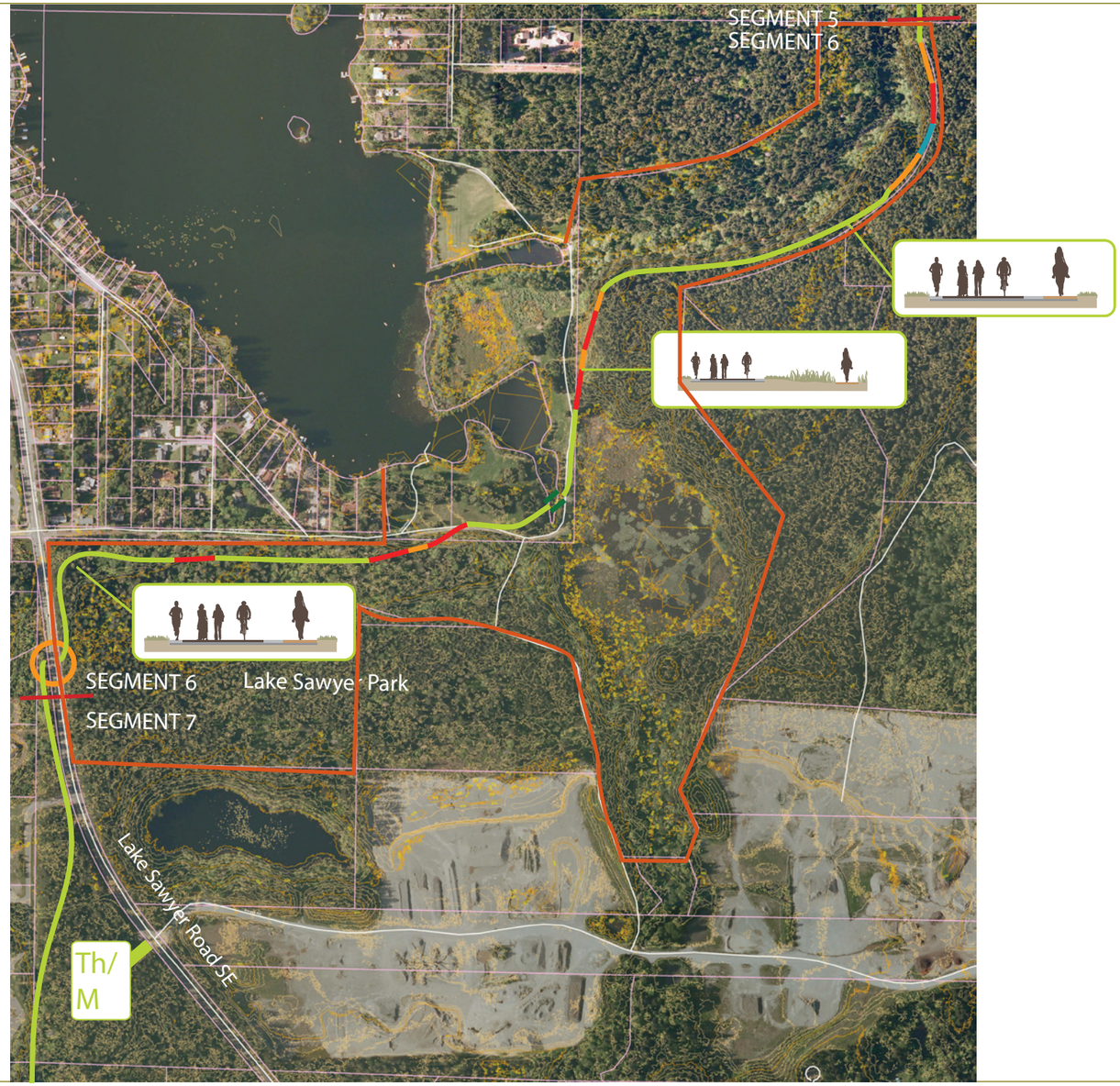
SOFT SURFACE TRAIL

Although Lake Sawyer Park would seem to provide a wide variety of opportunities for a soft-surface trail separated from the shared use path, sensitive areas constraints and an interest in preserving options for the long-term development of the park constrain potential alignments. The feasibility study shows a soft-surface trail that generally parallels the shared-use path along the top of the grade break above the creek. There is room for some variation in the trail section as it follows along the lakeshore and then through the park to the crossing of Lake Sawyer Road. The equestrian trail and shared use path both cross Lake Sawyer Road at a shared crossing to the County's future trailhead area.

The proposed trailhead will feature a variety of amenities for equestrians, including trailer parking, hitching areas, mounting blocks, and others.

Other options for alignments through Lake Sawyer Park could be explored during the design phase for the trail, or if there is a comprehensive master planning process for the park. One option would split the soft-surface path from the shared use path near the north edge of the park. Equestrians would cross Ravensdale Creek on a new bridge, then parallel the northern boundary of the park to a second crossing of the creek on the existing road along the lakeshore. Under this option the soft-surface path and shared use paths would reconnect where the shared use path reaches the lakeshore after traversing down a forested hillside from the plateau. A second option would locate the soft-surface trail on the same side of Rock Creek as the shared use path, however the soft-surface path would generally follow the toe of the slope with the shared use path at the top of the slope.

SEGMENT 6



LEGEND

- *Public right-of-way, below 5% grade*
- *Requires right-of-way*
- *Public right-of-way, 5%-7% grade*
- *Public right-of-way, 8% grade*
- *Boardwalk (wetland or stream)*
- *Bridge*

CROSS-SECTIONS

Separated shared-use and soft-surface trail

Single line and grade, wide buffer

Single line and grade, constrained width

Boardwalk or structure

SEGMENT 6

SENSITIVE AREAS

Lake Sawyer Park includes a section of Rock Creek as it flows to its outlet at Lake Sawyer. The creek has a well-developed riparian area, including extensive riparian wetland. A few small tributaries flow into the creek within the park. The shoreline of Lake Sawyer is a mix of managed grassland and more natural areas, and a large marsh drains into Lake Sawyer from the south. There is an active bald eagle nest at the edge of the wetland where it connects to Lake Sawyer.

The trail alignment was selected to minimize sensitive area impacts; however there are a few unavoidable areas. As the trail approaches Lake Sawyer from the northwest it crosses a small tributary to Rock Creek. The tributary channel is not well-developed here, and the feasibility study assumes a short section of boardwalk. In a segment of trail that follows the east and south shore of Lake Sawyer, the trail is near the lake's shoreline, and crosses the channelized outlet connecting the large wetland to Lake Sawyer. The trail alignment includes a new crossing of this channel to allow some separation between the trail and the active eagle's nest. Based on preliminary study the crossing location would be approximately 200-300' feet from the nest tree. If the eagles abandon the nest prior to development of the trail it would be possible (and likely preferable) to use an existing crossing adjacent to the nest tree for the trail.

Given the sensitive areas that occur in this segment, subsequent study is necessary to inform the final alignment and design. Depending on delineated boundaries, the quality of the resources, and the status of nesting sites, changes may be appropriate to further minimize effects on sensitive areas.

SUPPORT FACILITIES

(EMERGENCY ACCESS, TRAILHEADS, CONNECTING TRAILS, PARKING)

As described above, the park currently includes a gravel parking area and portable toilet. These facilities would likely be adequate as a short-term trailhead if the trail is constructed prior to additional improvements to the park. The County-owned trailhead location across Lake Sawyer Road provides an opportunity for a major trailhead and maintenance base area in this part of the corridor. The character of the trailhead on the County property will be determined to some extent by the future plans for Lake Wilderness Park. If adequate space can be provided within the park, then parking for trail users other than equestrians may make sense inside the park. Assuming that most trail traffic will be heading north from this trailhead in the near-term, focusing parking inside Lake Sawyer Park for bicycle and foot users would reduce the number of crossings and improve safety. If the master plan for Lake Sawyer Park emphasizes separation between park and trail facilities, then it may make sense to provide facilities more focused on all user groups in the County property.

RIGHT-OF-WAY

The entire segment is in public ownership. King County retained an easement through Lake Sawyer Regional Park for the trail when ownership was transferred to Black Diamond. The proposed alignment does not follow the location of the initial easement, however the easement language allows for the easement to be relocated within the park. King County owns the triangular trailhead property west of Lake Sawyer Road.

ROAD CROSSINGS

The road crossing at Lake Sawyer Road is the only crossing in this segment. The proposed location is as far north as the County's ownership allows, improving sight distance as much as possible. A location further north would be preferred; although this location meets sight distance standards for the road's design speed.

LAKE SAWYER PARK TO 218TH AVE SE SEGMENT

SEGMENT 7

OVERVIEW

From its northern end at the Lake Sawyer trailhead, this segment continues through forestland that is currently undeveloped, but will eventually become a developed residential area. Much of this segment follows trail easements held by King County. For most of this segment the trail follows rolling topography; however at the southern end the alignment begins the challenging descent to the Green River Valley. In the northern part of the segment the trail corridor is generally near 550 feet' elevation. To the south the trail begins the transition to a final elevation of approximately 180 feet' along the banks of the Green River. If the trail route ran as the crow flies from the top of the plateau to the entry to Flaming Geyser State Park, it would drop a staggering 400 vertical feet in a distance of only 1,800 feet. Instead, this segment follows an alignment that brings the trail westward into the Black Diamon Natural Area, connecting small benches with a trail alignment that traverses a series of sidehills to reduce the trail grade.

This segment does not have continuous right-of-way secured. There is a "missing link" at a section corner where the County's current easements shift from one quadrant to the opposite quadrant. There is also a missing section where the alignment traverses east from the existing easement to the Black Diamond Natural Area.

SEGMENT 7

SHARED USE TRAIL

The shared use path follows rolling, forested terrain southward from the County trailhead site. Although the County has acquired a 100-foot-wide' wide easement for the trail from underlying property owners, the relatively challenging topography constrains some of the opportunities for locating the trail within the easement. The trail will likely meander both in its horizontal and vertical alignment in response to the underlying topography.

The trail would cross SE Auburn Black Diamond Road as far west as possible, either within the easement or further west towards an existing road entry. Sight distance is limited here and travel speeds are high along this road. On the south side of the road the trail alignment continues over rolling terrain. The alignment includes an extensive wetland. Depending on the ultimate right-of-way acquisition, the trail would either cross on a structure or skirt around the wetland if possible.

Several locations are possible for the trail alignment to connect between the existing easement and County property associated with the Black Diamond Natural Area to the west. The boundaries of the natural area follow the edge of a steep grade into a creek channel that drains towards the Green River. County ownership includes a narrow strip of flatter ground that skirts the drop-off, and the trail alignment follows this more level area around the creek channel and heading towards the west. Once past the upper reaches of the creek, the trail begins to head downslope, sidehilling along steep slopes between small benches in the grade that drops into the Green River valley. The segment ends at an undeveloped County park property at 218th Ave. SE.

SOFT SURFACE TRAIL

The equestrian path would generally parallel the shared-use path through this segment without wide separation, although the rolling topography provides an opportunity to develop the path with an independent line and grade. The path would generally be expected to run on the west side of the shared use path through this segment. As the path cuts west towards the Black Diamond Natural Area, there may be opportunities to link with the local horse trail system planned for the adjacent community.

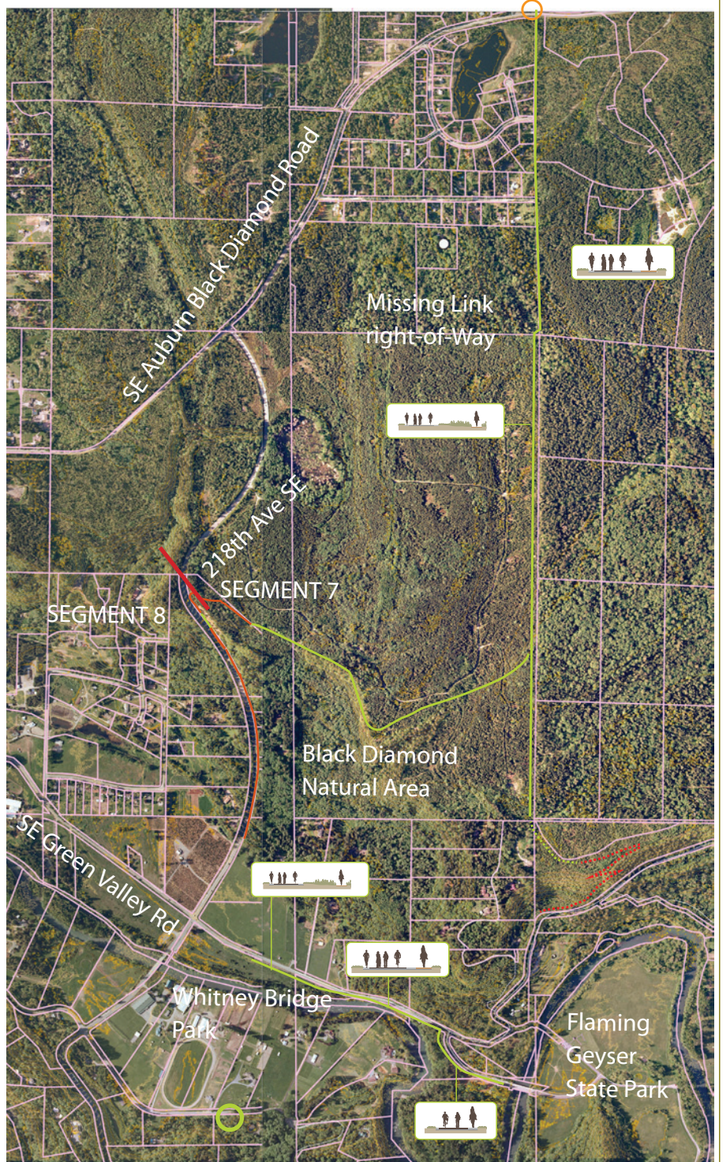
SENSITIVE AREAS

The majority of the trail alignment through this segment passes through second-growth upland forest. There is a large wetland complex near the section corner where the trail easement jogs. There may be an opportunity to acquire an upland route bypassing the wetlands as part of the acquisition to resolve the "missing link" location where the adjacent easements do not allow a continuous trail corridor.

In the southwestern portion of the alignment the trail follows the top of a steep valley system that surrounds an incised drainage flowing towards the Green River. This area has been protected for habitat values, and a wildlife corridor has been identified south of the proposed alignment.

Given the sensitive areas that occur in this segment, subsequent study is necessary to inform the final alignment and design. Depending on delineated boundaries and the quality of the resources, changes may be appropriate to further minimize effects on sensitive areas.

Green to Cedar Rivers Trail–SOUTH
LAKE SAWYER PARK TO 218TH AVE SE SEGMENT



LEGEND

- *Public right-of-way, below 5% grade*
- *Requires right-of-way*
- *Public right-of-way, 5%-7% grade*
- *Public right-of-way, 8% grade*
- *Boardwalk (wetland or stream)*
- *Bridge*

CROSS-SECTIONS

Separated shared-use and soft-surface trail

Single line and grade, wide buffer

Single line and grade, constrained width

Boardwalk or structure

SEGMENT 7

ROAD CROSSINGS

There are two road crossings in this segment–a major crossing at SE Auburn Black Diamond Road and a likely crossing of a low volume internal road for a future development near the Black Diamond Natural Area. The crossing at SE Auburn Black Diamond Road is a challenging crossing on a curve, with limited sight distance and relatively high speed traffic. Although sight distance nominally meets standard for a crossing within the easement boundaries, safety would be improved if the crossing could be located further west. The preferred location would be adjacent to the existing road serving the residential development to the west of the trail corridor. It may be possible to jog the path westward within the road right-of-way to improve the crossing location. The grading for the trail on the south side of the road is challenging, and should be coordinated with the crossing details in final design. Some fill in wetland buffer on the south side of SE Auburn Black Diamond Road may be necessary to move the crossing to the west.

The anticipated crossing of the planned low volume internal roadway should be coordinated with the developer to ensure an appropriate location and design standards are selected.

SUPPORT FACILITIES
(EMERGENCY ACCESS, TRAILHEADS, CONNECTING TRAILS, PARKING)

The County-owned trailhead across from Lake Sawyer Park provides opportunities for access and services for this segment. Following future development of adjacent residential properties, there will likely be opportunities to connect to several local trail systems.

RIGHT-OF-WAY

There are several locations in this segment where right of acquisition would be required:

- Some additional right-of-way could improve the crossing location at SE Auburn Black Diamond Road; however, while additional property would be advantageous for improving the trail alignment through the crossing, it may not be necessary.

- As described above, there is one location where current County easements meet at point in opposite quadrants of a section corner. At minimum, a small easement needs to be secured from one of the adjacent owners to provide a continuous corridor. This location is also in a wetland, and it would be advantageous if possible to acquire an easement sufficient to either reduce or eliminate the need for wetland impacts/trail structures in this location.

- Two acquisition locations are necessary along the route that connects to the west from the County's current easement to the park property along 218th Ave. SE. A relatively long easement is necessary between the current easement and the nearest section of the Black Diamond Natural Area. There is significant flexibility in the final location for this easement to coordinate with the plans for the future development of the underlying property. A second, shorter easement is necessary in a location where the Black Diamond Natural Area boundary drops into the step creek channel, and does not provide an adequate trail corridor at the top of the slope.

DESTINATIONS AND CONNECTIONS

There are no major public recreation destinations in this segment. Future residential developments adjacent to the trail corridor will offer some smaller park facilities that will likely be accessible from the regional trail via a local trail system.

218th AVE SE TO FLAMING GEYSER ST. PK. SEGMENT

SEGMENT 8

OVERVIEW

Completing the connection into the Green River Valley, this segment follows 218th Ave. SE to SE Green Valley Road, and then follows the riverbank in the County's Whitney Bridge Park to the entrance of Flaming Geyser State Park. This segment includes a sustained and challenging grade dropping from north to south along 218th Ave. SE, then a pleasant riverside segment to the end of the trail.

Green to Cedar Rivers Trail—SOUTH
218TH AVE SE TO FLAMING GEYSER SEGMENT

SEGMENT 8

SHARED USE TRAIL

The trail reaches 218th Ave. SE at an undeveloped County Parks property. At this point 218th Ave. SE is in a cut section, making the connection between SE Auburn Black Diamond Road on the upper plateau, and SE Green Valley Road in the valley bottom. The roadway section in this portion of the hillside is three lanes wide, with one lane southbound (downhill), and two lanes northbound (uphill) through the steepest section of the grade. The shared-use path replaces the second northbound lane between the parks property and SE Green Valley Road, reducing the roadway to two lanes for approximately ½ mile. The shared-use path crosses SE Green Valley Road on the east side of the existing intersection with 218th Ave. SE, then turns westward along the riverbank. The riverfront section of the trail is located within Whitney Bridge Park, and for most of the alignment there is adequate space for the trail to have a wide separation from the roadway. There has been some habitat restoration completed in this area, and the final location of the trail would be designed to meet restoration goals, as well as preserving recreational access to the park, maintaining trail safety, and providing a positive trail experience.

The shared-use trail would be developed near the road, almost as a sidepath , in the location where the river bend is nearest the road. This area has been used in the past as overflow parking for Flaming Geyser State Park, and is currently fenced to discourage parking.

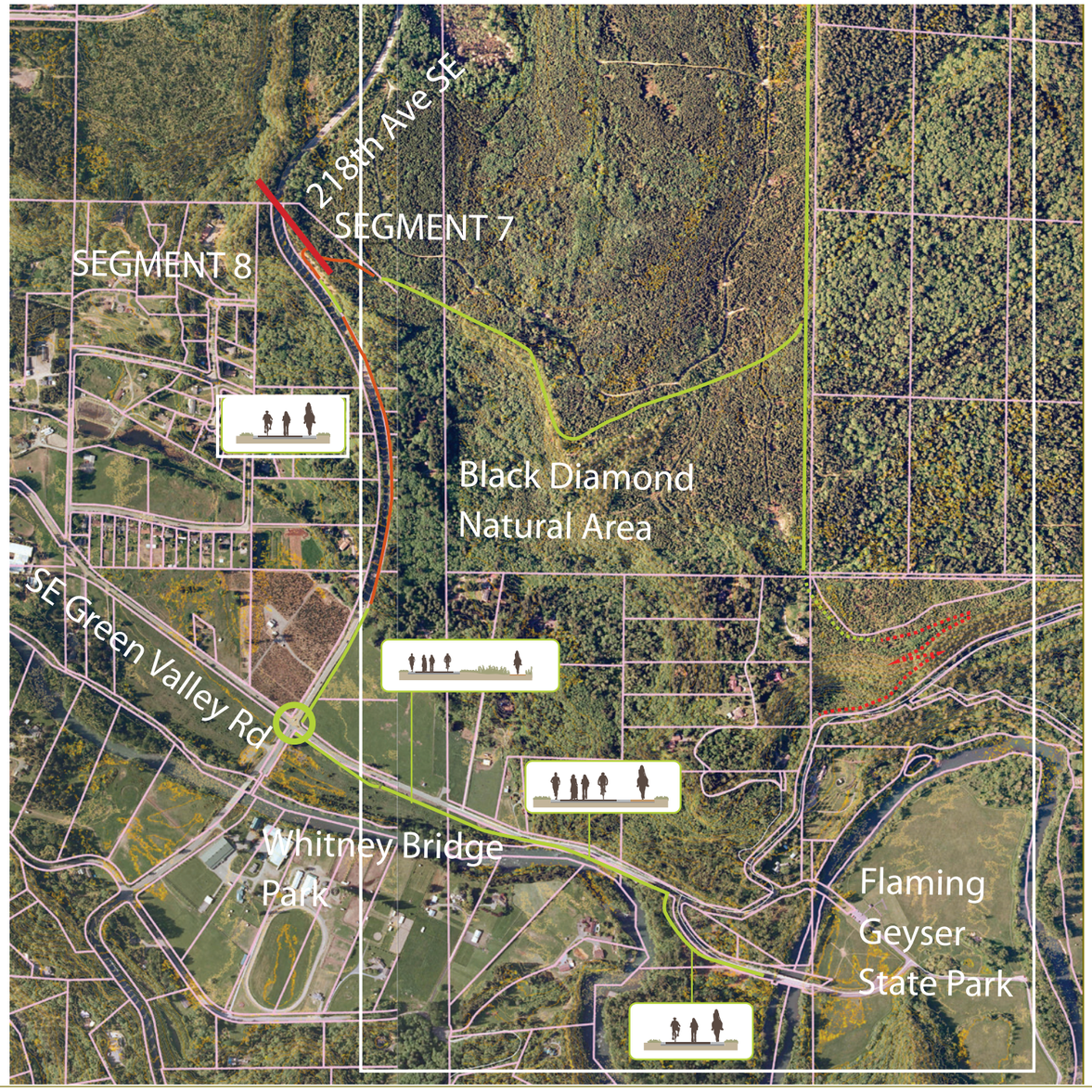
The road to Flaming Geyser State Park is narrow and is congested on busy park days. As the trail approaches the access road to flaming Geyser there are several different options for the location of the trail, depending on the future management plans for the Flaming Geyser Natural Area, and Washington State Parks' preference for accommodating new non-motorized access. A sidepath alignment along the entry road would minimize impacts to the County's Flaming Geyser Natural Area, as well as serving a variety of non-motorized visitors to the park. A separated trail along the access road could offer improved access to the Natural Area, but would also have a greater impact.

The regional trail is expected to end at the bridge entering Flaming Geyser State Park. The park is an attractive destination or trailhead location for trail users; however there are limited facilities within the park to accommodate the types of uses anticipated for the regional trail. There are no separate non-motorized trails in the park similar to the regional trail, and no connecting trails or roads that offer a through route.

SOFT SURFACE TRAIL

The soft surface trail would be a widened gravel shoulder directly adjacent to the shared-use path along 218th Ave. SE. The soft-surface path would be on the east side of the shared-use path, farthest from vehicle traffic. As with all road crossings, the soft-surface and shared-use paths use the same crossing location at SE Green Valley Road. Through Whitney Bridge Park the soft-surface path would have a separate line and grade and good separation from the shared-use path. Located between the shared-use path and the river, the soft-surface path would join the shared-use trail in a narrow sidepath configuration where the river bend constrains the alignment. As the trail enters the County's Flaming Geyser Natural Area, there is an opportunity to meander the equestrian path on a separate line and grade before rejoining the shared-use trail at the entry bridge to Flaming Geyser State Park. There are existing equestrian trail and facilities within Flaming Geyser State Park, which could serve as an equestrian trail head for the regional trail.

SEGMENT 8



LEGEND

Public right-of-way, below 5% grade
Requires right-of-way
Public right-of-way, 5%-7% grade
Public right-of-way, 8% grade
Boardwalk (wetland or stream)
Bridge

CROSS-SECTIONS

Separated shared-use and soft-surface trail

Single line and grade, wide buffer

Single line and grade, constrained width

Boardwalk or structure

Green to Cedar Rivers Trail—SOUTH
218TH AVE SE TO FLAMING GEYSER SEGMENT

SEGMENT 8

SENSITIVE AREAS

The segment of the trail along SE Green Valley Rd. is near the Green River, and located adjacent to properties where the County has installed habitat enhancement plantings in Whitney Bridge Park. There is a bend in the river near the trail alignment that may be a long-term erosion concern.
This segment is located in unincorporated King County. Multiple shoreline designations may apply to the stretch of trail near the Green River; however, the applicable designation where the trail is closest to the river is Rural.
The purpose of the Rural shoreline is to accommodate land uses normally associated with rural area levels of development while providing appropriate public access and recreational uses to the maximum extent practicable. Thus, development of a trail appears consistent with this designation. However, proximity and application of designations should be confirmed through subsequent study or design.

DESTINATIONS AND CONNECTIONS

This segment connects to Flaming Geyser State Park, a major regional recreational destination, and the County's Whitney Bridge Park along the Green River. Whitney Bridge Park features river access, a boat launch, and a picnic area. SE Green Valley road is also a popular road for long-distance bicycling in this part of the County. Flaming Geyser State Park includes large open areas for informal recreation, river access, and flying model airplanes.

ROAD CROSSINGS

There is one road crossing in the segment, at the intersection of 218th Ave. SE and SE Green Valley Road. This intersection is stop controlled in all directions, and a simple crosswalk improvement would be adequate.

RIGHT-OF-WAY

There is continuous right-of-way for the regional trail in this segment. Completion of the trail as described would require agreement from King County Roads to use the existing climbing lane along 218th Ave SE as the trail route.

SUPPORT FACILITIES (EMERGENCY ACCESS, TRAILHEADS, CONNECTING TRAILS, PARKING)

Flaming Geyser State Park offers existing parking and services that could function as a trailhead for all users, including equestrians. Use of the park requires a fee, either paid per day or with an annual pass.

OVERVIEW: Covington Highlands Trail

SEGMENT HIGHLIGHTS

- Valuable "missing link" connector between Soos Creek Trail and the Cedar River Trail.
- Important local trail corridor connecting to downtown Covington, the Maple Valley Library and Community Center, and local parks.
- Provides access to Cedar Creek and Cedar Downs Parks, a little-used open space on the border of Covington and Maple Valley.

TRAIL OVERVIEW

The Covington Highlands Trail is a regional connection between the Soos Creek Trail, the Green to Cedar Rivers Trail, and the Cedar River Trail. It is also an important local non-motorized route linking Covington, Maple Valley, and Black Diamond. Like many trail corridors planned through already developed areas, the proposed right-of-way is complex, taking advantage of existing public lands and linear powerline and road corridors. These public areas with potential for trail development are linked by potential acquisitions of private land to make a continuous right-of-way. The majority of the proposed trail corridor traverses a pleasant rural landscape, including remnant forest, open fields, residential and pastureland, and riparian areas. Overhead powerlines along a Puget Sound Energy (PSE) and Bonneville Power Administration (BPA)detract from the trail experience on the western side of the corridor, and a few roadside segments of the trail area also less attractive alignments; however the overall trail experience should be positive, especially given the value of the trail corridor as a regional link.

PLANNING-LEVEL OPINION OF COST

This trail leg is a complex alignment that includes undeveloped right-of-way, powerline corridors, and roadside segments. A steep hillside rising to the east of the Soos Creek Trail would require retaining structures for most of its length, and more retaining walls would likely be necessary as the trail winds through rolling topography in Cedar Creek and Cedar Downs Parks. Several locations could require elevated structures to minimize wetland impacts, and impacts to wetlands and a stream crossing in Cedar Creek Park would likely require mitigation. The majority of the trail in this leg requires right-of-way acquisition, which would significantly add to the cost of development.

All construction costs in the feasibility study are based on limited design information and should be used for planning purposes only. Right-of-way acquisition costs, where necessary, are not included in estimates. The estimates do not include permitting, survey, engineering, and administrative costs that would be part of an all-inclusive cost of construction. These additional costs would typically add another sixty percent or more to the bare construction cost shown below.

ESTIMATED TOTAL CONSTRUCTION COST

Trail construction:	$10,100,000
Sensitive Area Mitigation:	$975,000
Total:	$11,075,000
Total length, lf:	34,134
Cost/lf:	$322
Total length, miles:	6.5
Cost/mile:	$1,700,000

Notable features of the trail corridor include a challenging forested hillside at the connection to the Soos Creek Trail, a little-used King County Parks meadow near the west end of the corridor, and access to Cedar Creek and Cedar Downs Parks near the eastern end of the corridor. Depending on the final route selection, the trail will also either connect directly or provide nearby access to the Maple Valley library, Community Center, and Lake Wilderness Park.

POTENTIAL TRAIL AMENITIES

Public open spaces along the trail route, including Cedar Downs Park owned by King County Parks and Cedar Downs Park, owned by the City of Covington, are currently undeveloped and may provide opportunities for picnicking, interior trails, or other park amenities. Where the trail is located in the BPA powerline corridor a short connector trail to the north would create a connection to Covington Community Park (currently in development) which could also provide restroom and parking facilities for the regional trail.

The City of Covington owns two residential parcels as part of Cedar Downs Park. These parcels can be accessed from SE 248th St., and could potentially be locations for a trailhead, services, and maintenance facilities for the trail.

PERMITTING, OWNERSHIP AND ENGINEERING CONCERNS

- The majority of the trail in this segment can be developed with the preferred section; however there are fairly long segments where physical or ownership constraints will require some modifications.
- A majority of the trail corridor requires acquisition of easements or ownership to secure right-of-way.
- The trail corridor includes wetlands and wetland buffers which may not be avoidable. Two locations where wetland impacts may not be avoidable include sections of the Puget Sound Energy easement used for the trail near the western end of the corridor, and within Cedar Creek Park.

TRAIL NAME

The name for this trail leg has not yet been formalized. The King County Regional Trail Needs Assessment lists this trail as the “SR 18” trail, based on an early placeholder concept to consider the highway right-of-way for the trail alignment. Other proposed names for this trail include the “Soos to Cedar Trail”, which has the advantage of assisting with wayfinding for trail users, and the name used in this document “Covington Highlands Trail”.

Covington Highlands Trail –Soos Creek to SR 18 Segment

Introduction

The western segment of the Covington Highlands Trail is a complex alignment linking powerline easements, a roadside segment, and minor reworking of a WSDOT overpass to cross SR 18. Although the overhead powerlines detract a bit from the trail experience, the overall feel of the alignment is pleasantly rural as the trail winds between remnant woodlots, small pastures, and large lot rural residential areas. A steep slope connecting from the Soos Creek Trail to a higher plateau will be a signature experience for this trail segment, and an open pasture area at the top of the slope is a beautiful rural open space that may develop as a popular destination for picnicking and play. This segment of the trail provides a valuable trail linkage between neighborhoods in Covington, and creates an east-west spine trail that will eventually connect intersecting north-south City of Covington trails.

This alignment minimizes acquisition needs by linking publicly owned rights-of-way as much as possible. However, several key acquisitions and negotiations with local jurisdictions, agencies, and utilities would still be necessary to create a continuous trail corridor.

SHARED USE TRAIL

At its western end, the Covington Highlands Trail begins at the Soos Creek Trail, near the trailhead facility at 148th Ave SE. Almost immediately after beginning its run to the east, the trail would begin a steep climb to a plateau that borders the Soos Creek riparian corridor. The connection from the Soos Creek Trail up the sideslope to the top of a plateau is one of the most challenging grade connections in the Covington Highlands/Green to Cedar Rivers Trail system. A long, sustained hillslope offers limited options for traversing to reduce the trail grade. This is one of the few locations where the trail will need to switchback to make the grade at an acceptable longitudinal slope. A few small benches would be connected with trail segments, but for the most part the grade is steep and sustained from the Soos Creek Trail to the top of the slope, where the trail makes the connection first to a gently sloping meadow, then to a Puget Power right-of-way.

At the top of the slope above Soos Creek, the trail corridor passes through an open, rolling meadow with picturesque trees. This small King County parks property is an attractive location for picnicking or other unstructured recreation along the trail route. Although not as steep as the hillside above Soos Creek, this meadow continues to climb and requires a weaving path alignment to meet grade standards and avoid retaining structures. The trail winds through the meadow as it makes its way towards the adjacent Puget Power right-of-way.

The entire Puget Power easement where it adjoins the King County Parks property is an unusual wetland. An attractive pond with emergent vegetation and abundant frogs is perched right at the top of the slope that leads down to Soos Creek. East of the pond, nearly the entire width of the easement is a complex palustrine wetland that extends for several hundred feet. The preferred alignment skirts the wetlands on the south side of the Puget Power easement, then transitions into the easement once past the wetland area. From here the trail corridor follows the rolling topography of the powerline right-of-way to 156th Ave SE, where a new mid-block crossing is developed. East of 156th Ave SE, the trail jogs to the north to avoid a Puget Power substation, and then continues in the powerline easement to another new midblock crossing at 164th Ave SE, eventually turning to the south where the Puget Power right-of-way meets a north-to-south BPA powerline.

The trail follows the BPA right-of-way to an intersection with SE 256th St, where it turns to the east again, and becomes a sidepath located on the north side of the street. At the intersection with 180th Ave SE, the trail makes a double crossing at the existing intersection, to the southeast quadrant of the intersection. The trail then continues as a sidepath on the south side of SE 256th St as it approaches an existing overpass and crosses SR 18.

SOFT SURFACE TRAIL

For a majority of this segment, the soft-surface path would be developed with a separate line and grade from the shared-use path. Along the steep slope above the Soos Creek Trail the shared use trail and the soft-surface trail may have significant differences in their location and alignment, taking advantage of the different design standards for the soft-surface trail. Overall, the soft-surface trail can be developed with much steeper slopes, and switchbacks can be developed with much tighter turning radii. An existing soft-surface trail on a similar alignment to the proposed trail may provide a baseline for the future soft-surface connection in the corridor. By separating the two trails on this slope, the shared-use trail grading can be reduced, requiring smaller walls and less cut and fill for the hillside segment.

Once at the top of the slope, the soft-surface path could continue with a relatively wide separation from the shared-use path, assuming that alignment is acceptable to Puget Power. If the trail is required to be constructed on structure for any of the sensitive areas in the alignment, the soft-surface path would use the structure for that section, and then separate again when the trail can be built on-grade.

For the sidepath segments of the trail along SE 256th St., the soft-surface path would be adjacent to the shared-use path as a widened shoulder, with the shared-use path closest to the roadway and the soft-surface path the most distant. The existing overpass over SR 18 is paved, and soft-surface path users would need to use a paved surface for this segment of the trail.

Covington Highlands Trail
SOOS CREEK TO SR 18 SEGMENT

LEGEND

- *Public right-of-way, below 5% grade*
- *Requires right-of-way*
- *Public right-of-way, 5%-7% grade*
- *Public right-of-way, 8% grade*
- *Boardwalk (wetland or stream)*
- *Bridge*

CROSS-SECTIONS

Separated shared-use and soft-surface trail

Single line and grade, wide buffer

Single line and grade, constrained width

Boardwalk or structure

SENSITIVE AREAS

A wetland system located within the Puget Power easement at the top of the slope leading to Soos Creek includes an open pond and extensive connected palustrine areas. This wetland seems to have been created by the clearing and site preparation process for the installation of the power lines, as the forested landscapes on both sides of the easement are entirely dry, with exclusively upland plant associations. The preferred trail alignment is to avoid the wetlands by acquiring new trail easement parallel to the Puget Power easement. If this is not possible then this segment would be constructed as an elevated boardwalk.

Further east along the Puget Power easement there is an area with complex drainage that includes emergent wetlands. There are drainage tiles and other features modifying the hydrology in this location, and there seems to be a complicated intermixing of upland and wetland areas. The final design for this segment will need to be developed following formal delineation of sensitive areas and more detailed design study. For purposes of the feasibility study, it was assumed that approximately 50 percent of the trail alignment through this area would be developed on a structure.

PUBLIC RECREATION DESTINATIONS/ COMMUNITY FACILITIES DESTINATIONS

This segment connects to the Soos Creek Trail, and provides access to an open meadow area in King County parks ownership that is currently not used by the public. A connecting trail along the BPA right-of-way, included in the City of Covington's trail plan, would connect to the Covington Community Park, currently in development.

ROAD CROSSINGS

Two new mid-block crossings are required for this segment, one at 156th Ave NE and one at 164th Ave SE. Both of these roads are relatively low volume; however, there is a concern that actual travel speeds could be higher than posted.

The crossing location at 156th Ave NE could be complicated by wetlands on both the east and west side of the road. Sight distance is adequate here, and the final location of the crossing will depend on more detailed wetland delineation and tail design.

The crossing at 164th Ave SE is less constrained by sensitive areas, but potentially conflicts with bus storage or drop-off parking for the adjacent school. Final design of the crossing will need to be coordinated with the school and City of Covington to ensure that there are no conflicting uses at the crossing location.

The two-way road crossing at SE 256th St. is at a developed intersection, and should not require modifications to the current design except for enhanced signage. The overcrossing of SR 18 will require coordination with WSDOT to ensure consistency with their policies. There is adequate space for a combination of an existing sidewalk with a generous bicycle lane.

RIGHT-OF-WAY

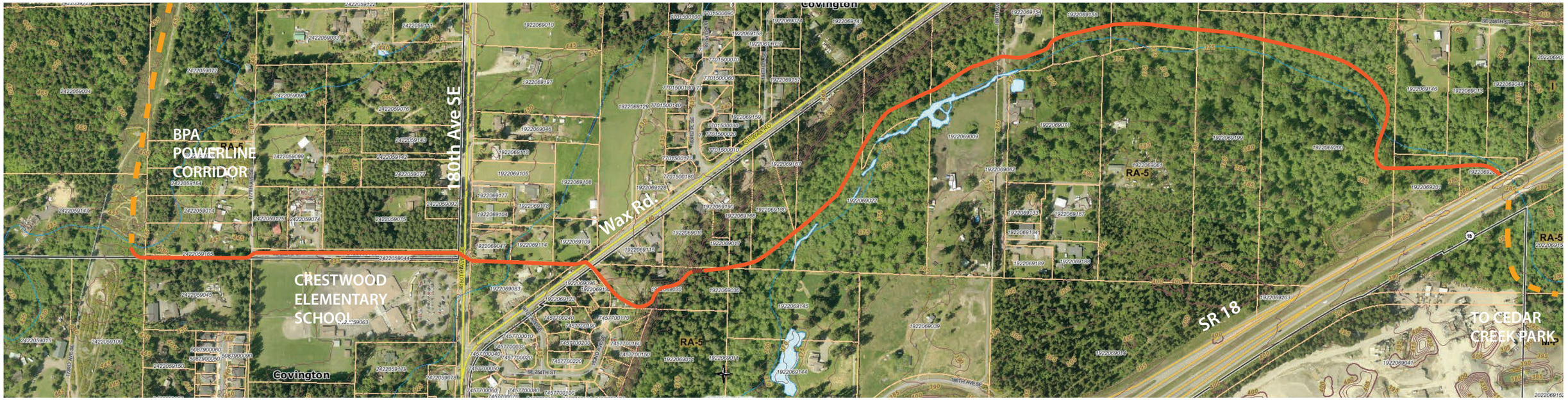
The majority of this segment will require acquisition of right-of-way for trail. Puget Power owns most of the right-of-way proposed for use as a trail between the Soos Creek Trail and a BPA powerline right-of-way. An easement will be required from Puget Power for use of the right-of-way under their ownership. In a few locations the Puget Power right-of-way is on an easement, and development of the trail will require acquisition of a separate easement from the underlying landowners. Additional easements from adjacent landowners may be appropriate to pursue to avoid wetland impacts within the Puget Power right-of-way, as described above.

The BPA powerline right-of-way is developed on easements from the underlying landowners. As with the privately-owned parcels along the Puget Power right-of-way, easements for right-of-way will require purchase for the proposed trial alignment under the BPA powerlines.

SE 256th St. is a City of Covington street, and will require development of an inter-jurisdictional agreement to redevelop the north side of the right-of-way for trail use. Use of the existing SR 18 overcrossing may require acquisition of airspace rights from WSDOT.

SUPPORT FACILITIES (TRAILHEADS, CONNECTING TRAILS, PARKING)

Trail access and parking is available at the existing trail head for the Soos Creek Trail along 148th Ave SE.



Covington Highlands Trail, ALTERNATIVE NORTH ALIGNMENT

The Covington Highlands North Alignment is an alternative route connecting the BPA powerline easement to Cedar Creek Park. Compared to the alignment that follows SE 256th st and crosses SR 18 on the existing overpass, the North Alignment does not include any on-road or sidepath segments. Instead it follows a creek corridor through a rural and forested landscape setting that would provide a positive trail experience. This alignment would, however, require significantly more property acquisition and provide less connectivity with adjacent neighborhoods.

This is an attractive trail option, but has the disadvantage of requiring additional property acquisition, and includes an exceptionally difficult undercrossing of SR 18. The potential undercrossing area is through an extensive wetland, and the existing highway bridges offer only six to eight feet of vertical clearance. Hydrology at the existing undercrossing precludes improvements for additional clearance, and developing a new grade-separated overcrossing for SR 18 is cost-prohibitive.

Because of the acquisition necessary for the preferred alternative for the Covington Highlands alignment, this trail corridor will require a longer period to secure right-of-way and develop the trail. If a new grade-separated road crossing for SR 18 is considered for development prior to the trail being completed, it may be worthwhile to reevaluate this alignment it is possible to connect to a crossing location.

Covington Highlands Trail –SR 18 to the Green to Cedar Rivers Trail

Introduction

The eastern segment of the Covington Highlands Trail travels through a large gravel pit expected to redevelop as a mixed-use residential and commercial neighborhood, then a charming natural park with only minimal development, and finally connects to the Green to Cedar Rivers Trail near the Maple Valley Community Center. This trail segment includes some challenging grades and sensitive areas in Cedar Creek Park. Connecting to the east from the park, the feasibility study recommends carrying two alternatives to reach the Green to Cedar Trail, one requires more acquisition but has fewer engineering constraints and a second that is located in public road right-of-way but would require challenging construction.

SHARED USE TRAIL

Directly south of the SR 18 overcrossing the trail corridor enters a large gravel mining operation. Although the mine is currently active, it is anticipated that the site will be redeveloped in the near future. For planning purposes, the trail corridor is shown following an existing trail that circles the fence line of the mine; however, it is more likely that the ultimate trail alignment will travel through the site following future coordination with the underlying landowner. Since land use plans have not yet been developed for the site, there should be a good chance of negotiating sufficient right-of-way to accommodate the preferred trail section. With the exception of the pit itself, this area is relatively flat, and shouldn't provide any significant grade challenges. The eventual trail route needs to connect to the east, crossing a gas line corridor, and exit the gravel mine property at an undeveloped public road easement that connects between the mine and Cedar Creek Park.

As the trail continues east from the gravel mine property, it follows a barely improved dirt road towards Cedar Creek Park. In this location the trail section is narrowed to reduce grading into the adjoining sideslopes. As the trail enters Cedar Creek Park it must negotiate a steep slope to climb above adjacent wetlands and avoid property impacts. A historic logging road grade provides a good location for the trail to be developed, although the underlying grade is too steep to accommodate the trail without extensive regarding and a winding trail route that provides a longer distance for trail users to make up the grade difference. As soon as the trail corridor enters the park, it is expected to be developed to the full design standard, with a separate soft-surface path.

Once at the top of the grade, the trail is located on a dry bench, and can continue nearly level for a little ways before it enters Cedar Creek Park and drops again to cross the creek at the base of the slope, and enter one of the residential properties described above. While on the topographic bench, the regional trail intersects several internal soft-surface park trails, and offers opportunities for trail users to visit the park and enjoy different options for side loops or explorations of the surrounding forest.

The elevation drop back down from the bench to the stream is again a long, steep drop for the trail. To minimize grading it is anticipated that the trail will drop at the maximum allowable grade for several hundred feet to the foot of the slope. Once at the bottom of the grade change, the trail crosses a new bridge over the stream, and then follows a rolling alignment through the residential property to SE 248th St. This property is a good opportunity to provide services and parking for trail users and park visitors, and the trail alignment will need to be coordinated with a long-term park development program for this site.

Two options are shown for the segment between Cedar Creek Park and the Green to Cedar Trail connections. The roadside option along 248th St. is feasible, however it includes several engineering challenges, and will significantly change the character of the roadway. The off-road option to the north would provide a stronger trail experience, avoid a road crossing at an existing roundabout, and offers fewer engineering issues, however it would also require acquisition of a continuous right-of-way. If acquisition can be accomplished, the off-road option would be preferred.

The alignment along SE 248th St. would be anticipated to be developed on the north side of the road. While there is adequate right-of-way to accommodate a side path here, there are several constraints that could make development a challenge. Based on preliminary evaluation it is likely that all utilities along the north side of the street would require relocation to accommodate a trail. In one location a small stream or drainage passes under the road, and the road grade is approximately fifteen to twenty feet above the adjacent grade, with a steep fill slope on the north side. Developing a trail on this side of the road would require either extensive retaining with a lengthened culvert, or some sort of structure that bridged the low area. For the entire length of the road, adjacent residents have developed and maintained the public right-of-way as yard and garden space, and would likely feel infringed upon if the trail were located in front of their homes. Similarly, significant vegetation removal would be required to locate the trail in the frontage at the Maple Valley Library, which has a complex, forested parking area. The trail would be anticipated to be developed with a highly constrained cross section through this alignment to limit impacts to adjacent properties and remain within the public right-of-way.

The alignment to the north of SE 248th would be less constrained, generally following the buffer of a small stream through a natural areas easement of an adjacent residential development, and then along the backs or sides of large lot rural residential properties. The trail should be able to be developed with a full cross section for this alignment, pending successful acquisition of easements from underlying property owners.

Either option described above would terminate with a connection to the Green to Cedar Rivers Trail. The SE 248th St. alignment would cross Witte Road at an existing roundabout, and then connect to the Green to Cedar Corridor inside Lake Wilderness Park. The final alignment of the trail through the park would depend on coordination with the City of Maple valley and the non-profit organization which manages the Lake Wilderness Arboretum. The option to the north of SE 248th St. connects to the Green to Cedar Trail on a large bend to the north of the Maple Valley Library, and does not require a crossing of Witte Road.

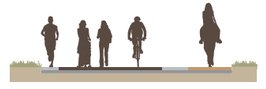
Covington Highlands Trail
SR 18 TO THE Green to Cedar Rivers Trail SEGMENT

LEGEND

- *Public right-of-way, below 5% grade*
- *Requires right-of-way*
- *Public right-of-way, 5%-7% grade*
- *Public right-of-way, 8% grade*
- *Boardwalk (wetland or stream)*
- *Bridge*

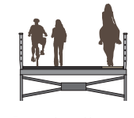
CROSS-SECTIONS

Separated shared-use and soft-surface trail



Single line and grade, wide buffer

Single line and grade, constrained width



Boardwalk or structure

SOFT SURFACE TRAIL

Assuming that adequate right-of-way can be acquired to support a preferred cross-section for the trail corridor, the soft-surface trail should be able to be constructed with good separation and separate line and grade for the majority of this segment. Ownership constraints might require a narrower separation within the undeveloped road right-of-way as the trail approaches Cedar Downs and Cedar Creek Parks.

If the alternative along SE 248th is developed, the soft-surface path would likely be very constrained in a narrow section along the edge of the road. The alternative to the north of SE 248th would allow development of a full preferred cross section for the trail if sufficient acquisition is possible.

SENSITIVE AREAS

The trail follows the lower side of a topographic bench as it passes through Cedar Creek Park. A large wetland and stream system dominates the lowlands below this bench, and it is likely that the trail will require some buffer impacts and a stream crossing as it works through the park, and then connects to Maple Valley. One alternative route for connecting between Cedar Creek Park and the Green to Cedar Creek Trail corridor follows SE 248th St, likely including widening on the north side of the street. A few wetland impacts would be likely where a minor drainage crosses under the existing street, then spreads out into a small wetland area.

The alternative alignment to SE 248th parallels a stream corridor as it heads north from Cedar Creek Park, then turns towards the Green to Cedar Rivers Trail. This alternative traverses private property, and a sensitive areas reconnaissance was not possible for the feasibility study. Map and aerial photo review suggests that this alternative would include buffer impacts, but no direct wetland or stream impacts; however, this will have to be evaluated in more detail through the design process.

PUBLIC RECREATION DESTINATIONS/ COMMUNITY FACILITIES DESTINATIONS

This segment of the Covington Highlands Trail provides access to Cedar Downs and Cedar Creek Parks, which are currently only accessible from nearby neighborhood paths. As with other parks, the trail generally skirts the park in an effort to separate regional trail use from internal trail use. In this case, however, the feasibility study anticipates a new connection to Maple Valley via SE 248th St. through a residential property which is part of the park, but is being rented until the park can be developed. Development of the trail would likely include the conversion of this property to park use, possibly including parking or other visitor services in this location. The trail would also provide an improved stream crossing connecting this property to the park's uplands, which would improve overall access. If the park is not developed prior to the completion of the trail, then the trail would likely introduce many new users to the park. Park maintenance and operations would need to be in place to provide services and ensure appropriate stewardship of park resources.

If the SE 248th St. alternative is developed, the trail will also pass directly by the Maple Valley Library and Maple Valley Community Center, providing non-motorized access to these facilities from the west.

ROAD CROSSINGS

A road crossing is only required for this segment if the SE 248th St. alignment is developed. In that case, the trail crosses Witte Road on the north side of the intersection with SE 248th St. using an existing roundabout.

RIGHT OF WAY

The majority of the right of way for this segment will require acquisition. The existing gravel pit is a large single parcel, and connects to public right-of-way through Cedar Creek Park. If the SE 248th St. alternative is selected to connect from Cedar Creek Park to the Green to Cedar Rivers Trail, then most of this final segment will be in public street right-of-way and Lake Wilderness Park. If the preferred alignment to the north of SE 248th is selected, then most of this final connecting piece will need to be acquired.

SUPPORT FACILITIES (TRAILHEADS, CONNECTING TRAILS, PARKING)

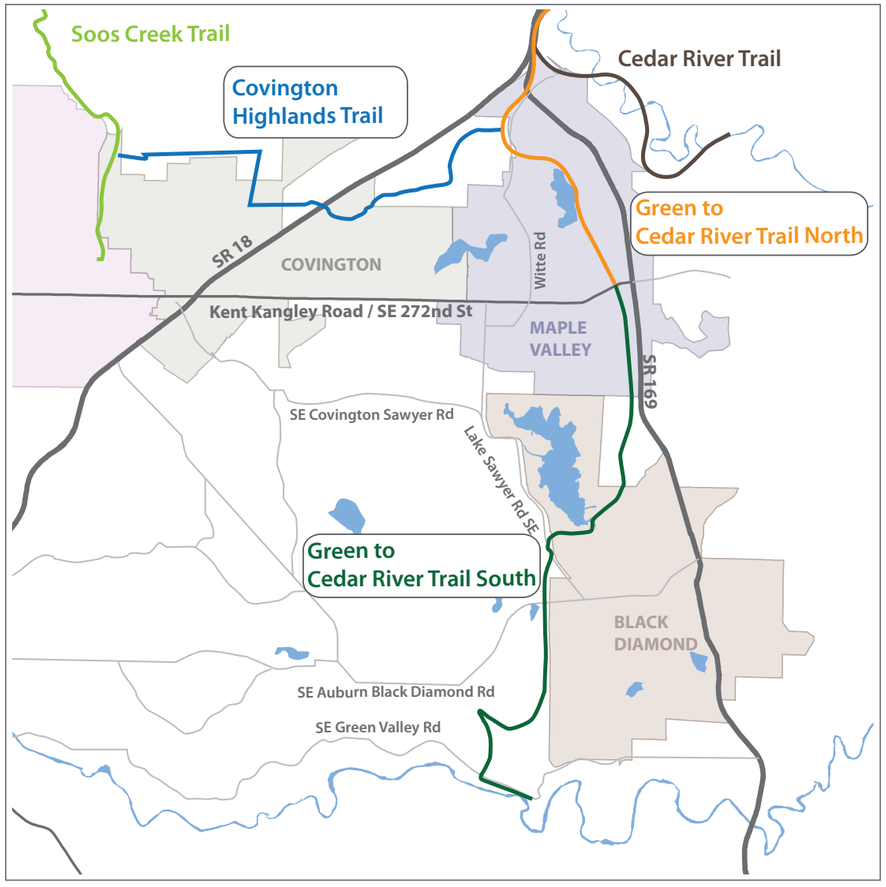
This segment of the trail would likely have several access points, with potential parking at Lake Wilderness Park and the Maple Valley Community Center. Access from adjacent neighborhoods would also be possible at Cedar Creek Park and near the existing gravel pit at SR 18. Residential properties at the west end of SE 248th St. which are part of Cedar Creek Park are potential locations for parking, restrooms, and other visitor amenities, as well as maintenance facilities.

FEASIBILITY SUMMARY

The Green to Cedar Rivers Trail and Covington Highlands Trail would connect regionally important open spaces, offer easy trail access to thousands of nearby residents, and complete missing segments of the regional trail network. Extending farther south than other King County regional trails in this section of the county, the Green to Cedar Rivers Trail would offer practical access to the regional trail system connecting with the city of Enumclaw, in addition to serving Maple Valley, Covington, Black Diamond, and nearby areas of unincorporated King County.

This section of the county has a high population of horse owners and riders, and the soft-surface portion of the trail system would provide a valuable new option for riders. Equestrians have limited lowland trail options in the winter months, and King County's backcountry trail system does not meet the needs of all riders. A new regional trail equestrian facility would likely see relatively high levels of use.

As connecting links in the regional trail system, both of these trail corridors would connect thousands of county residents to employment centers via the regional trail system. Both trails could be valuable new facilities for non-motorized commuting and other necessary travel.



THE GREEN TO CEDAR RIVERS TRAIL FEASIBILITY CONSIDERATIONS

COST SUMMARY

The northern portion of the Green to Cedar Rivers Trail uses existing railroad grade for most of its alignment. It is developed in new right-of-way from Lake Sawyer to the Green River. Challenging segments include a traverse of the steep hillside above Lake Wilderness and a new alignment that connects from the Black Diamond plateau to the Green River Valley.

All construction costs in the feasibility study are based on limited design information and should be used for planning purposes only. Right-of-way acquisition, survey, design and permitting costs are not included in estimates.

Trail construction:	$20,440,000
Sensitive Area Mitigation:	$1,300,000
Total:	$22,670,000
Total length, lf:	59,930
Cost/lf:	$378
Total length, miles:	11.35
Cost/mile:	$1,997,000

The Green to Cedar Rivers Trail corridor includes few significant constraints to trail development. Right-of-way is nearly complete; with a few exceptions, the underlying topography is advantageous for trail development; and there are relatively few sensitive areas. The most significant constraints to trail development include:

- **Steep slopes along the trail corridor on the northeast side of Lake Wilderness.** These conditions need to be better understood to develop an appropriate engineering solution. Depending on the conditions, the cost to construct could be substantially higher than expected.

- **Development of a new bridge over the active BNSF rail line.** Reestablishment of a bridge crossing over this corridor is feasible, but would likely include extensive coordination with BNSF.

- **Coordination with master plan development for Lake Sawyer Park.** Lake Sawyer Park does not have an adopted master plan, and there is disagreement in the local community over the vision for future park development. Although the regional trail would likely not have major impacts on the park, it may require extensive work with the City of Black Diamond and community stakeholders to build consensus for the trail's alignment and character.

- **Acquisitions in south Black Diamond.** A few missing link acquisitions are necessary to complete the continuous right-of-way to the Green River Valley.

- **Steep slopes descending into the Green River Valley.** The Green River Valley is a major topographic feature, and there are no trail alignments that can avoid the long and steep grades from the Black Diamond plateau to the river. This section of the trail is relatively expensive, and will require careful engineering to ensure a stable, maintainable route.

- **Conversion of a lane along 218th Avenue SE from motorized to non-motorized use.** An important segment of the trail connection to the Green River Valley is conversion of an existing road lane to a dedicated non-motorized trail. This road has a very low volume of users and the lane is not necessary to maintain road performance; however, reducing road capacity can be a technical and policy challenge.

COVINGTON HIGHLANDS TRAIL FEASIBILITY CONSIDERATIONS

The Covington Highlands Trail has more significant feasibility concerns than the Green to Cedar Rivers Trail corridor, primarily because there are a number of acquisitions that will be necessary to complete a continuous right-of-way. The most significant constraints for trail development in this corridor include:

- **Acquisition of right-of-way.** Currently, less than half of the trail miles in the corridor are in public ownership. Acquisition of the necessary right-of-way will require a sustained commitment to acquisition, and may require modifications to the planned trail route if easements are unavailable for key parcels.

- **Steep slopes connecting to Soos Creek Trail.** There is a dramatic climb from Soos Creek to the rest of the trail route continuing east. This will be a difficult engineering challenge, and is the only location on either of these trail routes that will likely require several switchbacks.

- **Steep slopes and sensitive areas in Cedar Creek Park.** The trail alignment is challenging through Cedar Creek Park, where a historic logging grade provides the best location to bring the trail up a steep slope and avoid extensive wetlands.

- **Redevelopment of SE 248th Street.** One option for connecting between Cedar Creek Park and the Green to Cedar Rivers Trail corridor includes a side path along SE 248th Street in Maple Valley. This alignment would require relocation of utilities, sections of large fill walls or spanning structures, and impacts to residential yards and the entry to the Maple Valley Library. In addition to cost and technical challenges, a side path along this roadway would significantly change its character.

COST SUMMARY

The Covington Highlands Trail is a new alignment that proposes use of existing powerline corridors, public rights-of-way, and publicly-owned open space to connect between the Soos Creek Trail and the Green to Cedar Rivers Trail in Maple Valley. Right-of-way acquisition will be required for significant portions of the trail.

All construction costs in the feasibility study are based on limited design information and should be used for planning purposes only. Right-of-way acquisition, survey, design and permitting costs are not included in estimates.

Trail construction:	$10,100,000
Sensitive Area Mitigation:	$975,000
Total:	$11,075,000
Total length, lf:	34,134
Cost/lf:	$322
Total length, miles:	6.5
Cost/mile:	$1,700,000

PHASING CONSIDERATIONS AND OPPORTUNITIES

A segment connecting the Cedar River Trail to Witte Road is approximately 1.25 miles, and estimated to cost approximately $1.5 million, not including design and other soft costs.

Trail construction:	$1,542,000
Sensitive Area Mitigation:	$75,000
Total:	$1,617,000

Final phasing decisions depend on a range of fiscal and management issues that are too early to evaluate in this feasibility study. Overall, the Green to Cedar Rivers Trail corridor is nearly ready for predesign-level work, while early action in the Covington Highlands Trail corridor is likely to focus on acquisition. While final phasing recommendations are premature, several phasing considerations and scenarios can be considered at this point in the development process.

For phased development, early criteria that might be considered for the Green to Cedar River and Covington Highlands trail systems include locating logical access points, determining which segments are closest to "shovel ready" for early construction, and identifying the segments that might offer secondary benefits of improving access to underused public open spaces in the corridor.

SEGMENTS READY FOR EARLY CONSTRUCTION

Several segments of the Green to Cedar Rivers Trail system would be ready for construction in the near term. Beginning at the Cedar River Trail, the segment connecting through Lake Wilderness Park and extending past Kent Kangley Road has been improved as a soft-surface trail and would be relatively easy to develop to full regional trail standards. There are several access points north of Lake Wilderness that accommodate phased development, depending on funding availability. The work would most logically progress from the existing paved portion of the Cedar River Trail to the south with logical termini at both State Route 169 and Witte Road. Proceeding south from Witte Road toward Kent Kangley Road, there are fewer access points, geotechnical challenges, a stretch with a narrower right-of-way and closer proximity to adjacent residents.

OPENING ACCESS TO PUBLIC OPEN SPACE

Lake Wilderness Park and Arboretum is a developed open space with good public access; however, other spaces along the route currently have limited access and use. Lake Sawyer Park, Cedar Downs Park, Cedar Creek Park, and Whitney Bridge Park offer strong opportunities for new access and facilities. Development of regional trail segments connecting to or through these open spaces could provide strong public benefit by raising awareness and providing access to these open spaces.

Adding trail access to these locations will require coordinated planning to ensure that maintenance, public safety, and management programs are in place to accommodate higher levels of use.

Lake Sawyer Park is likely to be the most developed parkland along the route over time; however, stakeholders in Black Diamond have differing visions for the park's future. The development of the trail corridor through Lake Sawyer Park will require extensive coordination with the City of Black Diamond and their planning process for the park.