

# Sandy River to Springwater Multimodal Corridor Feasibility Study

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## About SCI

The Sustainable Cities Initiative (SCI) is a cross-disciplinary organization at the University of Oregon that promotes education, service, public outreach, and research on the design and development of sustainable cities. We are redefining higher education for the public good and catalyzing community change toward sustainability. Our work addresses sustainability at multiple scales and emerges from the conviction that creating the sustainable city cannot happen within any single discipline. SCI is grounded in cross-disciplinary engagement as the key strategy for improving community sustainability. Our work connects student energy, faculty experience, and community needs to produce innovative, tangible solutions for the creation of a sustainable society.

## About SCYP

The Sustainable City Year Program (SCYP) is a year-long partnership between SCI and one city in Oregon, in which students and faculty in courses from across the university collaborate with the partner city on sustainability and livability projects. SCYP faculty and students work in collaboration with staff from the partner city through a variety of studio projects and service-learning courses to provide students with real-world projects to investigate. Students bring energy, enthusiasm, and innovative approaches to difficult, persistent problems. SCYP's primary value derives from collaborations resulting in on-the-ground impact and expanded conversations for a community ready to transition to a more sustainable and livable future.

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## Introduction

The City of Gresham, Metro, Multnomah County and the City of Troutdale collaborated with the U.O. Sustainable Cities Initiative in executing a trail planning and feasibility study reported here. Students of landscape architecture conducted the study. It investigated the problem of “closing Portland’s 40-mile Loop” in its biggest gap along its eastern edge through Gresham and Troutdale. The “40-mile loop” was originally proposed by John Charles Olmstead in 1903. It intended to link Portland’s open spaces and greenways to create a public accessible trail system. That loop has grown to a much more extensive contemporary trail system and the eastern gap is arguably the most challenging part of today’s 40-mile Loop system to complete. Unlike most of the rest of the system, there is no existing right-of-way or river or other landscape corridor to follow. A new trail here must traverse the suburban landscape through parks, along roads, along unused rights-of-way, near creeks, or along the edge of private properties. This report summarizes the planning and urban design processes the students undertook, and the proposed solutions for creating a path from the Sandy River waterfront in Troutdale to the Springwater Trail through southeast Gresham.

Robert Ribe and Mark Eisheid, professors of Landscape Architecture at the University of Oregon, led the project studio class called Land Planning and Design. Students formed teams that found alternative proposed trail alignments within three abutting study areas, called Beaver Creek, Kelly Creek, and Springwater. These study areas are shown in maps in the following chapters.

A portion of the class also studied the region around the Gresham Buttes. They identified a trail alignment through the new urban areas to be developed in south Gresham. This prospective path travels from the core of the Pleasant Valley community plan to the core of the Springwater community plan, and design details for it are found in Chapter 6.

## Study Overview

The class first did regional studies of many potential trail links and their good and bad impacts as candidates to assemble into alternative trail alignments. Proposed better alternative trail alignments were then mapped. The class then developed more detailed designs for segments of alignments selected by city and Metro planners.

The project began with field studies of many existing trails in the Portland region and a combination of field and GIS analysis of the study areas. During the field trips that visited trails, students recorded trails' layout and construction, site furnishings, trail experience, access, and context.

With this background of case studies and regional analysis, an all-class workshop was held to develop the overall goals and objectives for the class scope of work. Goals described an intention or ideal that was sought in seeking alignments and designing trails for the overall project problem. Objectives emphasized describing demonstrable, measurable or identifiable future landscape performance or physical features in proposed designs. These objectives were defined to be much more operational or measurable descriptions of specific attributes of the landscape and how it functions, or how animals (including people) behave (including their perceptions).

## **Impact Assessment of Potential Trail Links**

This workshop also identified 13 categories and types of impact assessments that the goals and objectives entailed. These assessments sought to create evidence to support the students' decisions in searching for alternative trail locations. The impact assessment methods were utilized as a measurable rating system for assessing the suitability of all possible trail links that could be assembled into whole path alignments.

Final impact assessment criteria were identified and written by student teams, as mentioned in the following chapters. Each link assessment determined several impact categories based upon categorical definitions. A class-wide scoring system from 1 to 5 was also applied to each different impact assessment method's impact categories to ordinally measure the degree of bad to good impact. The impact assessment methods were limited to the readily available GIS and other Metro data, inspection of current air photos and rapid assessments in the field, and by the students' limited abilities. See the Technical Appendix for details of the impact assessment methods.

A class-wide gradient of green colors were assigned to each of these 1-5 scores as visual cues for impact assessment results in data matrices that aided the identification of potential trail alignments -- the darker the green, the better the

impact. (The color white indicates not applicable). These matrices for each study area are shown in the following chapters.

## Mapping of Alternative Trail Alignments

The students produced initial link maps by reference to GIS data and aerial photos to map many reasonably promising links that might be assembled into path alignments, as described in the following chapters. This initial mapping of potential trail links followed four criteria: 1) reasonable existing ROW locations from a real estate point of view: that follow public lands, undeveloped land, or the boundaries between tax lots; 2) ROW locations that follow physiographic, ecological or hydrological landscape features like creeks, ridges, floodplains or forests; 3) ROW locations that take advantage of opportunities for good impacts in producing high-quality recreational experiences or connecting amenities; 4) ROW locations that tend to avoid incurring bad impacts, such as affecting people's privacy or wildlife habitats, or upon steep slopes or valuable properties. Clearly bad links were identified and filtered out, and final base maps of many trail links were produced within each study area for further analysis.

By employing the impact assessment methods, all the links on the final base trail link map were evaluated. Sorts of color-coded data matrixes were generated to display all the link assessment results. These results were analyzed and assembled into proposed alternative trail alignments for three trail types within each study area: a low cost trail, a quality trail, and a more cost-effective trail that sought to optimally combine cost savings and quality elements. Student teams defined and determined these alignments in their own way, as described in the following chapters.

Once these three trial alignments were mapped, constraints and opportunities associated with assembled links were identified and labeled on maps. After receiving feedback from planners, stakeholders, and the public at the Midterm workshop at Gresham City Hall, a quality trail alignment from the west end of the I-84 bridge over the Sandy River to the Springwater Trail near SE 267th Avenue was chosen by Metro and City planners as the focus for the rest of the term.

Designs were based on the following specifications from the Federal Highway Administration's planning and project funding standards: A PATH is a low-friction, wide, paved trail that can accommodate many users, including those employing non-motorized vehicles with wheels. A TRAIL is a high friction non-paved trail

that typically accommodates mainly non-wheel users on foot or horseback. It may be narrow, based foot use, but may accommodate off-road wheeled vehicles, such as 'mountain bikes'.

In the design assignment, the instructors and class developed 20 design guidelines. These listed criteria helped students complete their final trail alignment designs:

1. There must be a continuous path all the way along the full alignment. This path must be off-street wherever possible. It may be on local residential streets or collectors only when no other option is available.
2. This path cannot be within the traffic surface of any arterial streets unless this is absolutely unavoidable. (This is because bicycle lanes within streets do not accommodate other types of users.) Where this must occur, there must be a complementary 'trail' along the same arterial for foot use, eg. a sidewalk.
3. Wherever possible, the path must be 12 feet wide. Only if circumstances clearly prevent this width may it be reduced, but not to less than 6 feet.
4. Wherever possible, the path should be separated from the nearest sidewalk, street edge, building edge or fence by a distance of 4-10 feet.
5. In sections of the quality alignments being designed where clear and good opportunities arise, over a length of roughly at least 200 feet, there should be a separate trail. This trail should be between 5 and 800 feet away from the path. A "clear and good opportunity" means there are recreational experience, safety, habitat conservation, universal design, and/or educational advantages or opportunities to design a supplemental trail along the corresponding length of the alignment.
6. Wherever possible, both paths and trails should be located within Metro Title 13 200 foot riparian setback ESRA zones as already mapped along creeks and rivers, but may be on opposite sides of such waterways.
7. Wherever possible both paths and trails should be located on public lands and rights-of-way.
8. Paths should avoid location through wetlands, riparian forests or on slopes exceeding 10% unless circumstances absolutely require such crossings or when such crossings can be as short as possible and designed to minimize ecological impacts. Trails need not follow such constraints but should still seek to minimize ecological impacts.
9. Feeder paths or trails should be designed from many trailheads in surrounding neighborhoods or nodes of public use to the main path or trail.
10. All crossings by both paths and trails of arterials should typically be at signaled intersections. If this is not optimal, they can be at mid-block if

1. traffic sight-lines are adequate and a user-activated crossing signal could be designed and installed.
2. Path crossings of major regional arterials and highways or major rivers should be on flyover bridges specially built just for the main path.
3. Wherever circumstances allow, a path and/or trail should be located within a parkway that is 20-200 feet wide. Such circumstances mean public land, land that will be inexpensive to acquire rights to, habitat areas that should be acquired, or areas that should be acquired for ecological restoration projects.
4. Paths should not exceed 5% longitudinal slope unless this is impossible over as short a length of the path as necessary.
5. Trails should not exceed 10% longitudinal slope unless this is impossible over as short a length of the trail as necessary.
6. Beyond the above guidelines, path and trail designs should seek to minimize the bad impacts and maximize the good impacts that the class had already identified. But, local circumstances may dictate other considerations that can prevent these objectives from being met.
7. All trailheads from streets and neighborhoods and social use nodes onto the main path and feeder paths should be designed to mark parking, information and associated uses.
8. Special parks, interpretation, resting etc. areas should be designed at well-selected locations all along the paths.
9. A master pallet of site furnishings developed by the class were employed throughout designs. This included signs at key locations required for way finding.
10. Key places for landmarks or public art works that add to the image-ability and landscape identity of the trail and its surrounding neighborhoods should be designed.
11. New and appropriate commercial nodes, restrooms, bike-maintenance stations, and other special facilities and land uses associated with the path were designed.

Following these guidelines, students created designs to produce a single trail alignment master plan, detailed trail designs, sections, and perspective drawings for a potential Sandy River to Springwater path with feeder trails, trialheads and other amenities. These are found in Chapter 5. In addition, a student team also produced some designs for the class' other potential regional path alignment between the Pleasant Valley and Springwater communities. These are found in Chapter 6.

# Chapter 2: Analysis of Beaver Creek Study Area

## Introduction

The Beaver Creek study area is located in Troutdale, Oregon to the north and Gresham, Oregon to the south within Multnomah County (Figure 2B). The Sandy River lies to the northeast and highway I-84 is at the north edge of the study area. Troutdale serves as the western gateway of the Historic Columbia River Highway, the Mount Hood Scenic Byway, and the Columbia River Gorge. The trail alignment being sought for this study area will connect to a join point along the north edge of Kelley Creek to the south. The north end of the Beaver Creek trail section will be at the pedestrian section crossing of the Sandy River on the I-84 bridge.

As shown in Figure 2A, the trail planning process was divided into six parts: site analysis, visits to other trails in the Portland region, generation of goals and objectives, development of various potential trail link impact assessment methods, link assessments, and trail alignment selection and mapping as explained below.



Figure 2A: Trail Planning Process and Beaver Creek Study Area Context

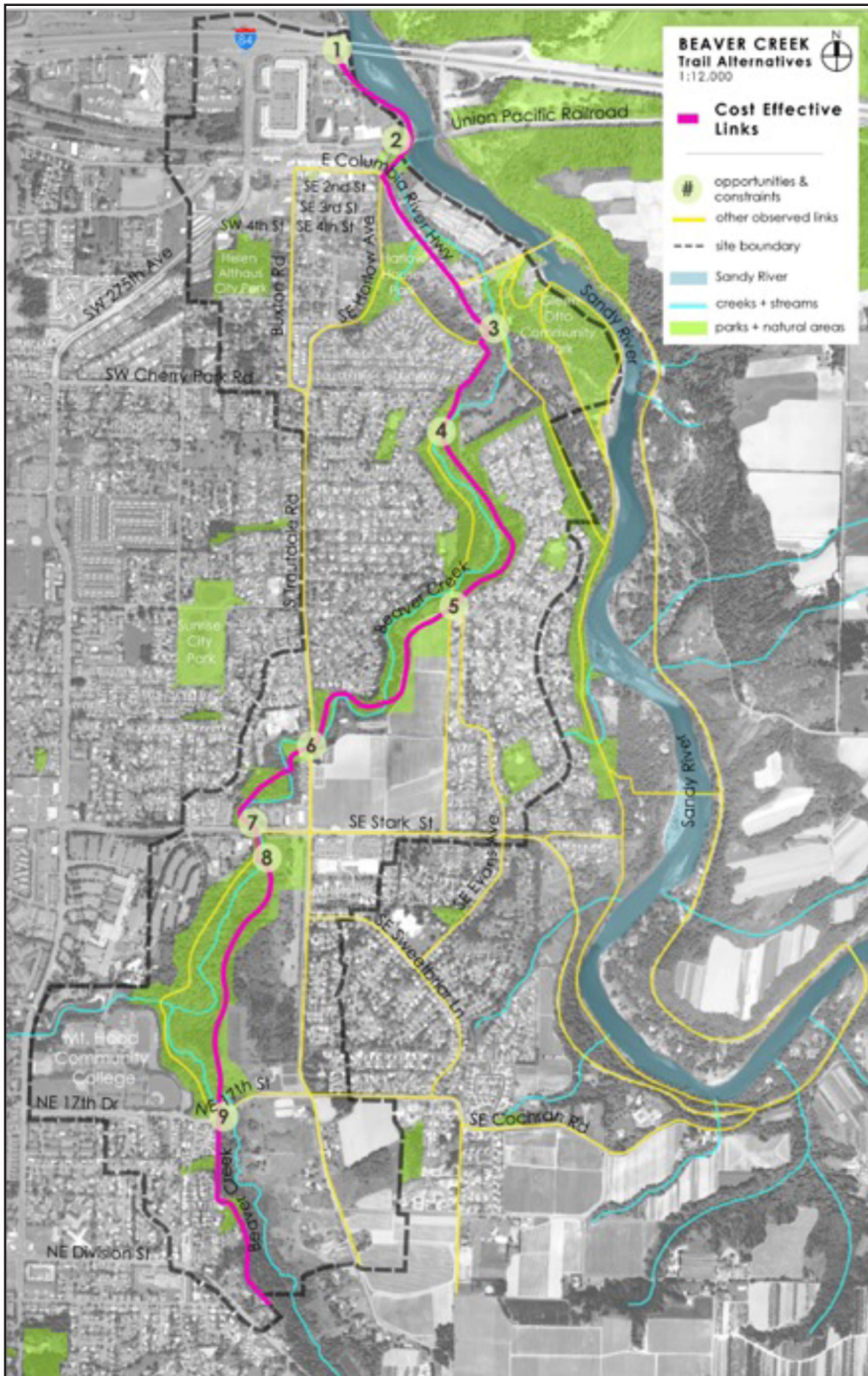


Figure 2B: Beaver Creek Study Area

## **Site Analysis**

Using layered GIS data and aerial photography, the Beaver Creek study area was analyzed for existing conditions spanning attributes such as vegetation, tax lots, wetlands, existing bike lanes and paths, and topography.

## **Case Study**

Our team visited the Fanno Creek Trail in the western part of the Portland region and learned much from the trails that the other five teams visited.

## **Generation of Goals and Objectives**

A set of goals and objectives was generated based on values representative of the various opportunities that were discovered within the study area. These goals and objectives helped identify the categories and types of assessments needed to support a decision-making process when searching for trail alignments.

## **Impact Categories**

A list of 13 impact categories was generated to assess the qualities of potential trail links (good or bad). Each impact category contained 3-5 impact levels, such as: very good, good, fair, poor, very poor, and not applicable. The definitions of impact levels were developed by the whole class and are found in a technical appendix.

## **Link Assessments**

Links were mapped as unique potential lengths of trail between points where at least two other links converged. Once all possible links were mapped based on the impact categories, all the links were labeled with numbers and sub-sections labeled with letters. The numbers represent the link itself and the letter represents where the physical design of the trail would change.

## **Trail Mapping**

Based on the results of the qualitative data from the link impact assessments, three proposed trail alignments were selected and mapped. The three categories used to define the trail alternatives include: Low Cost Trail Alignment, Quality Trail Alignment, and Most Cost-Effective Trail Alignment.

## **Site Analysis**

As shown in Figure 2C, a study of the 40-mile loop designs and plans, the East Metro plan, Troutdale Comprehensive Plan, and the 'Eastwinds' development prospectus was the first step in understanding future potential trail alignments along and around the Beaver Creek study area. The aforementioned documents contain relevant information that helped build the design priorities and desired outcomes for the Beaver Creek study area. These were used as a departure point in the study area analysis process described below.

# Site Analysis

- ☑ 40 Mile Loop
- ☑ East Metro Connections Plan
  - “Multi-modal connections from Downtown Troutdale to Mt. Hood Community College and the Springwater Corridor Trail.” (p.8)
- ☑ Troutdale Comprehensive Land Use Plan
  - “The City has been successful in acquiring and nearly completing a greenway system along Beaver Creek through open space dedication...the City is working to provide bikeways and pedestrian paths to interconnect all parks, residential neighborhoods, and scenic corridors.” (p.50)
- ☑ ‘Eastwinds’ Development Prospectus

**Figure 2C:** *Site Analysis*

The 40 Mile Loop is a nearly continuous greenway trail that aims to encircle and run through the Portland metropolitan area. First proposed by the Olmsted Brothers in 1903, the concept for this trail system was originally to connect open park spaces and boulevards while catering to many different users. Today, the trail has expanded to roughly 120-miles; this trail proposal will complete the north part of one of the ‘gaps’ in this loop and help complete the original now expanded concept envisioned by the Olmsted Brothers and embraced by the region.

The East Metro Connections Plan provided an understanding of the Gresham and Troutdale area’s transportation challenges and offered solutions that reflect the community’s values and initiatives for future use. Many aspects were observed that pertain to road capacity, safety, transportation, public and private investment. The connection plan helps forecast the growth of the cities over time and improvements needed to the development of transportation systems. The Sandy River to Springwater Trail has been recently adopted as an amendment to this plan. This information was useful in the setting of priorities and goals for trail planning.

The Troutdale Comprehensive Plan provides a set of information maps, policies, and guidelines that affect land-use within city boundaries. The purpose of this plan is to act as a guide for land improvement and use, and help to facilitate the direction, quantity, and quality of future development and redevelopment. This plan informs the community as to specific design goals, such as bikeways and

pedestrian paths that interconnect all parks, residential neighborhoods, and scenic corridors.

The 'Eastwinds' Development Prospectus proposes an urban renewal district and schematic concept in a historically important part of Troutdale near the Sandy River, which is currently a brownfield site. The property is located behind a factory outlet mall west of the Sandy River, and includes the 12-acres of public land that was once a sewage treatment plant and a private parcel. The prospective schematic seeks to transform the area into a hub of amenities. It includes a luxury hotel complex, several restaurants, a spa, office buildings, stores, and recreational parklands. Access to and from the site is proposed either via a new overpass road through the heart of the outlet mall or (Greenworks concept) over the existing railroad tracks. There would also be an underpass trail that connects under the railroad bridge along the banks of the Sandy River. These future conditions were adopted in the three trail alignments planning for the Beaver Creek study area.

### **Precedent Study**

The Fanno Creek Regional Trail, and the other regional trail examples we studied) provided a wide range of transferrable context scenarios and informs opportunities for trail alignment proposals within the Beaver Creek study area. Similar to the 40-mile Trail Loop, Fanno Creek Regional Trail (Figure 2D) is also a partially completed trail system that weaves through five cities (Beaverton, Durham, Portland, Tigard and Tualatin) and two counties that cater to all form of users. This 15-mile trail is a collection of various size and designs of trail segments that connected with one another and also provide an essential river corridor for community and local habitat. The trail ties the community to many neighborhoods, local amenities (city hall, library, and retirement home), sensitive natural areas, and Fanno Creek itself. It allows the community to have an alternative transportation corridor with relatively low environmental impacts and the restoration of this creek in places provides many opportunities for education about habitat and ecological restoration. In addition, certain parts of the trail follow an historical route of the Oregon Electric Train.

Many points along the Fanno Creek Trail serve as moments of pause; for example, benches and picnic spaces provide respite with the additional benefit of high canopy covers and the tranquil sound of running water from the creek. Other segments transitioned into artistic spaces where a mural was painted along repurposed concrete roadblocks or where safety was showcased with LED lights of changing colors on an underpass. There are places that help to refresh users, where seasonal fruits are available in an allée of apple and plum trees.

This case study demonstrated how the trail planning process will encounter issues that are often seen in the 40-Mile Loop system. These include funding, land purchases and procurement of easements. The process will also tackle the problem of crossing busy roads, vitality of water quality and wildlife. Such trails

# Precedent Study

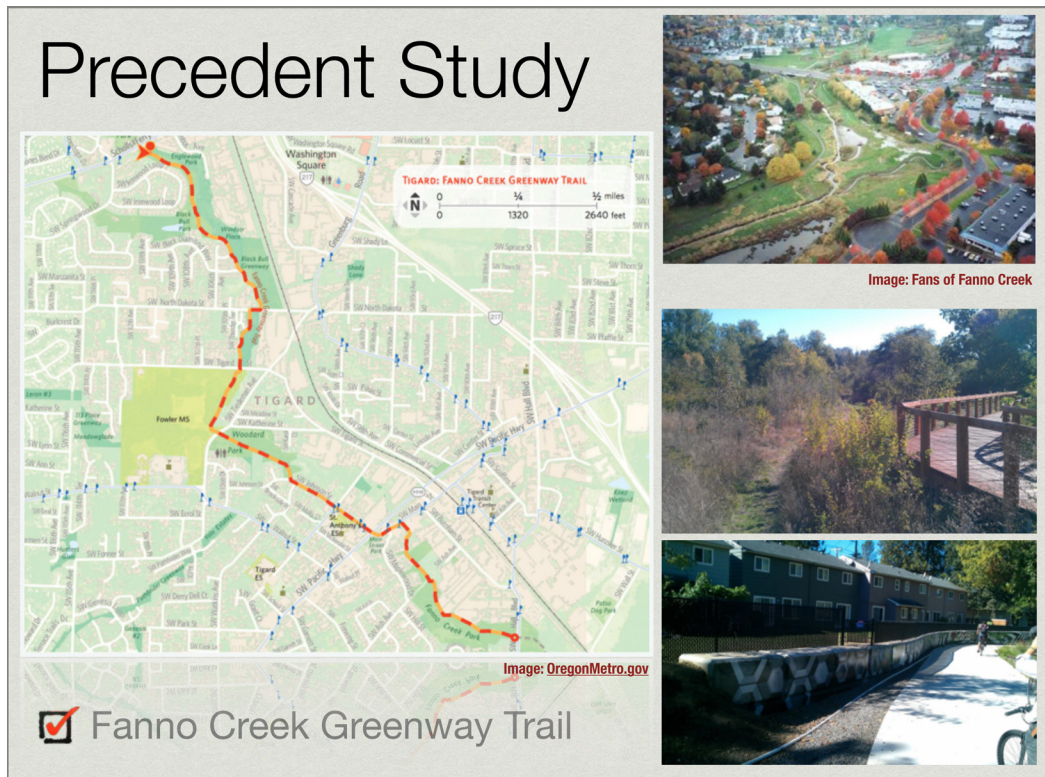


Figure 2D: Precedent Study of Fanno Creek Greenway Trail

can also serve as a great example for linking neighborhoods, schools, homes, shopping areas, parks, open spaces, etc.

## Goals & Objectives

Figure 2E lists our trail alignment analysis and planning goals and objectives. The goals and objectives are driven by the plans described above and the study team. The design proposal for the trail aims to encompass an ease of accessibility and navigation, as it is important to provide users an opportunity to have a quick alternative route to nearby destinations (Goal 1). To increase experience and broader use, safety is an important concern to bear in mind (Goal 2). Adequate lighting and clearance, in addition to sufficient path widths will all offer further safety. The trail will provide opportunities to define and enhance community character and role in the region (Goal 3). In turn, this will increase the likeliness for community involvement to help maintain the trail quality and the management of habitat and creek ecology. Minimizing disturbances to natural habitats and improving ecological conditions and will help to create a higher quality trail with habitat and for users and adjacent neighbors (Goals 4 and 5). Lastly, the implementation of trails can be costly and will require much funding (through public and private grants) in order to preserve the trails integrity and upkeep for future use (Goal 6).

# Goals & Objectives

1. **Create an Inclusive Trail Design**
  - a. Make wayfinding and access accessible to all user types
  - b. Brand trails with a distinctive identity
  - c. Keep grades at or below 5%
  - d. Link trails to public transit and neighborhood nodes
2. **Safety**
  - a. Provide adequate lighting throughout the trail.
  - b. Trail width accommodating all user types
  - c. Design open spaces to discourage camping.
  - d. Add pathway reflectors and similar features
3. **Create a Community Asset**
  - a. Provide opportunities for diverse events to take place all year around
  - b. Embrace the historic characteristics that help to define the community along the trail
  - c. Coordinate with landowners to manage habitat and watershed?
  - d. Provide standard facilities for users
4. **Enhance Natural Habitat**
  - a. Engage with natural resource consultants
  - b. Avoid impacting waterways specifically
  - c. Actively restore environmentally degraded areas
  - d. Avoid fragmenting habitats
5. **Minimize Environmental Impacts**
  - a. Restrict access beyond approved trails
  - b. Be conscientious of material choices and how they may leach into the landscape.
  - c. Design for wildlife corridors and greenways
  - d. Stabilize banks to minimize erosion
6. **Secure Dependable Financial Support**
  - a. Use public and private money where appropriate
  - b. Fund maintenance programs for trails
  - c. Study cost-effective building techniques
  - d. Fund aesthetics as well as functionality

Figure 2E: Goals and Objectives

## Initial Impact Categories

A list of 13 impact categories were developed that helped to define the opportunities and constraints found at different links (Figure 2F). The mapping of potential links that could be assembled into trail alignments is described in a later section.

Using aerial imagery and Metro's Geographic Information System (GIS) layers, a set of impact assessment ratings were applied to every link using criteria found in the technical appendix. An impact score of 5 (very good), 4 (good), 3 (fair), 2 (poor), 1 (very poor) were assigned to every link for every impact category, and a (N/A) was assigned if not enough data were available to determine an impact. This rating system was universal throughout the class.

## GIS Overlay Method

The Beaver Creek study area analysis to identify potential trail links began with combinations of Metro GIS data. A series of three maps were created within GIS, as seen on the top of Figure 2G. Key layers were identified and combined to display and overlay spatial patterns. The left hand map emphasized current transportation and land use, the center map emphasized slopes, and the right map emphasized a natural resource.

The first round of maps was refined using an overlay method on tracing paper, by adding data from other GIS layers that were also needed. The maps on the bottom of Figure 2G show examples of informative combined maps

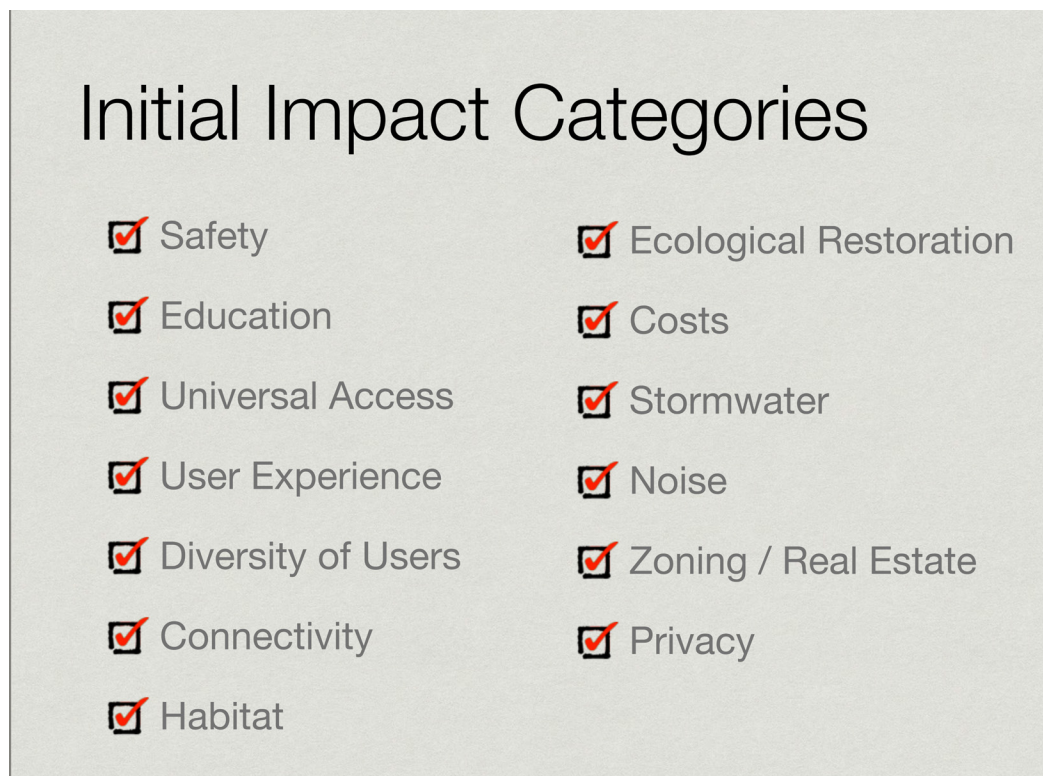


Figure 2F: Initial Impact Categories

### Determination of Links

A link is defined as a segment between any two points, which form the end points of other links, where two other links join together. The three final maps found on the bottom of Figure 2G, guided an informative exercise in trail route identification from left to right on the top of Figure 2H. The three maps from this analysis were then combined to produce the preliminary link map at the right edge of Figure 2H. This map of potential trail links identified 340 link possibilities for assembly into alignments.

### Refinement of Links

Again using aerial imagery and more consideration of GIS layers that dealt with particularly challenging conditions such as topography, tax lot boundaries, habitat, and sensitive resources a reduced set of 50 optimal and connected links was mapped within the study area (Figure 2I).

# GIS Overlay Method

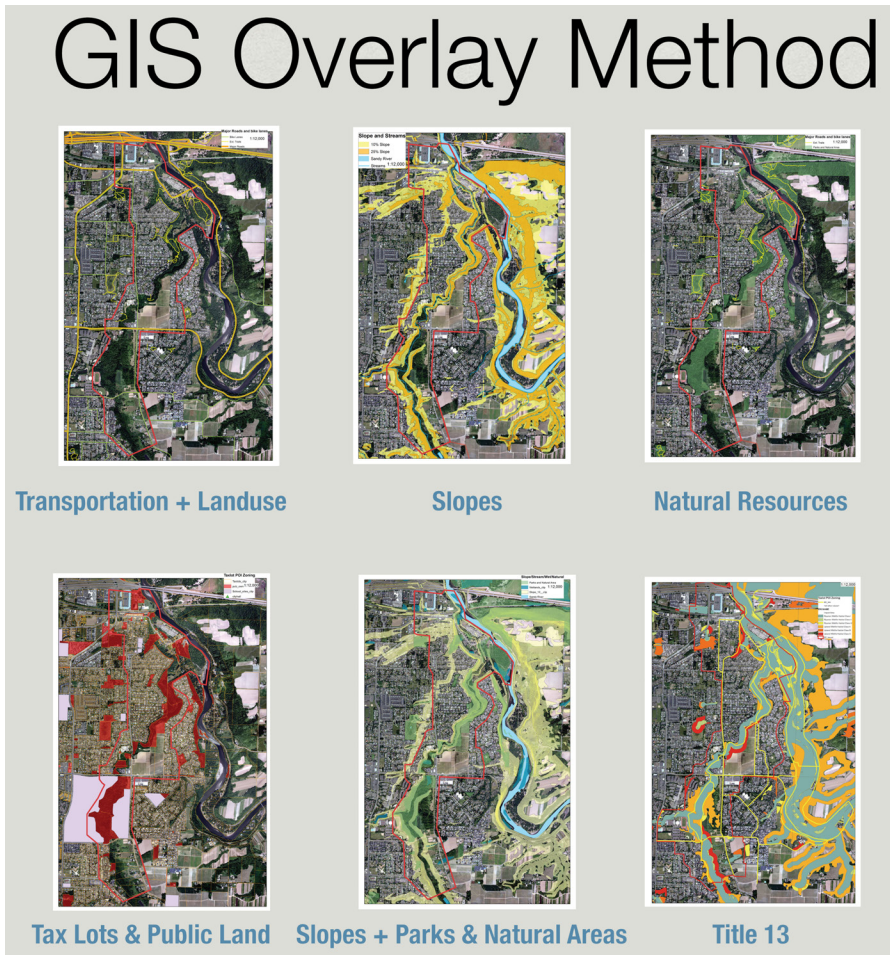


Figure 2G: GIS Overlay Method

## Determination of Links

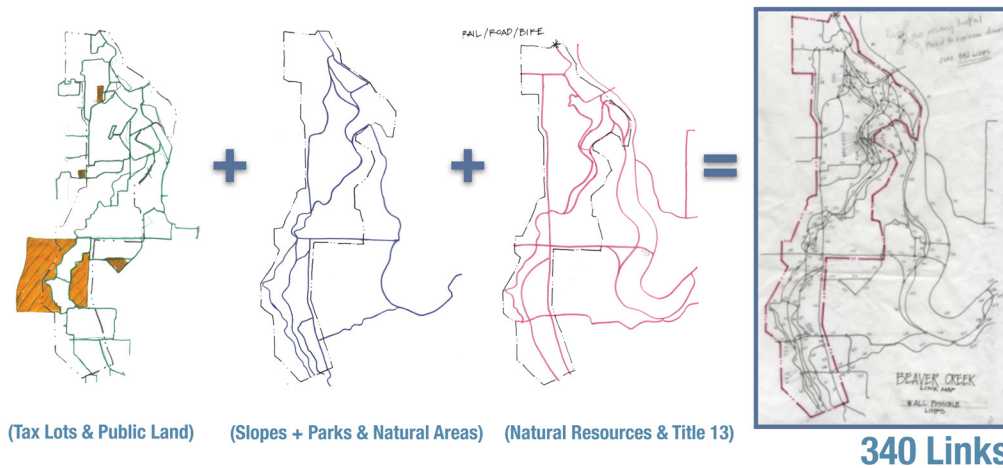


Figure 2H: Determination of Links

# Refinement of Links

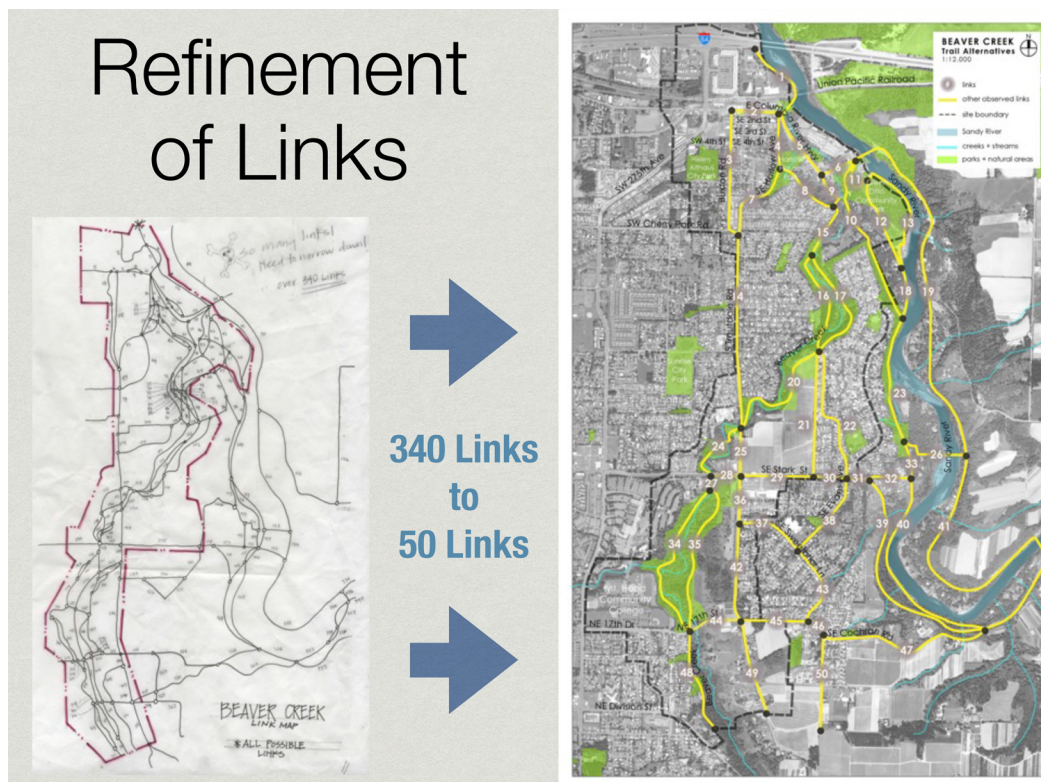


Figure 2I: Refinement of Links

## Ecological Impact Category Example

Figure 2J illustrates just one impact assessment procedure among the 13 different assessments that were performed for every one of the 50 links in Figure 2I. The process for evaluating impact assessments followed a common procedural format, but was quite different for each impact, as illustrated in the technical appendix. Each method used GIS data layers and air photos to categorically assess the relative goodness or badness of a particular link regarding a given impact. The common numerical ranking was on a 5-point scale from Very Good to Very Poor where each link is scored accordingly.

The example Ecological Restoration impact assessment, shown on the top right of Figure 2J, is an example of this process where GIS data is filtered through a matrix that scores each link segment along the 5-point scale. Ecological Restoration impacts measure how well a link offers opportunities to implement restoration projects associated with trail construction. By analyzing each potential link using each link assessment method in the matrix of Figure 2J, readily available data was applied to the location of each link in relation to its landscape conditions. Title 13 Inventory and habitat GIS layers, provided by Metro, were used in this case to analyze all 50 links through the Beaver Creek study area. The Ecological Restoration impact assessment identified Habitat Types and Classes, which can be seen in the Metro Title 13 Inventory.

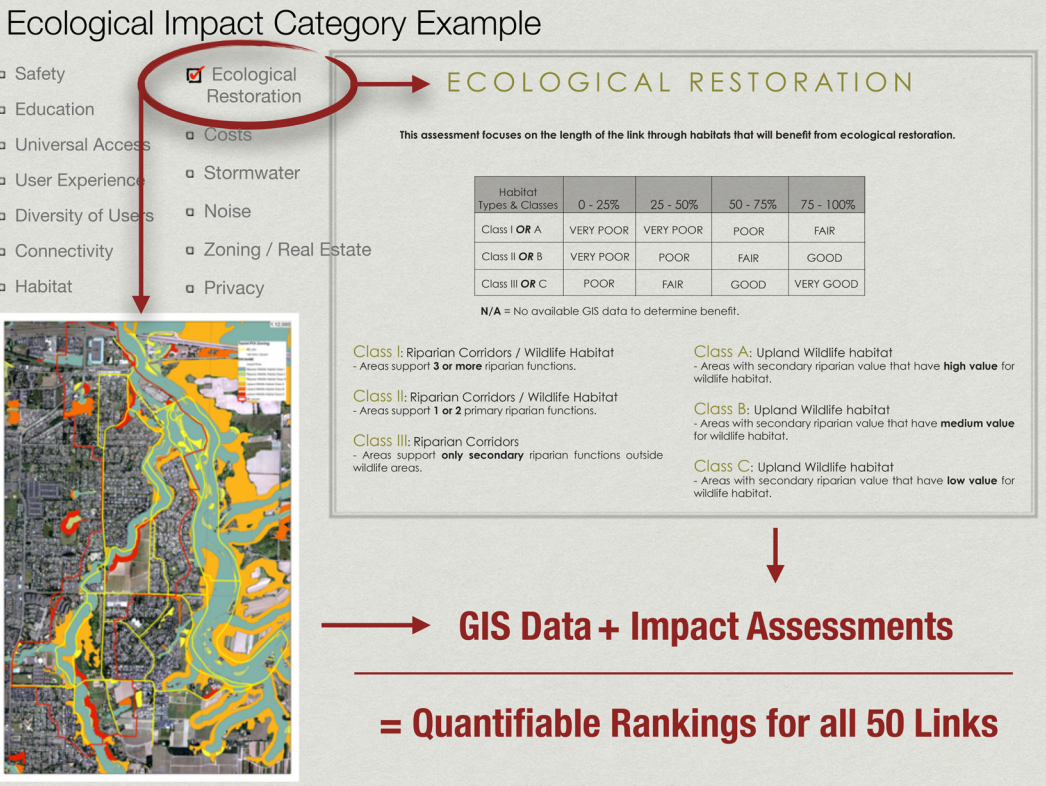


Figure 2J: Ecological Impact Category Example

The better the Class - such as Class I, which supports three or more riparian functions or Class A, which includes areas with secondary riparian habitat value - the lower the need exists for ecological restoration. The opposite is true for Class III, which supports only secondary riparian functions outside wildlife areas or Class C, which includes areas with secondary riparian habitat value. In this case, the higher the percentage of the link that runs through either Class III or Class C, the better the link is suited for ecological restoration.

Each Class was color coded as shown on the lower left-hand map of Figure 2J for clarity, and all 50 links were layered on this map for the full assessment of the link map just for ecological restoration. Based on the percentage of each link running through habitat quality types, the link would then be assigned a corresponding categorical impact level as seen in Figure 2K.

**Link Rating System**

All 50 potential links are scored according to their 13 impact categories and by level, and a color-coded chart was drawn of the 'best' and 'worst' links across the study area (Figure 2K). This map shows each numbered link with a color corresponding to a range of total impact scores. It gave equal weight to all 13 impact categories. If certain variables were instead weighted as higher or lower importance with different weights, the resulting map would change to reflect the



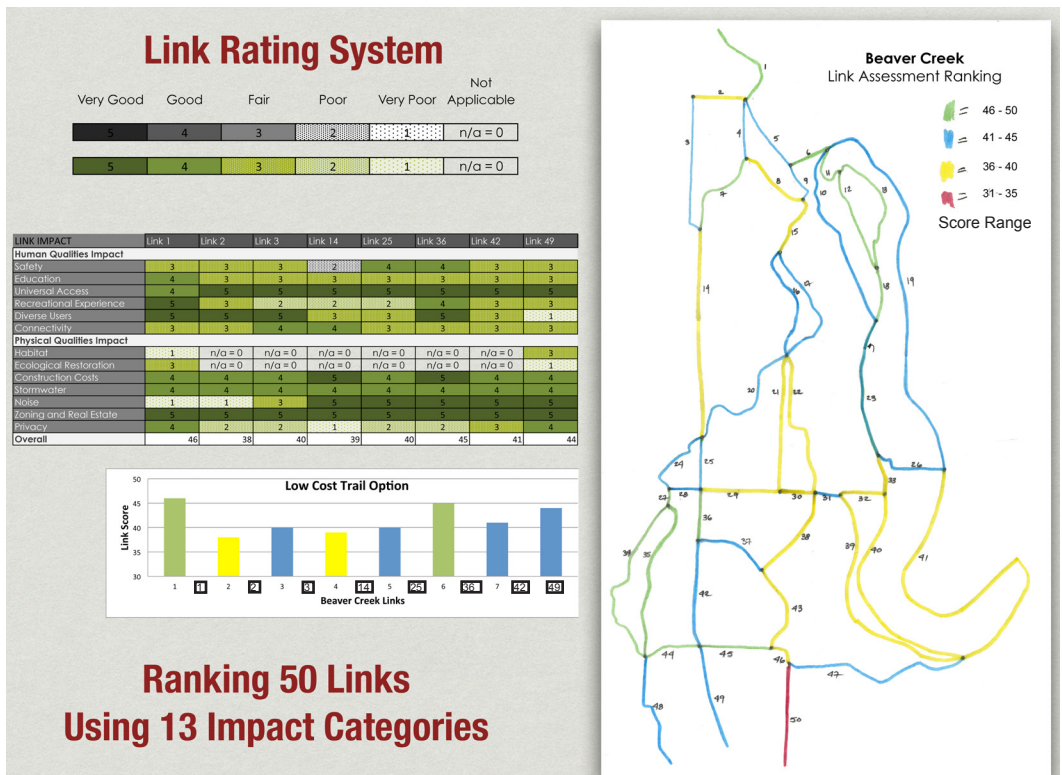


Figure 2K: Link Rating

priorities. The system is flexible enough to accommodate such different weight choices. The ability to isolate and weight different impacts separately provided a method to create three different trail alignment options, while prioritizing the highest ranking segments of trail according to each option’s own priorities.

**Trail Mapping**

Based on the results of the link impact assessments with the priorities placed on various impact categories, three separate maps were produced to provide three different options for further study of trails and paths through the study area. In addition to the recommended alignments that each alternative takes, major opportunities and constraints were identified that constrain or favor each one. Corresponding projects that would need to be implemented to solve each constraint or facilitate each opportunity were mapped and listed to make each alignment safe and successful.

## Low Cost Trail Profile

This alignment is low cost only with respect to property acquisition for trail construction away from existing rights-of-way. It seeks to align the trail along existing rights-of-way where there may be room to add a trail to arterial streets or slightly expand such rights-of-way. It does not avoid steep slopes that such streets may traverse. It also does not consider the potentially high financial cost of trail construction and street tree removals along arterial streets.

The Low Cost trail is an alignment that utilizes wherever possible the established rights of way along direct street routes to create a route that spans the study area with a minimum of circuitousness or unwanted detours (Figure 2L). The wide shoulders within the right of way of Buxton Rd and S. Troutdale Rd could probably accommodate generous bike lanes on either side of the street, or potentially a two-way cycle track on one side of the road.

This trail routing option scored very highly on our assessments for factors of connectivity, property acquisition cost impacts, and zoning/real estate as it relates to property values. Construction costs were not considered, and right-of-way acquisition costs were uncertain due to the unknown extent to which the arterial street rights of way would have to be expanded, so these factors were not measured well enough to include in the matrix. The students' inability to account for these factors suggests that this alignment may not actually be a low cost option.

## Low Cost Alignment: Opportunities and Constraints

The opportunity and constraints of this alignment are denoted by numbers on Figure 2L. Because these new alignment maps number junctions between links and not links a new numbering system is employed for the junction nodes.

### Opportunities

- (1) Junction with new I-84 bridge trailhead: There is an opportunity to begin the trail alignment at the end of the future multimodal Historic Columbia River Bike Trail.
- (2) Historic district: The trail goes through the historically significant downtown section of Troutdale. This juncture is an opportunity to integrate the biking route with the historic storefronts and connect to the visitor's center, restaurants, bike shops, etc.

### Constraints

- (1) Railroad crossing: There is a main-line, heavily used Union Pacific railroad crossing near the North-end trailhead and downtown Troutdale. The Eastwinds development prospectus offers one option for solving this crossing – an overpass and/or an underpass. A major railroad crossing here

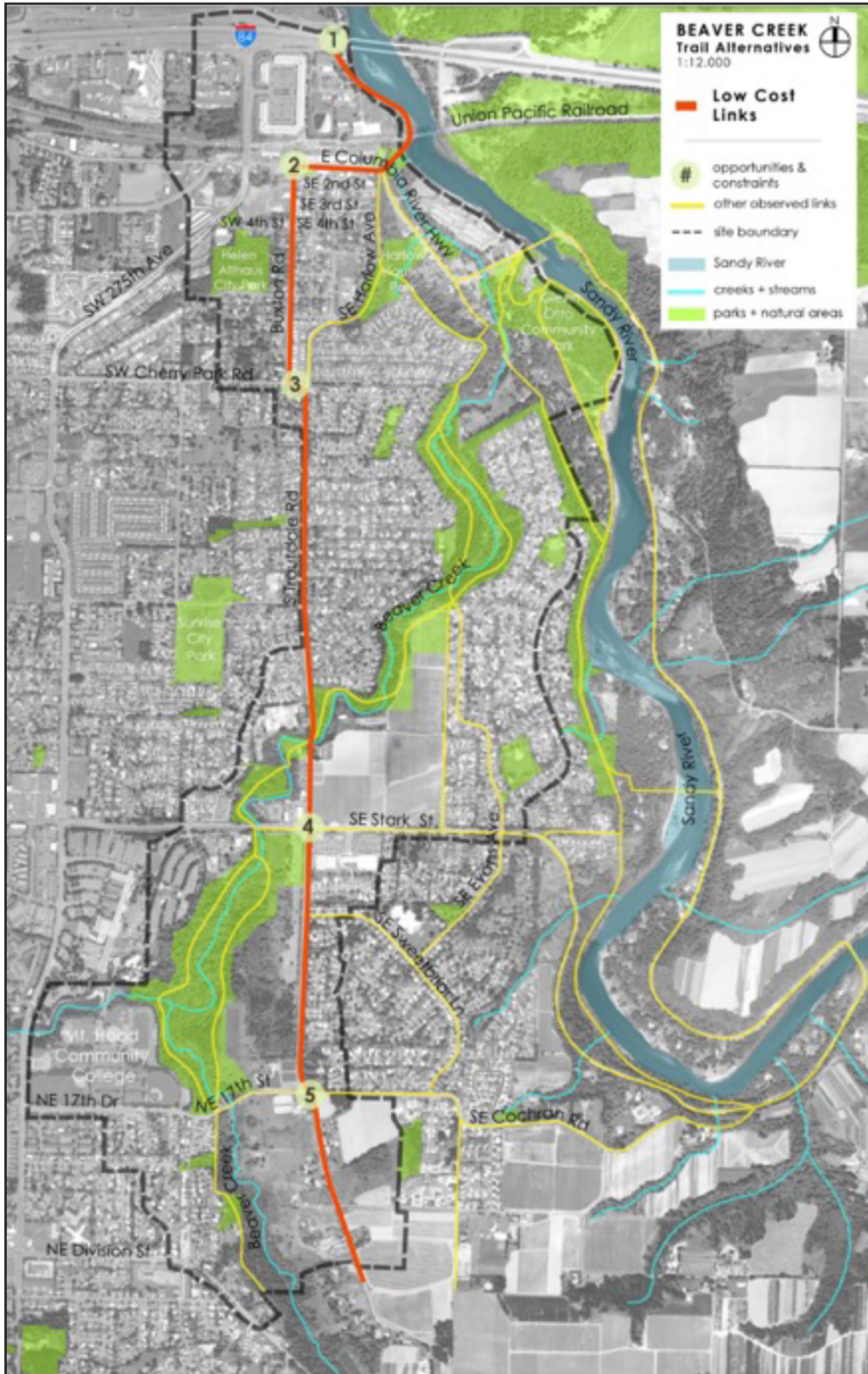


Figure 2L: Low Cost Trail Alternative

- is a potentially serious safety problem and a new at-grade trail crossing is very unlikely to be permitted in any case. An over- or under-pass may be expensive and merits further careful study.
- (3) Major intersection at SW Cherry Park Rd and S Troutdale Rd. At this intersection the path transitions onto a more direct thoroughfare and would need to be carefully designed to minimize potential conflict between vehicular traffic and trail users.
- (4) Major intersection at S Troutdale Rd and SE Stark St. This is a major intersection that requires some kind of crossing system and safety measures.
- (5) Major intersection at S Troutdale and NE 17th St.

## High Quality Trail Profile

The High Quality trail option was chosen to provide the best trail experience and to route users through the more beautiful parts of the study area (Figure 2M). It is no more circuitous than necessary and offers several options for moving through the more scenic portions of the trail while serving many neighborhoods. This alignment will give users the most interesting and dynamic trail experience while still maintaining efficient conveyance through the site. In the links assessment this route scored very highly in recreational experience, relatively low estimated construction costs (averaged over the length of the trail), and in low traffic noise areas.

## High Quality: Opportunities and Constraints

The opportunity and constraints of this alignment are denoted by numbers on Figure 2M:

### Opportunities

- (1) Junction with new I-84 bridge trailhead: There is an opportunity to begin the trail alignment at the end of the future multimodal Historic Columbia River Bike Trail.
- (2) Historic district: The trail goes through the historically significant downtown section of Troutdale. This juncture is an opportunity to integrate the biking route with the historic storefronts and connect to the visitor's center, restaurants, bike shops, etc.
- (10) This segment of existing road shoulder adjacent to Glen Otto Community Park has been engineered into an ideal bike lane. Utilize and expand this type of bike lane further down this segment of trail. It is a good model to follow for bike lanes.
- (11) The existing bridge along the Historic Columbia River Highway can be employed instead of constructing a new bridge.
- (12) High quality road shoulder along Historic Columbia River Highway with likely enough space for a path. This section could be a very high quality biking experience with minimal intervention.
- (13) Potential river access point off of intersection of Historic Columbia River

Highway and SE Woodard Road. The road comes close to a section of the Sandy River at this point and could potentially be a desirable access point for trail users. This is also a potentially good place to install a river crossing if desired.

- (14) Historic Stark Street bridge with beach access underneath. The Stark bridge is a very scenic river crossing, which could become a destination or hub along the trail given its historic character and good adjacent swimming holes/beach access.

## Constraints

- (1) Railroad crossing: There is a main-line, heavily used Union Pacific railroad crossing near the North-end trailhead and downtown Troutdale. The Eastwinds development prospectus offers one option for solving this crossing – an overpass and/or an underpass. A major railroad crossing here is a potentially serious safety problem and a new at-grade trail crossing is very unlikely to be permitted in any case. An over- or under-pass may be expensive and merits further careful study.
- (3) Enters undeveloped riparian area with habitat value. This is where the alignment transits the Beaver Creek riparian area and is a very important transition point in trail character. Careful planning and engineering needs to be applied to protect this sensitive habitat and to ensure minimal impacts during the lifespan of the trail.
- (4) Creek crossing that could require an expensive bridge. Use appropriate bridge construction techniques to minimize negative impacts on the biological health and available habitat of Beaver Creek.
- (5) Creek crossing that could require an expensive bridge. Use appropriate bridge construction techniques to minimize negative impacts on the biological health and available habitat of Beaver Creek.
- (6) Creek crossing & Rd. crossing. Safety, cost and habitat conservation issues where S Troutdale Rd crosses Beaver Creek. Route the path safely across creek using existing road infrastructure.
- (7) Major intersection at S Troutdale and Stark St.
- (8) Creek crossing at Mt Hood CC property, could require an expensive bridge. Use appropriate bridge construction techniques to minimize negative impacts on the biological health and available habitat of Beaver Creek.
- (9) Creek crossing at NE 17th St, could require an expensive bridge. Use appropriate bridge construction techniques to minimize negative impacts on the biological health and available habitat of Beaver Creek.
- (15) Transition from SE Stark St to SE Sweetbrier Rd that could require a traffic-calming device and/or road engineering for trail users' safety. This transition will need to switch trail users from arterial road conditions to rural bike lanes or future dedicated bike paths.
- (16) The dangerous existing bike lane crossing over the old Sandy River bridge may require a smoother and safer road substrate and/or other improvements.

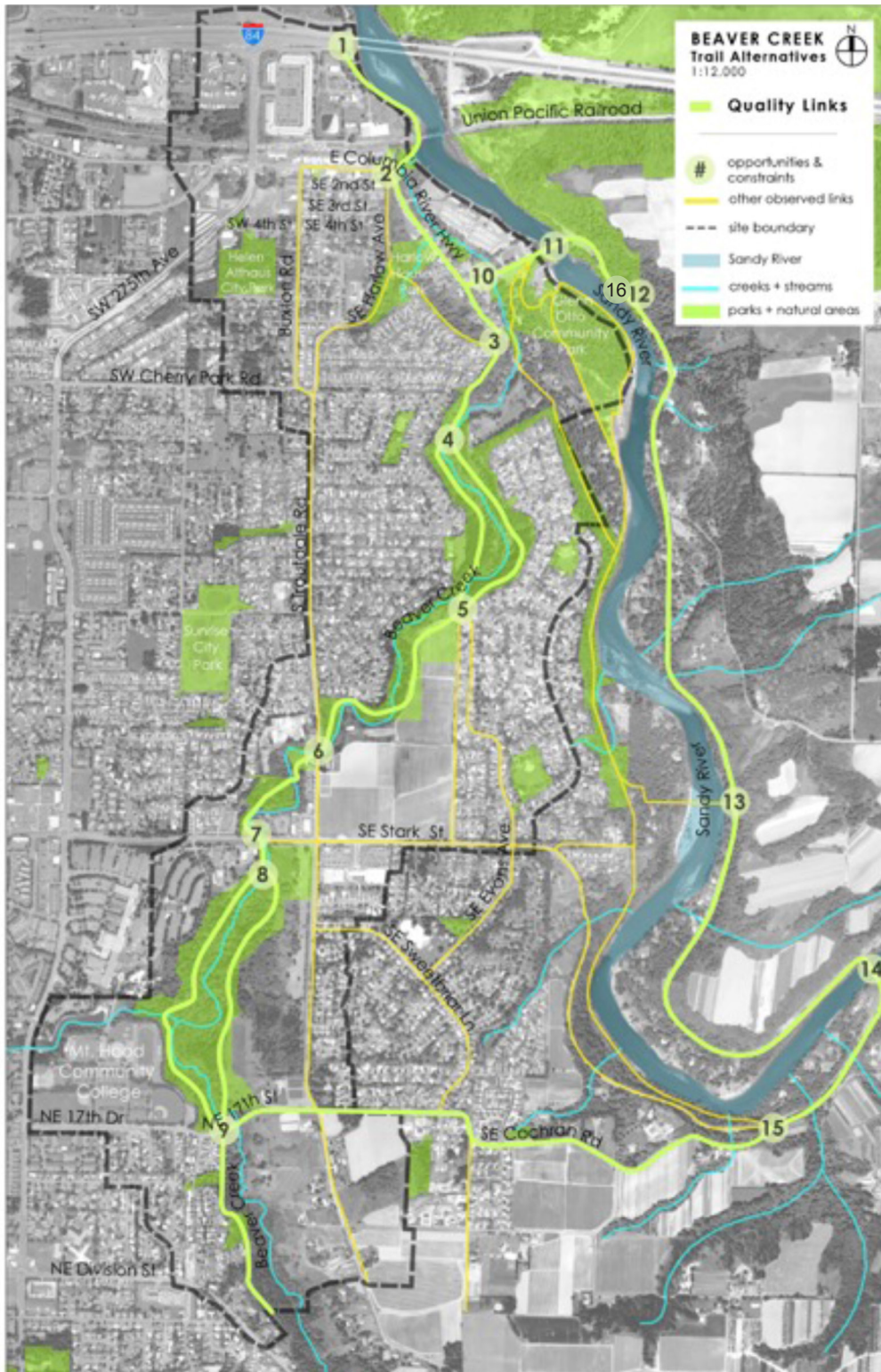


Figure 2M: High Quality Trail Alternative

## Cost-Effective Trail Profile

The Cost-Effective trail option (Figure 2N) borrows heavily from the 'quality trail' option in its alignment through the most scenic trail links, but is a much more streamlined and direct alignment, with a single path instead of many options. It still retains high assessment scores for recreational experience, expected construction cost and noise

### Cost-Effective: opportunities and constraints

The opportunity and constraints of this alignment are denoted by numbers on Figure 2N:

#### Opportunities

- (1) Junction with new I-84 bridge trailhead: There is an opportunity to begin the trail alignment at the end of the future multimodal Historic Columbia River Bike Trail.
- (2) Historic district: The trail goes through the historically significant downtown section of Troutdale. This juncture is an opportunity to integrate the biking route with the historic storefronts and connect to the visitor's center, restaurants, bike shops, etc.

#### Constraints

- (1) Railroad crossing: There is a main-line, heavily used Union Pacific railroad crossing near the North-end trailhead and downtown Troutdale. The Eastwinds development prospectus offers one option for solving this crossing – an overpass and/or an underpass. A major railroad crossing here is a potentially serious safety problem and a new at-grade trail crossing is very unlikely to be permitted in any case. An over- or under-pass may be expensive and merits further careful study.
- (3) Enters undeveloped riparian area with habitat value. This is where the alignment transits the Beaver Creek riparian area and is a very important transition point in trail character. Careful planning and engineering needs to be applied to protect this sensitive habitat and to ensure minimal impacts during the lifespan of the trail.
- (4) Creek crossing that could require an expensive bridge. Use appropriate bridge construction techniques to minimize negative impacts on the biological health and available habitat of Beaver Creek.
- (5) Creek crossing that could require an expensive bridge. Use appropriate bridge construction techniques to minimize negative impacts on the biological health and available habitat of Beaver Creek.
- (6) Creek crossing & Rd. crossing. Safety, cost and habitat conservation issues where S Troutdale Rd crosses Beaver Creek. Route the path safely across creek using existing road infrastructure.
- (7) Major intersection at S Troutdale and Stark St.

- (8) Creek crossing at Mt Hood CC property, could require an expensive bridge. Use appropriate bridge construction techniques to minimize negative impacts on the biological health and available habitat of Beaver Creek.
- (9) Creek crossing at NE 17th St, could require an expensive bridge. Use appropriate bridge construction techniques to minimize negative impacts on the biological health and available habitat of Beaver Creek.

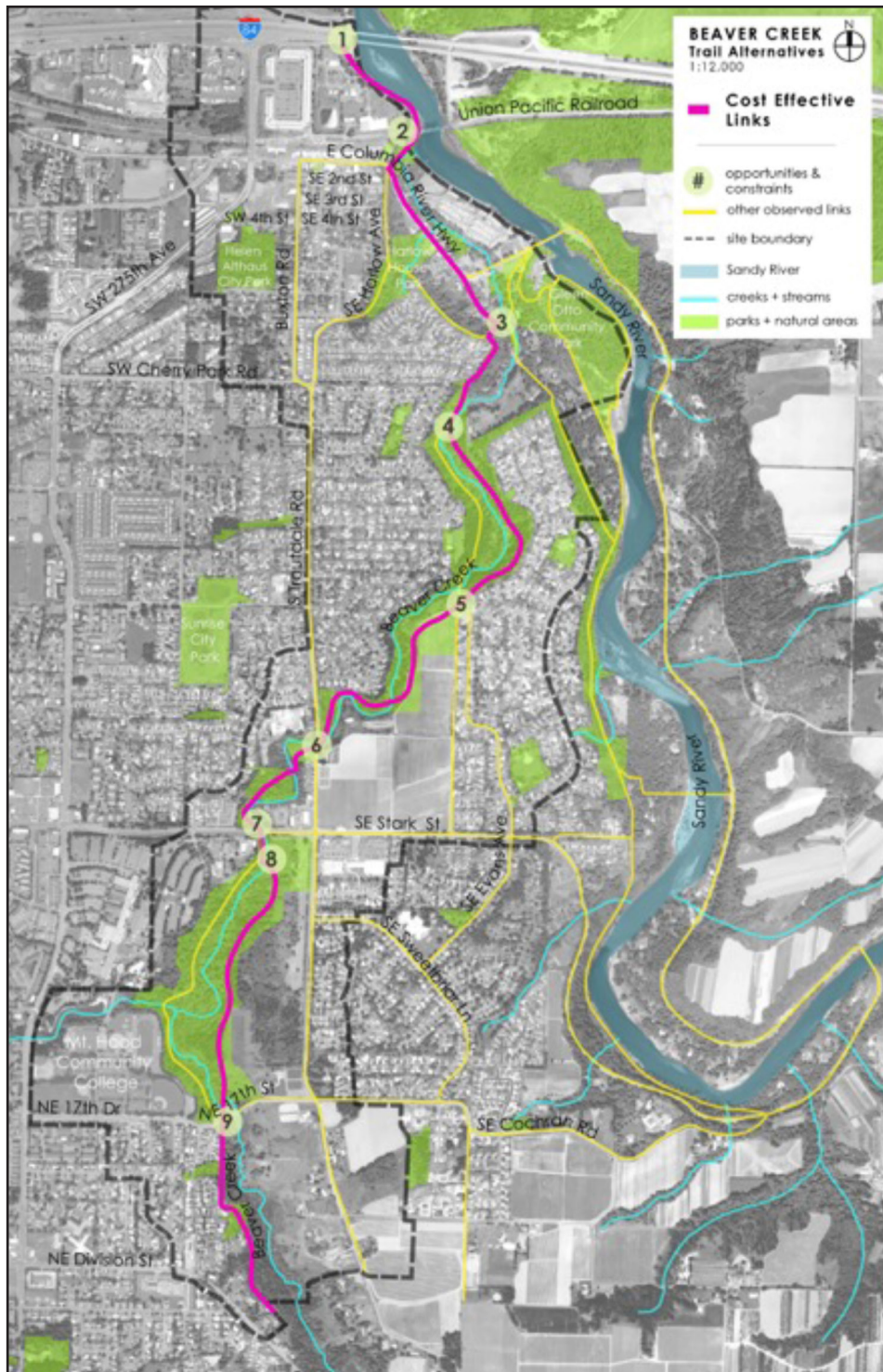


Figure 2N: Beaver Creek Cost-Effective Trail Alternative

# Chapter 3: Analysis of Kelly Creek Study Area

## Existing Conditions

The context map in Figure 3A maps how the Kelly Creek study area lies within the greater Sandy River to Springwater trail planning region, and how that region lies within Portland's 40 Mile Loop trail system. Before beginning to plan potential trail alignments in the Kelly Creek study area current landscape conditions there were explored. Eight topical categories were identified to do so.

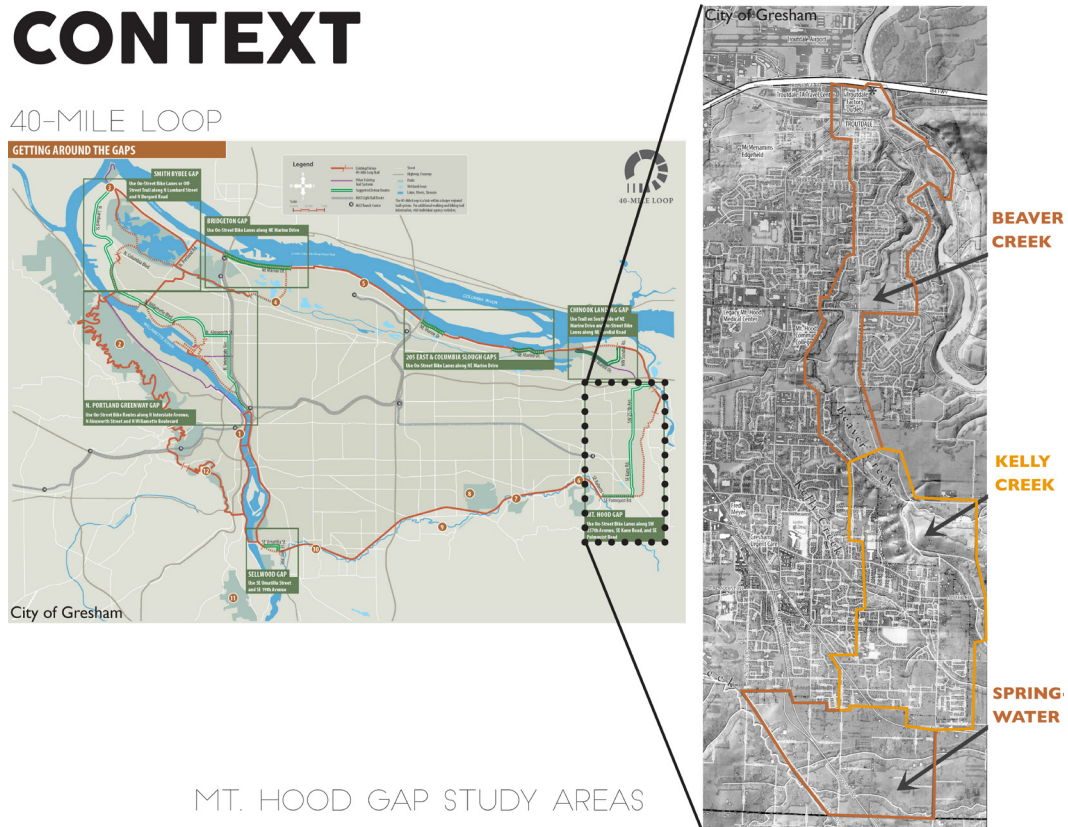


Figure 3A: Kelly Creek Study Area Context

### 1. Social and Cultural Life

The first category of landscape exploration was social and cultural life. This focused on how the landscape expresses aspects of a residential neighborhoods' character. From there, an opportunities and constraints list was generated to direct attention to what could potentially be built upon, and what landscape attributes posed potential drawbacks for moving forward with trail development.

Some of the issues raised were:

- Neighborhoods have different identities but lack connections within them for

easy non-motorized travel between homes and to outside commercial areas. This is characteristic of the cul-de-sac street patterns.

- Disconnected sidewalks that end and begin suddenly prevent safe and directed pedestrian flow (Figure 3B).
- Urban form is focused mainly on private needs and vehicular movement.
- Residents rely on automobiles for access to basic needs and more.
- Some opportunities related to trail planning of the existing residential neighborhood character in the Kelly Creek study area were:
  1. Undeveloped areas can offer places for new trail links between disconnected neighborhood streets or between neighborhoods (Figure 3C).
  2. Neighborhoods are a source of future path users.
  3. Houses in the neighborhoods have active streets fronts: “eyes-on-the-street” make residential streets safer as trail locations.



**Figure 3B:** *Disconnected sidewalks prevent safe and directed pedestrian flow*



**Figure 3C:** *Undeveloped areas can offer places for new trail links*

## 2. Private Needs

Private landowner needs at properties adjacent to the proposed path alignment were considered next. Here are some of the other prominent opportunities and constraints for private property owners adjacent or near to the path:

- Home residents adjacent to properties where a path system could produce a loss of privacy due to increased path and path related users
- Path will provide an amenity in itself and ready non-vehicular access to other nearby amenities.
- Path will potentially increase or decrease property values
- The study area contains contiguous areas of large, undeveloped parcels and contiguous areas of publicly owned land that harness potential for path development at a distance from homes.

### 3. Accessibility

Next, the team focused on neighborhoods' accessibility to the rest of the suburban landscape. Observations were made about how current neighborhoods' character aid and/or constrain pedestrian connectivity to nearby areas, as well as how effectively the landscape caters to alternately abled individuals. Some issues and problems related to accessibility included:

- Large traffic volumes on arterials, disconnected suburban street layout, and poor sidewalk or path pedestrian connections inhibit safe, non-vehicular access for alternately-abled people.
- Local children often do not have safe routes to walk or bicycle to school or to parks.

Some of the opportunities, and potential strategies relating to accessibility include:

- Incorporate universal design and specialized way-finding strategies into project construction to enhance navigation and access opportunities for alternately-abled people.
- Presence of sidewalks in newer neighborhoods and fragments at the edges of these suggest that the city desires pedestrian connectivity.

### 4. Recreation Experience

Recreational experience was described by observing existing pedestrian connectivity within and between neighborhoods as recreational opportunities. Many of the existing conditions were problematic due to insufficient pedestrian paths and trails in the study area. Some of the issues related to recreational experience include:

- Connections between neighborhoods are often on noisy, unattractive and potentially dangerous high traffic arterial streets.
- Insufficient trail or path connection are found across currently undeveloped areas.
- Existing paths are fragmented, paths are poorly marked, and paths do not readily facilitate different modes of recreational transportation because of width, surface, or grade.
- The Study area is a relatively monotonous landscape with mainly single family housing and streets.

Opportunities were identified for recreational experience related to the quality of user experience along potential paths or path systems through the Kelly Creek study area. Some potential opportunities included:

- Larger undeveloped parcels have greater potential for construction of multi-modal trail parkways within future development.
- The "borrowed landscape" in distant views can enhance path experience through path alignments directed at them or at future carefully selected viewpoints where open views might be maintained.

- Larger undeveloped parcels offer opportunities to construct trail with privacy screens or setbacks from existing or future homes.

## 5. Economic Development

Observations related to economic development were made based on the potential for a path to spur economic development or enhanced property values in depressed or currently underdeveloped areas within the study area. The issues related to economic development were:

- Public amenities like trails generally do not generate tax revenues.
- New urban development could be designed to “squeeze out” trail locations to arterial street edges or narrow strips between privacy walls so that a trail might no longer be a property value enhancing amenity.

The opportunities relating to economic development noted that potential path development could increase economic growth and construction projects due to several factors:

- Paths could attract tourism, new businesses, provide amenities that enhance home values and thereby help spur regional economic growth.
- Broader economic development in Gresham and Troutdale can be served by well designed trail systems that provide improved trail access to nearby or regional recreational opportunities.

## 6. Natural Resources

Open space natural resources within the Kelly Creek study area are fragmented and disconnected by development patterns. The presence of domestic animals and storm water flows hinder potential ecological restoration projects near new trails in the area. Existing natural areas could be linked to schools and residential neighborhoods by trails to enhance educational opportunities and recreational outings from home to nature.

## 7. Pollution

Pollution is both an issue and an opportunity. Trail development might serve to reduce pollution depending on its design and popularity in getting people to walk or bike instead of drive. Observations were made based upon current issues with reference to different types of pollution, and the potential for mitigation by a new path system with associated projects. Issues related to pollution in the study area include:

- Many impervious surfaces produce increases runoff and reduces water quality via car-related pollutants and those from residential activity (use of fertilizer and other chemicals).
- Urban and agricultural runoff is often channeled directly into Beaver and Kelly Creek increasing pollution, sediment and nutrient concentrations there.

Opportunities for future storm water and pollution mitigation and management:

- Path construction can improve water quality through careful grading, re-vegetation, and storm water management solutions, such as retention ponds, swales and constructed wetlands.
- Increased access to natural areas may increase desire for and willingness to implement conservation and rehabilitation efforts along trails.
- Projects along the trail to enhance environmental performance and habitats may increase the political viability of a new path system.

## 8. Real Estate Costs and Budget

In order to find alternative potential path alignments the Kelly Creek student team looked at opportunities and constraints pertaining to construction and real estate acquisition costs affecting the budget for implementing potential path alignments. Much of this analysis was speculative because the students do not have financial training. The methods and lists generated by the Kelly Creek team helped all the study teams in the class think generally about what potential financial factors could affect path alignment plans. Some of the issues generally include:

- Alignments passing through areas with a greater number of small parcels might be challenging to obtain rights-of-way or political approval.
- Acquiring already developed land for trail construction is likely more expensive than still undeveloped property.
- Special trail amenities, environmental projects with the trail and strategies for constructing universal accessibility and way-finding will add costs.
- Major grade changes and bridges over creeks and streets are costly.

Potential financial opportunities based on path location and different methods of trail system funding to sponsor path alignments are:

- Paths that pass through or nearby schools may be more attractive to receive funding related to safe routes to school or school improvements.
- Public/private partnerships could provide unique opportunities to assist fundraising and implementation in exchange for recognition to donors and enablers.
- Construction of paths through new developments will cost the developer inasmuch as land would not be sold to new home buyers, but such paths, if well designed, can provide amenities that may offset these costs via enhanced home prices.

## Goals and Objectives

Based on the above field analysis of the study area landscape, six planning goals were developed for finding alternative path alignments through the Kelly Creek Study Area (Figure 3D).

The first goal is to reduce auto dependency within the study area. By encouraging walking and bicycling, this goal serves to improve community health, safety, energy consumption, and wellbeing. To accomplish this goal, paths

alignments will be placed close to existing transit stops, and connect homes to places of work and shopping within the study area. To maximize safety (where possible) alignments will be located at least ten feet away from arterial streets and regional highways.

# GOALS + OBJECTIVES

## **1. Reduce auto-dependency to encourage community health and safety**

- Locate trails proximate to existing transportation corridors to encourage use of transit facilities
- Connect homes, workplaces, and other communities to trailheads using feeder trails or adjacent nodes
- Where possible, locate trail a minimum of 10 feet away from arterial roads

## **2. Encourage social interaction along trail alignments**

- Locate trail nearby or through existing schools and existing parks and open spaces
- Bisect cul-de-sac streets to encourage bike and pedestrian inter-neighborhood movement

## **3. Enhance community identity**

- Use unified trail palette and branding to help develop a sense of place
- Facilitate community events and tourism opportunities along the trail and its adjacent nodes

## **4. Maximize diversity of user experience**

- Locate trails through a variety of landscape typologies
- Provide opportunities for static activities within a natural setting through trail related recreation

## **5. Balance restoration goals and community access within natural areas**

- Identify and buffer conservation habitat areas and wetlands within study area
- Provide outdoor classroom opportunities for environmental education

## **6. Meet ADA requirements and embrace spirit of universal design**

- Main trunk of trail link will be multi-modal and graded with a slope not to exceed 5%
- Where possible, feeder trails will be multi-modal and graded with a slope not to exceed 5%

**Figure 3D: Goals and Objectives**

Second, the path will seek to help facilitate greater social interaction within the study area. The path should serve to connect neighborhoods by co-locating the path close to existing schools, shopping areas, and open space, as well as by connecting some of the many cul-de-sacs in the study area to increase connectivity between neighborhoods.

Third, the path will seek to help enhance community identity. Community identity encompasses many intangible qualities but may also be as simple as developing a unique logo or trail entrances that speak to the identity of the Kelly Creek community or the whole trail from the Sandy River to the Springwater Trail. Using a unified palette of path elements and furnishings could help enhance the existing community identity by creating a shared sense of place and unified element in the fabric of the city. Annual events and tourism opportunities centered on the path system will likely also enhance community identity.

The fourth goal is to enhance the diversity of user experience along the path. This can be achieved by locating paths through a variety of landscape types for users to experience, to avoid monotony in path design, and by providing opportunities to stop along the path and enjoy different activities and amenities in different places. The path should not only be about passing through places but also stopping to enjoy places.

Fifth, the needs of habitat protection and restoration must be balanced with the need for a trail system. There is a tension between protecting and restoring high quality habitat while allowing or promoting human access from the trail or path. By identifying sensitive habitat and wetlands, and areas that could benefit from restoration, path alignments will avoid areas of high ecological value where possible, but come close enough to enable ecological restoration projects as part of the larger path system project. Where habitat impacts do occur because of new trail locations, these impacts may be offset by selectively implementing restoration projects to improve habitat quality. To make use of and interpret the need for preserving and conserving ecologically sensitive and high quality habitat areas, opportunities for outdoor classrooms and interpretation will be sought and identified along the trail.

Finally, the path will meet the requirements of the Americans with Disabilities Act (ADA) and, more broadly, embrace the spirit of universal design. Universal design is the goal that every aspect of an experience should be accessible to anyone regardless of their ability. The path should be as much for the blind, the deaf, children, or parents running with strollers, etc. as anything else. The primary, but not only, way to achieve this goal is by maintaining a longitudinal path grade of 5% or less for both the main trunk of the path and feeder paths and constructing wider paths where possible.

## **Path Alignment Planning Process**

Path alignments were developed and mapped using a series of distillation steps, as shown in Figure 3E. These were: (1) speculative brain-stormed scenario alignments, (2) initial link mapping, (3) refined link mapping, and (4) link assessment. This process was aimed at drafting whole alignments clear through the study area, and is described below in more detail.

### **Scenario Alignments**

First, hypothetical alignments that spanned from the edge of the Beaver Creek study area to the north down to the edge of the Springwater study area to the south were mapped with specific user scenarios in mind. For example, a path with a focus on education would co-locate with schools, historic areas, and habitat to facilitate a user experience that was ideal for scientific or historical education. Many iterations of this speculative design process were made for various such scenarios, producing 35 different scenario-specific path alignments. These alignments were overlapped onto one map (Figure 3F) to create a

# PROCESS

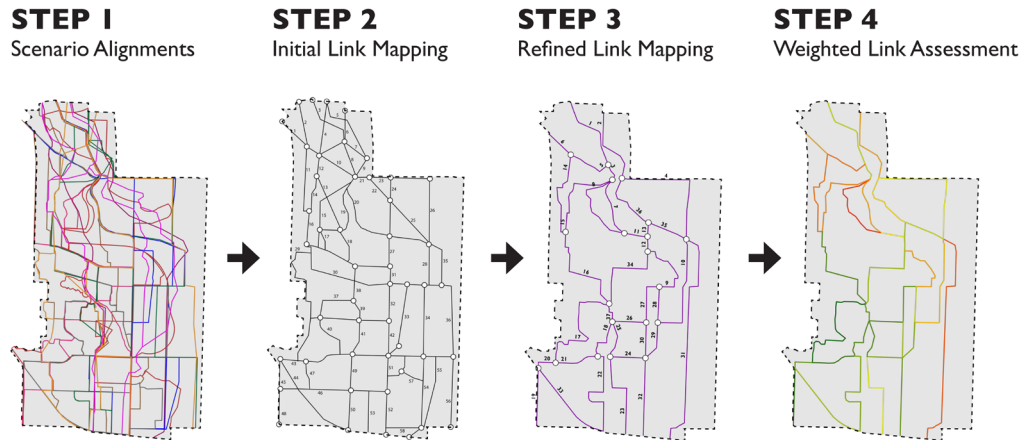


Figure 3E: Process

## STEP 1 SCENARIO ALIGNMENTS

### SCENARIO MAPPING

Developed over 35 possible alignments emphasizing different scenarios:

- |                                  |                                 |
|----------------------------------|---------------------------------|
| 1. Accessibility                 | 6. Diversity of User Experience |
| 2. Conservation                  | 7. Transit Connections          |
| 3. Low Cost Land Acquisition     | 8. Economic Development         |
| 4. Street and crossing avoidance | 9. Social Experience            |
| 5. Education                     | 10. Co-location with Streets    |

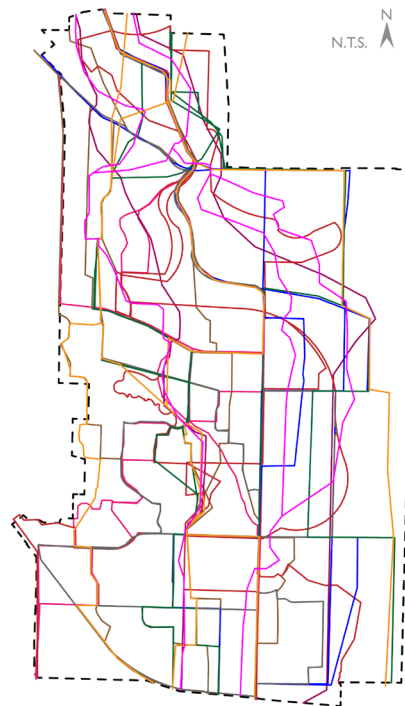


Figure 3F: Scenario alignments emphasised different criteria

composite of path scenario alignments as a first step in understanding trail alignment opportunities.

### Initial Link Mapping

From the scenario-based composite of path possibilities, locations of intersection between scenario alignments were identified so as to bisect these path alignments into a first draft of numbered trail links (Figure 3G). A link is a unique bit of trail alignment between two points where at least two other links junction. This process identified over 100 links and further distillation was needed to make a tractable number. East and west trending links were removed to only favor links that followed the desired more direct north/south pattern; and nearby redundant links were eliminated by merging them to the better location between the two.

# STEP 2 INITIAL LINK MAPPING

## MAPPING LINKS

Combining these initial scenario alignments, we derived over 100 feasible trail links.

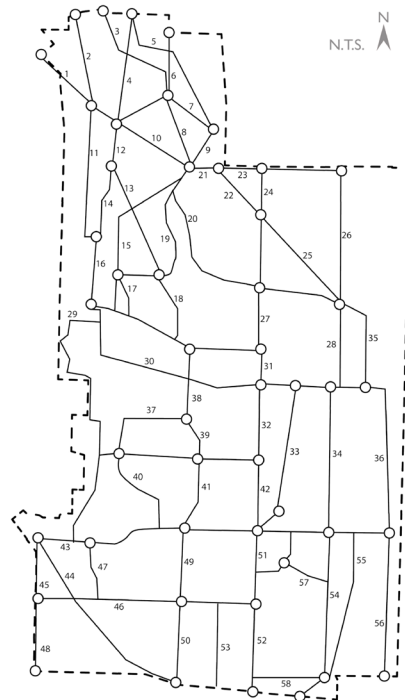


Figure 3G: Numbered trail links and potential alignments

### Refined Link Mapping

The end product of the initial link mapping process described above was 38 links, as shown in Figure 3H. These were non circuitous and allowed for assembly of sets of links into multiple potential trail alignments within the Kelly Creek Study Area.

# STEP 3 REFINED LINK MAPPING

## SIMPLIFY

Eliminating undesirable links, links with unnecessary E/W connections, and combining segments into longer links, we refined our total number of links from 105 to 38.

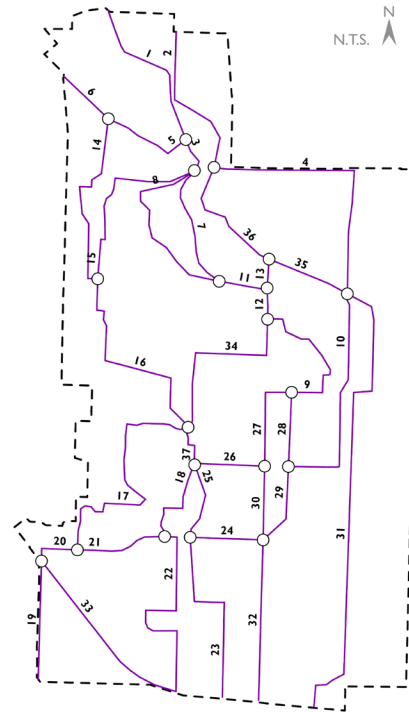


Figure 3H: Refined link mapping

## Weighted Link Assessment

To further assemble links into potentially advantageous single path alignments, each individual link was assessed using the initial link impact assessment methods described in the technical appendix. The whole class developed these methods. Thirteen assessment categories were used to analyze initial impact level for every individual link within the Kelly Creek study area. Symbols for these are shown in Figure 3J. They were: recreational experience, ecological restoration, universal access, safety, education, habitat, zoning and real estate, storm-water, noise, user diversity, connectivity, construction costs, and privacy. Geographic Information System (GIS) data maps and aerial photography were then used to examine the 38 links to assess good and bad impacts for every category, and score them on a suitability index where 5 represents a “very good” link (darkest shade of green in Figure 3K) and 1 is a “very poor” link (lightest shade of green in Figure 3K).

The Kelly Creek student team developed and applied specific weights to assign to different impact category scores to identify links, which, if assembled together, would determine different alternative trail alignments. The factors favored by these weighted assemblies determined the trail qualities emphasized by an alternative alignment. As assigned by the class-wide procedure, three final path alignments were found: low cost, quality, and cost effective, as described below.

# STEP 4 WEIGHTED LINK ASSESSMENT

## ASSESS

These 38 links were assessed by a modified "Initial Impact Assessment" to better define suitability for Low Cost, Quality, and Cost Effective Alignments.

LINK IMPACT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	
Human Qualities Impact	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
Ecology	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Physical Qualities Impact	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Total Score	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10

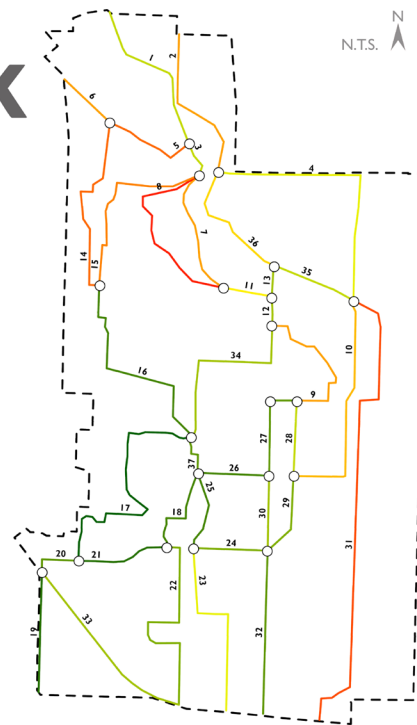


Figure 3I: Weighted link assessment

# LINK IMPACT ASSESSMENT CRITERIA



Figure 3J: Assessment Criteria

# INITIAL LINK IMPACT ASSESSMENT

\*Links were assessed on scale 5, where 5 was very good 1 was very poor.

5	Very Good	4	Good	3	Fair	2	Poor	1	Very Poor	0	Not Applicable
---	-----------	---	------	---	------	---	------	---	-----------	---	----------------

LINK IMPACT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38		
<b>Human Qualities Impact</b>																																							
Safety	3	4	4	4	4	3	3	4	3	4	3	3	4	3	3	3	4	4	4	4	4	4	4	4	4	4	4	3	4	4	3	4	3	3	3	4	4	3	3
Education	3	4	4	4	4	2	3	3	3	2	3	3	1	2	5	5	3	2	1	1	2	1	2	3	5	5	1	1	3	3	4	2	1	2	1	2	4	5	
Universal Access	5	1	4	4	0	2	0	0	4	4	3	4	5	0	0	5	5	5	5	5	5	3	3	3	5	4	5	5	4	3	5	4	4	5	4	5	5		
Recreational Experience	5	4	3	5	3	3	3	3	3	3	2	4	3	3	2	2	4	1	1	1	2	3	1	5	2	2	5	5	3	5	3	2	1	5	5	2	2		
Diverse Users	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5		
Connectivity	1	1	1	1	1	1	3	3	1	2	3	3	3	4	5	5	5	4	3	4	4	3	4	5	5	3	1	2	3	1	3	3	5	1	3	5	5		
<b>Physical Qualities Impact</b>																																							
Habitat	5	4	1	3	1	1	1	2	2	4	1	1	5	5	3	5	5	5	5	5	5	4	1	2	2	5	4	4	3	4	5	4	5	4	5	4	1	3	
Ecological Restoration	5	4	1	5	1	1	1	3	4	3	1	1	4	1	2	1	4	1	1	2	2	1	3	3	3	1	1	1	1	3	3	2	1	1	1	1	4	1	
Construction Costs	4	3	3	4	3	3	4	2	3	3	4	4	4	3	4	4	5	4	5	4	3	5	4	5	5	4	4	5	3	5	5	4	4	2	4	4	4		
Stormwater	4	2	2	4	2	4	2	2	4	4	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
Noise	1	3	1	5	1	1	1	5	1	5	1	1	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	1	4	5	1	3	1	1	1	5	5	
Zoning and Real Estate	5	5	4	5	5	2	3	1	5	5	5	4	4	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5	5	5	5	5	5	5	5	4	4	5	5
Privacy	2	1	1	1	1	2	2	1	1	1	2	2	4	2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	1	4	2	1	2	2	2	1	4	2	1
Total Score:	48	41	35	49	31	33	33	35	37	44	36	38	53	42	45	48	53	51	47	46	49	46	46	45	55	48	42	44	51	45	40	44	41	41	45	47	49	48	

Figure 3K: Impact Assessment

## Low Cost Path Alignment

The first proposed alternative path alignment is an assembly of links that would be easiest and lower cost to acquire and implement. This is the “low cost” path alignment. Impact categories that were weighted more heavily in determining this alignment are universal access, safety, zoning-real estate -construction costs (Figure 3L). These were given the greatest priority with a weighted numerical value of two. Connectivity was given some consideration via a weighted value of one. All other criteria were given no consideration for this particular low cost alignment, which is why the accompanying symbols are grayed out in Figure 3L. The result is a lower cost path alignment that also provides connectivity with directness.

# LOW COST TRAIL ALIGNMENT



Figure 3L: Low Cost Trail Alignment

## Low Cost Path Alignment Maps

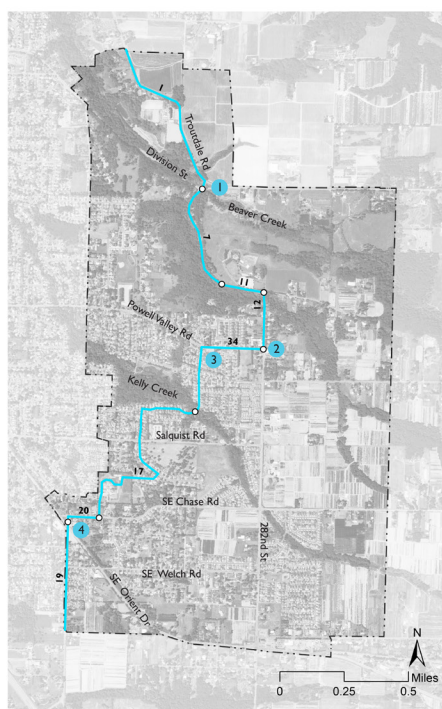
The map on the left of Figure 3M shows the links’ weighted impact assessment criteria in a colored hierarchy of dark green being very good and red being bad. After a visual inspection of this map and inspection of the weighted link evaluations, a continuous and non-circuitous low cost alignment was selected to also provide a balance between community connections and directness.

## Low Cost Path Projects

Figure 3N maps and lists projects, opportunities and constraints for the low cost path alignment. Projects are interventions necessary for making the trail possible

or desired for enhancing the users experience along the trail. For the low cost alternative, necessary projects include constructing flashing crosswalk signals across three collector streets and constructing a bridge (high cost) or signaled crossing (low cost) over/through SE Orient Drive, a major arterial road.

## LOW COST TRAIL PROJECTS



LINK IMPACT	1	7	11	12	17	19	20	34
Human Qualities Impact								
Safety	6	6	6	6	6	6	6	6
Education								
Universal Access	0	0	0	0	0	0	0	0
Recreational Experience								
Diverse Users								
Connectivity	1	1	1	1	1	1	1	1
Physical Qualities Impact								
Habitat								
Ecological Restoration								
Construction Costs	1	1	1	1	1	1	1	1
Stormwater								
Noise								
Land Use and Real Estate	1	1	1	1	1	1	1	1
Privacy								
Total Score:	35	27	33	37	43	42	38	37

### OPPORTUNITIES

- Connects study area schools
- Follows existing trails

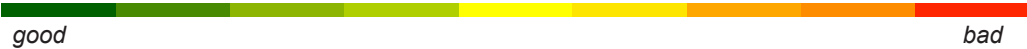
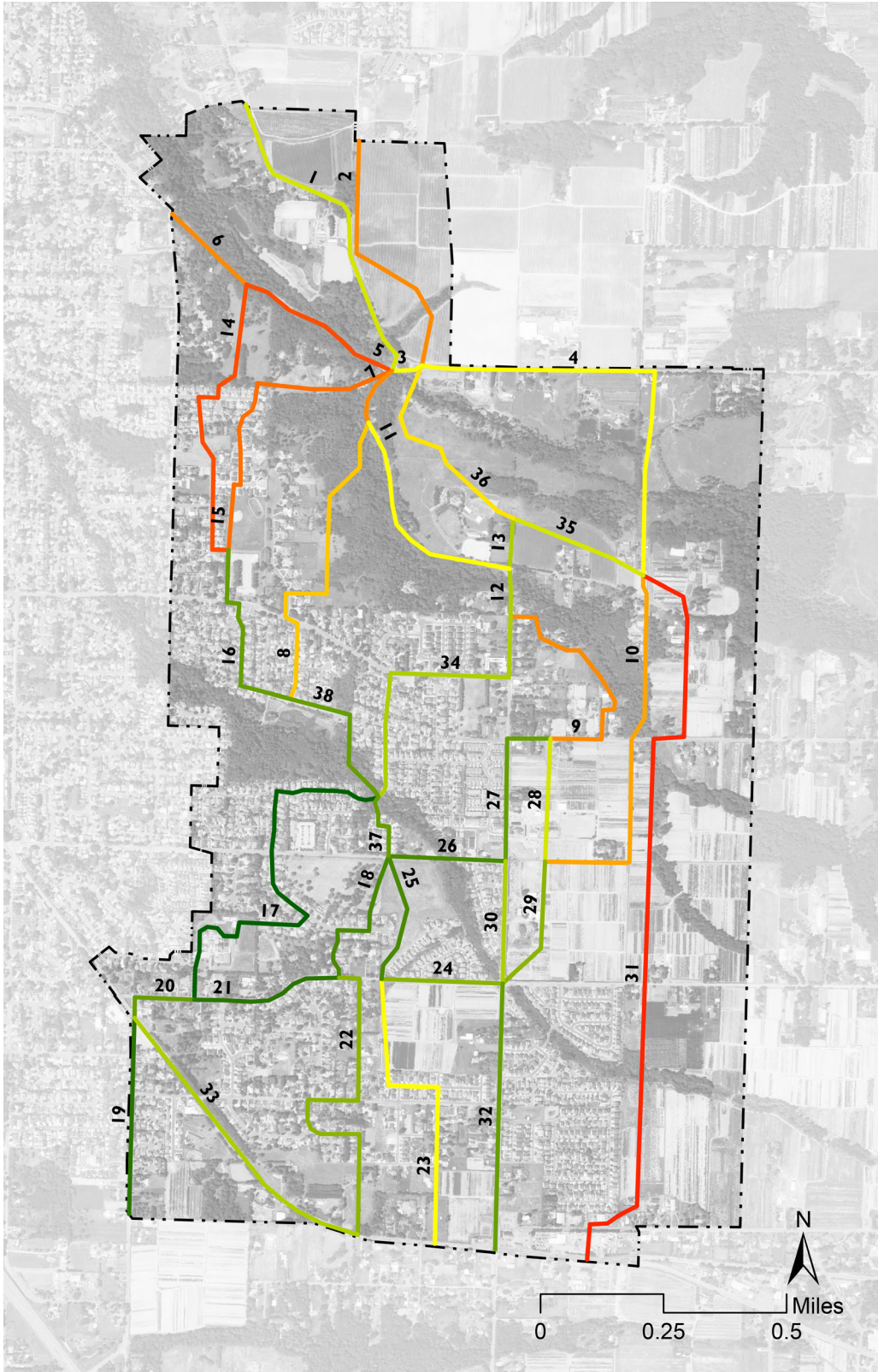
### CONSTRAINTS

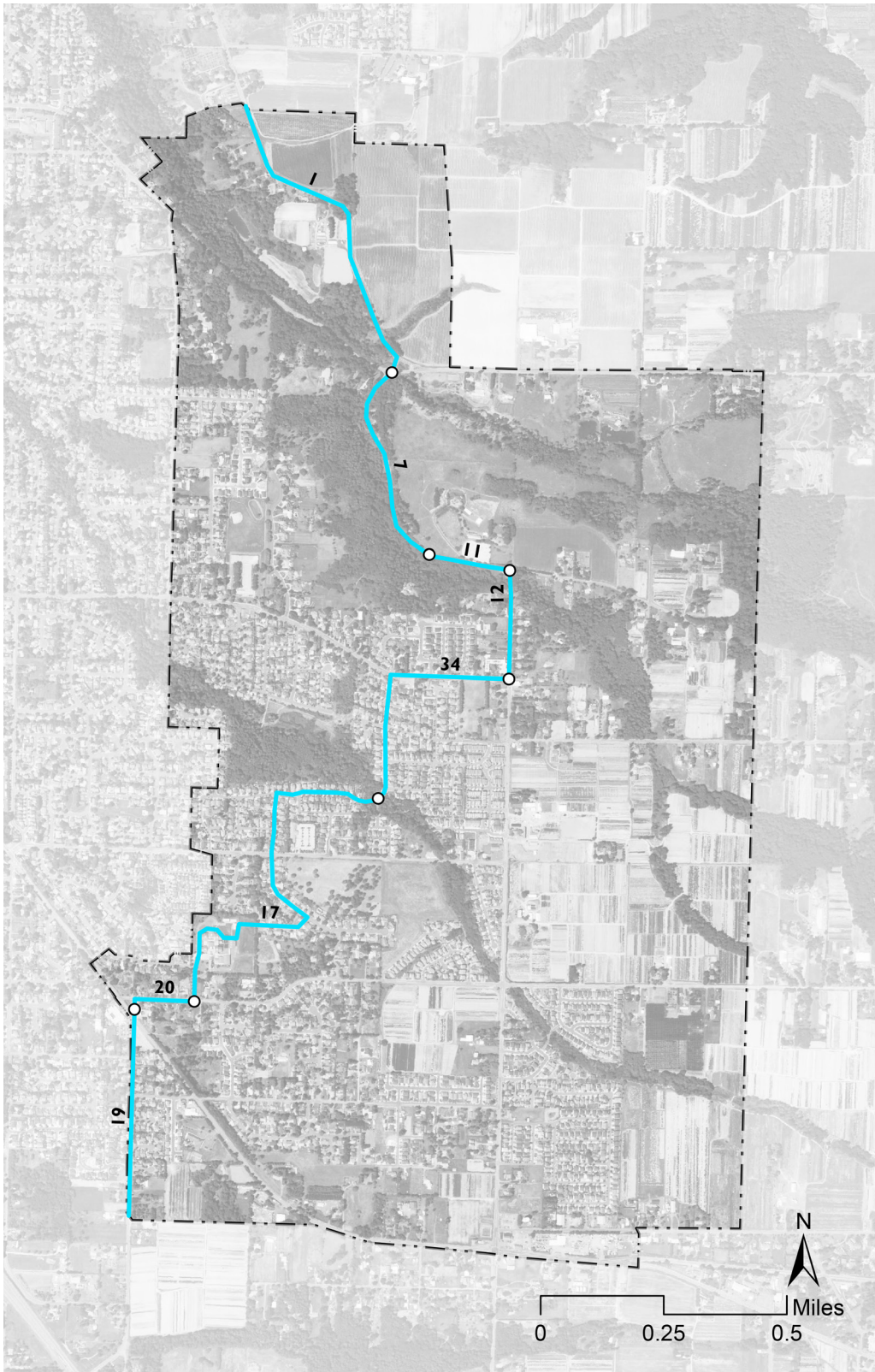
- Co-location with ROWs hinders experience
- Circuitous trail route
- Four intersection crossings

### NEEDED PROJECTS

- 1 Construct flashing crosswalk across collector road at Troutdale/Division Rd.
- 2 Construct flashing crosswalk across 282nd St.
- 3 Construct flashing crosswalk from collector road at SE Powell Valley Rd.
- 4 Construct bridge or tunnel across major arterial road at SE Orient Dr.

Figure 3N: Low Cost Trail Projects





**Figure 3M:** Colored hierarchy of weighted impact assessment criteria, low cost alignment

## Quality Path Alignment

The second proposed alternative alignment is a “quality” path that is always multi-modal, at least 6 feet wide, and is a distinct trail feature within the landscape of the Kelly Creek study area. In other words, wherever possible, the path alignment will be separated from road corridors by a minimum 10 foot buffer to optimize safety and attractive trail identity. The criteria given the greatest priority, with a weight of two, in determining this alignment were recreation experience, safety, education, habitat, noise, user diversity, and connectivity (Figure 3O). Some consideration, with a weight of one, was given to ecological restoration, universal access, and storm-water. All other criteria were given no weight in seeking this alignment (Figure 3O).

# QUALITY TRAIL ALIGNMENT



Figure 3O: Quality Trail Alignment

## Quality Path Alignment Maps

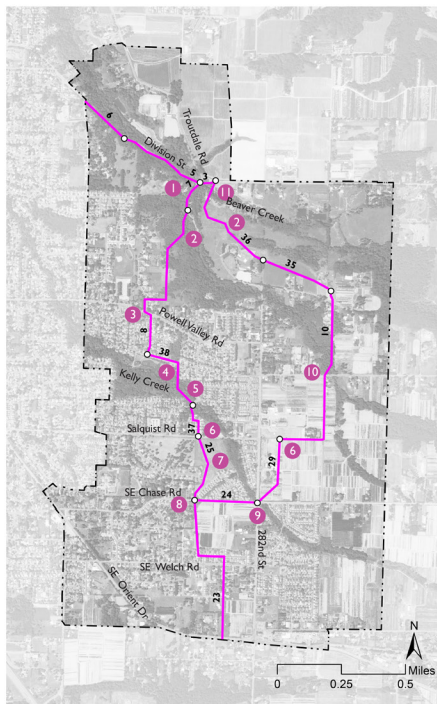
Connecting our quality alignment between Beaver Creek’s southern path alignment join point and Springwater’s northern joint point would provide a quality path alignment. The only way to achieve such a continuous quality path was to use some links that may not be good by our quality link assessment weights (left map of Figure 3P). By combining the best overall set of links as a whole however, overall alignments could balance improved user experience and reasonable directness as much as possible. Two options are mapped for the quality path (right map in Figure 3P) that would allow for use in the existing residential area to the west, and also for future connectivity within the less

developed eastern portion of the study area. Although the path on the east is currently more rural in character, this area will experience future development. A well-designed path system here in narrow parkways could be placed within new developments rather than fitting the path through the area along streets after it is developed.

## Quality Path Projects

Figure 3Q maps and lists projects, opportunities and constraints for the quality path alignment. Projects include constructing numerous flashing crosswalks, a bicycle and pedestrian bridge over Kelly Creek, and, if desired and financially feasible, an outdoor classroom on existing park land.

# QUALITY TRAIL PROJECTS



LINK IMPACT	1	5	6	7	8	10	23	24	25	29	35	36	37	38
<b>Human Qualities Impact</b>														
Safety	1	4	6	4	4	4	4	4	4	4	4	4	4	4
Education	1	4	6	4	4	4	4	4	4	4	4	4	4	4
Universal Access	0	2	0	0	3	3	3	3	3	3	3	3	3	3
Recreational Experience	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Green Spaces	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Connectivity	2	2	2	2	2	2	2	2	2	2	2	2	2	2
<b>Physical Qualities Impact</b>														
Historical	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Ecological Restoration	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<b>Construction Costs</b>														
Stormwater	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Noise	2	2	2	2	2	2	2	2	2	2	2	2	2	2
<b>Soaring and Real Estate</b>														
Priority														
Total Score:	45	41	39	41	52	56	62	56	66	62	65	63	64	64

### OPPORTUNITIES

- Connects study area schools
- Connects existing parks and open space
- Co-located with existing trails and transit stops
- Passes close to wetland (educational value)

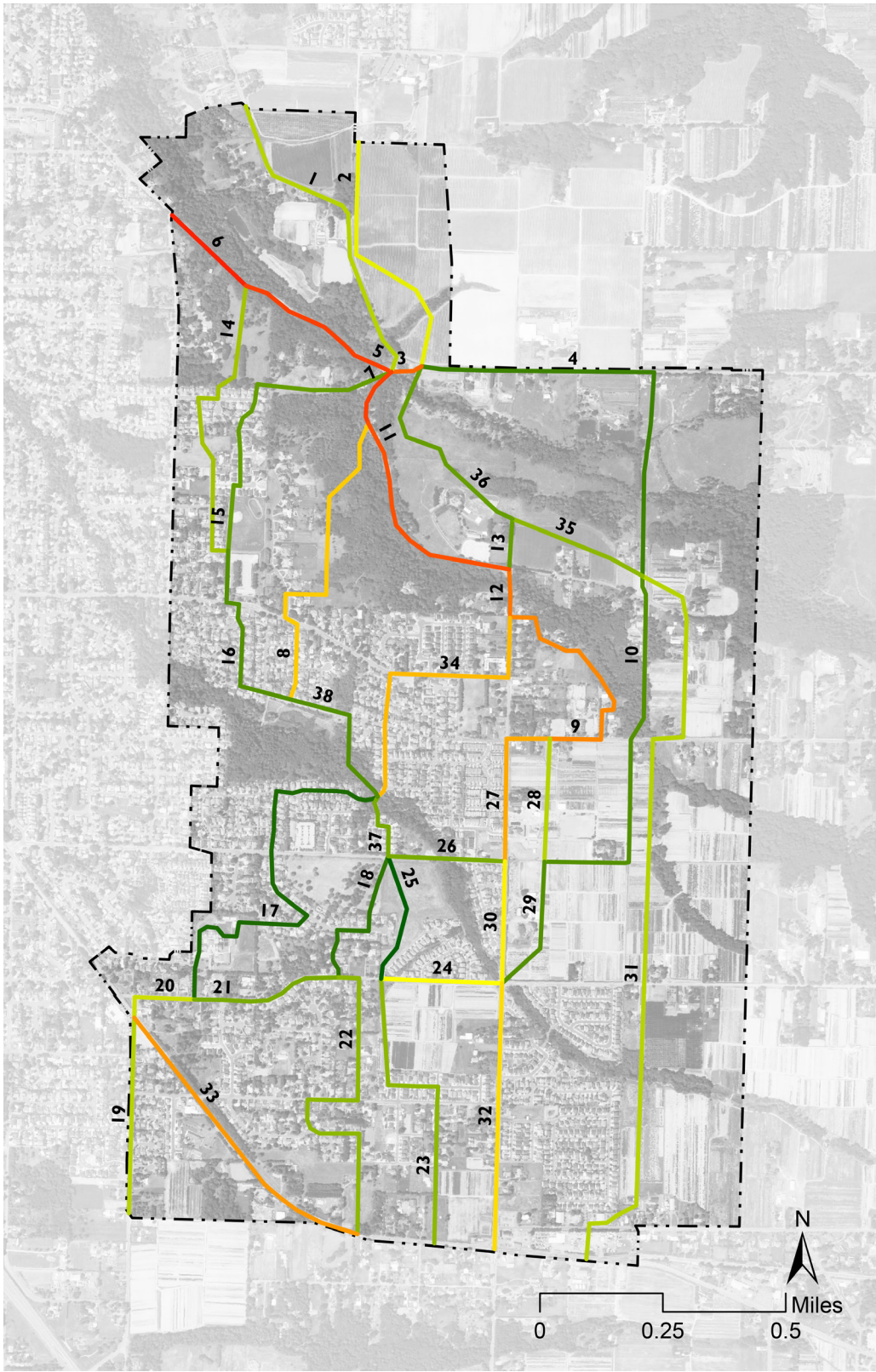
### CONSTRAINTS

- Several intersection crossings
- One major stream crossing
- Navigates steep terrain

### NEEDED PROJECTS

- 1 Construct flashing crosswalk across collector road at Troutdale/Division St.
- 2 Regrade trail alignment not to exceed 5%
- 3 Construct flashing crosswalk at SE Powell Valley Rd.
- 4 Construct bike/ped bridge over Kelly Creek
- 5 Outdoor classroom on park land desired
- 6 Construct flashing crosswalk across Salquist Rd.
- 7 Rest stop on park land desired
- 8 Construct flashing crosswalk across SE Chase Rd.
- 9 Construct flashing crosswalk across intersection at 282nd St.
- 10 Construct flashing crosswalk crossing at Lusted Rd.
- 11 Construct flashing crosswalk at Division Dr.

Figure 3Q: Quality Trail Projects



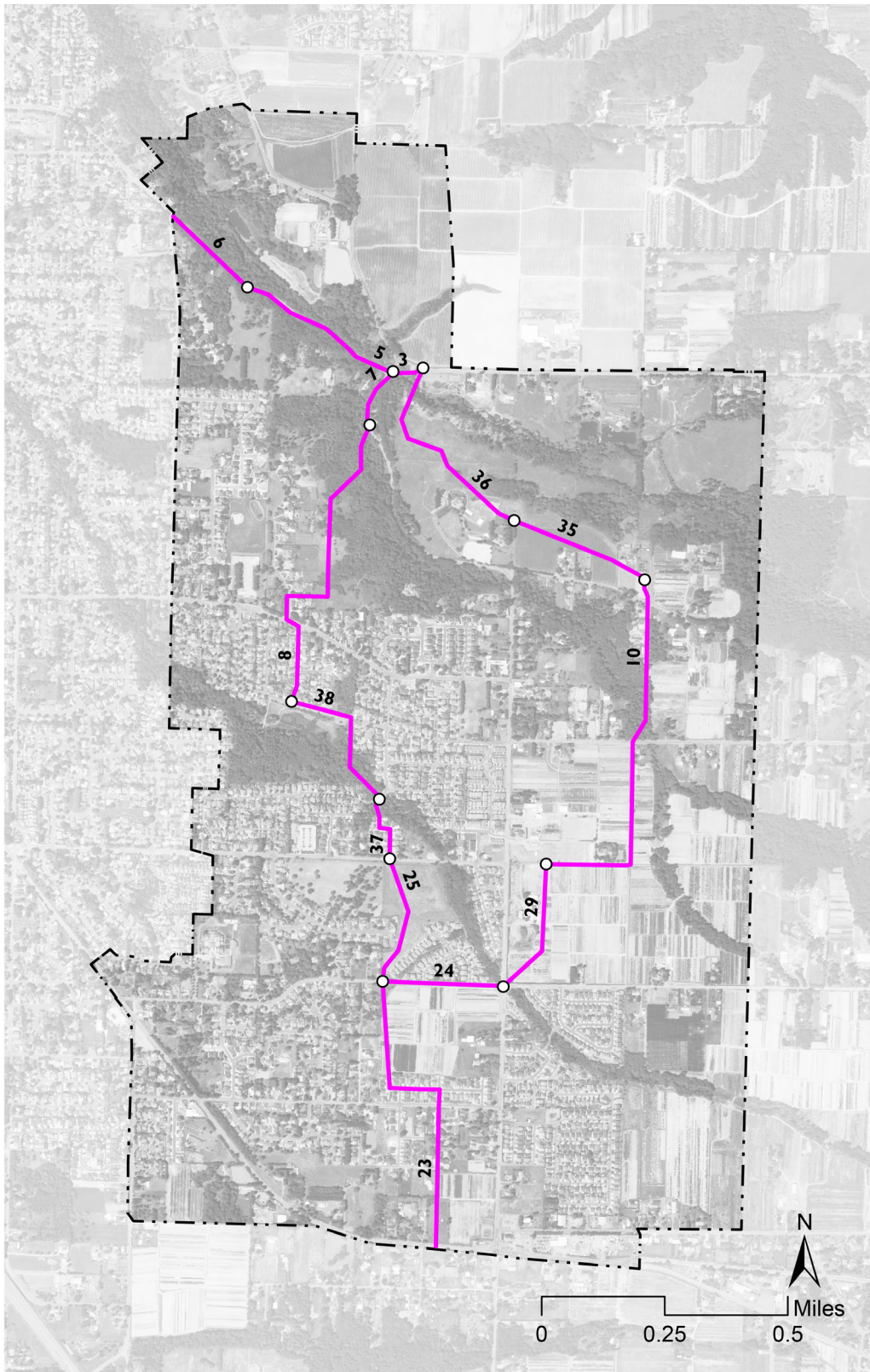


Figure 3P: Colored hierarchy of weighted impact assessment criteria, quality trail alignment

## Cost Effective Path Alignment

The final alternative proposed path alignment seeks to optimize quality across all impact types and at reasonable cost. In other words, it is a hybridized version of the low cost and quality path alignments described above. The criteria given top priority in determining this cost effective alignment were recreational experience, connectivity, ecological restoration, universal access, safety, and zoning-real estate-construction costs (Figure 3R). These criteria were given a weight of two. All other criteria were assigned a weight of one and thereby given some consideration while assembling the cost effective path alignment.

# COST-EFFECTIVE TRAIL ALIGNMENT



Figure 3R: Cost-Effective Trail Alignment

## Cost Effective Path Alignment Maps

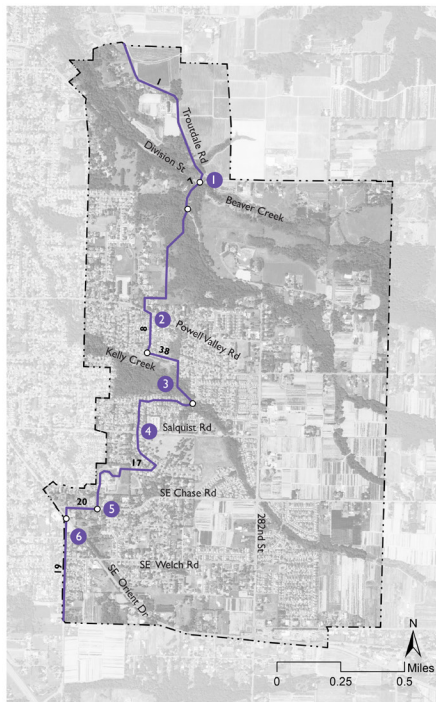
The cost effective path took into consideration both quality and cost to determine this alternative alignment (left side of Figure 3T). The final cost-effective alignment is shown on the right side of Figure 3T. Many spatial design choices were made in assembling links into this alignment. For example, to achieve a less circuitous path, rather than choose link number four, which would lead to more lower ranked links on an indirect route, links seven and eight were chosen despite their lower ranking because they connect to higher ranked links, and also provide a less circuitous path alignment. For links seven and eight, more money could be invested to benefit the user's experience, such as constructing flashing crosswalks and adding privacy screens between the trail and homes.

## Cost Effective Path Projects

Figure 3S lists projects, opportunities and constraints of the cost effective path alignment. In addition to constructing five flashing crosswalks, a bicycle and

pedestrian bridge over Kelly Creek would be most optimal to make the cost effective alignment work.

## COST-EFFECTIVE PROJECTS



LINK IMPACT	1	7	8	17	19	20	38
<b>Human Qualities Impact</b>							
Safety	6	6	4	4	1	1	6
Education	3	3	3	3	1	1	1
Recreational Access	0	0					
Recreational Experience	6	6	4	2	2	2	4
Urban Uses							
Connectivity	2	6	6				6
<b>Physical Qualities Impact</b>							
Water	1	2					1
Ecological Resilience	2	6		2	4	2	2
Construction Costs	1	4					1
Homeless	1	2	2	1	1	1	1
Noise	1	1					
Energy and Fuel Emissions			4				
Property	2	2	1	1	2	2	1
<b>Total Score:</b>	71	51	61	72	70	75	

### OPPORTUNITIES

- Connect study area schools
- Follows existing trails
- Co-located with multiple transit stops
- Connects existing parks and open space

### CONSTRAINTS

- Co-location with ROWs hinders experience
- Indirect connectivity
- Five intersection crossings

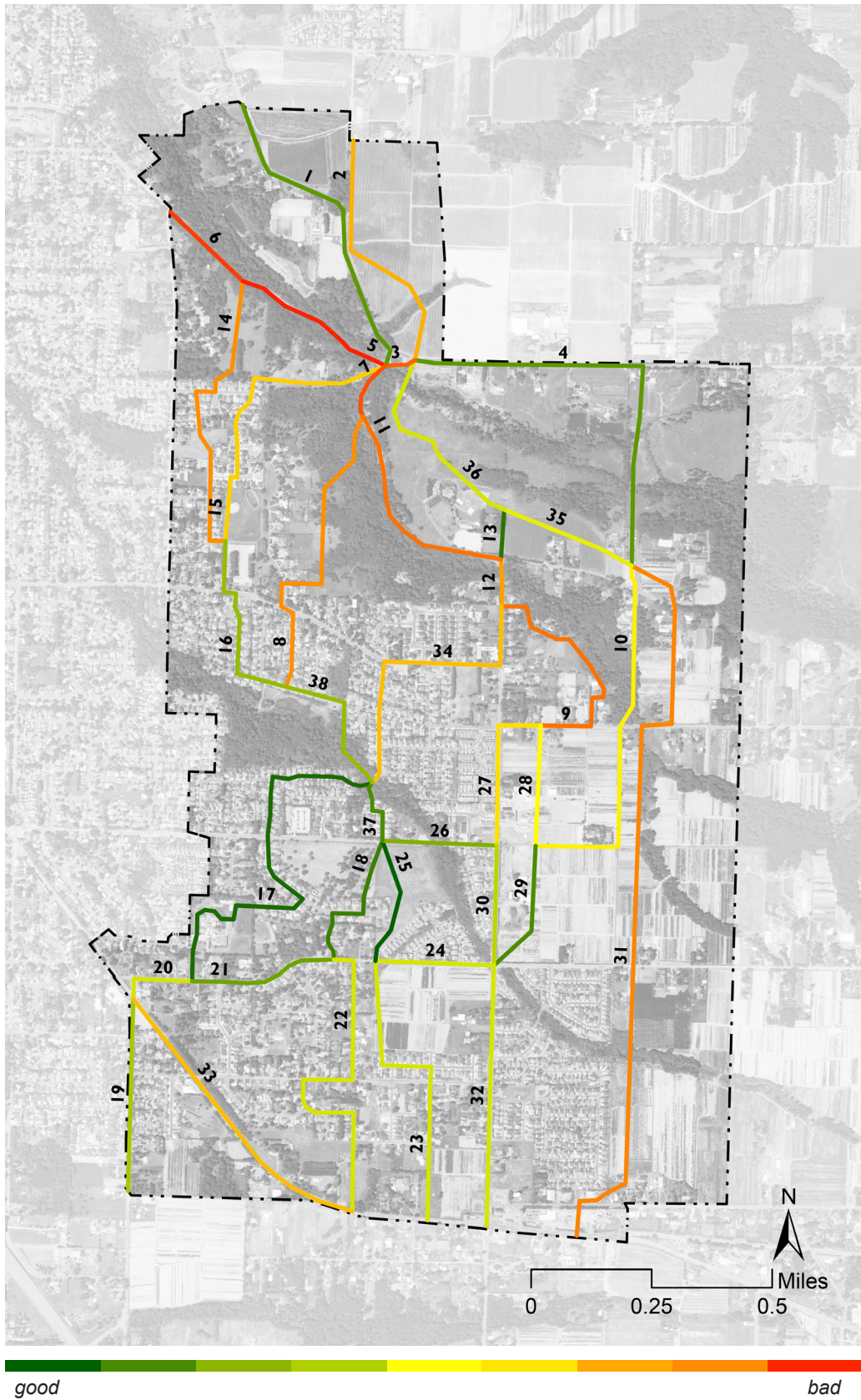
### NEEDED PROJECTS

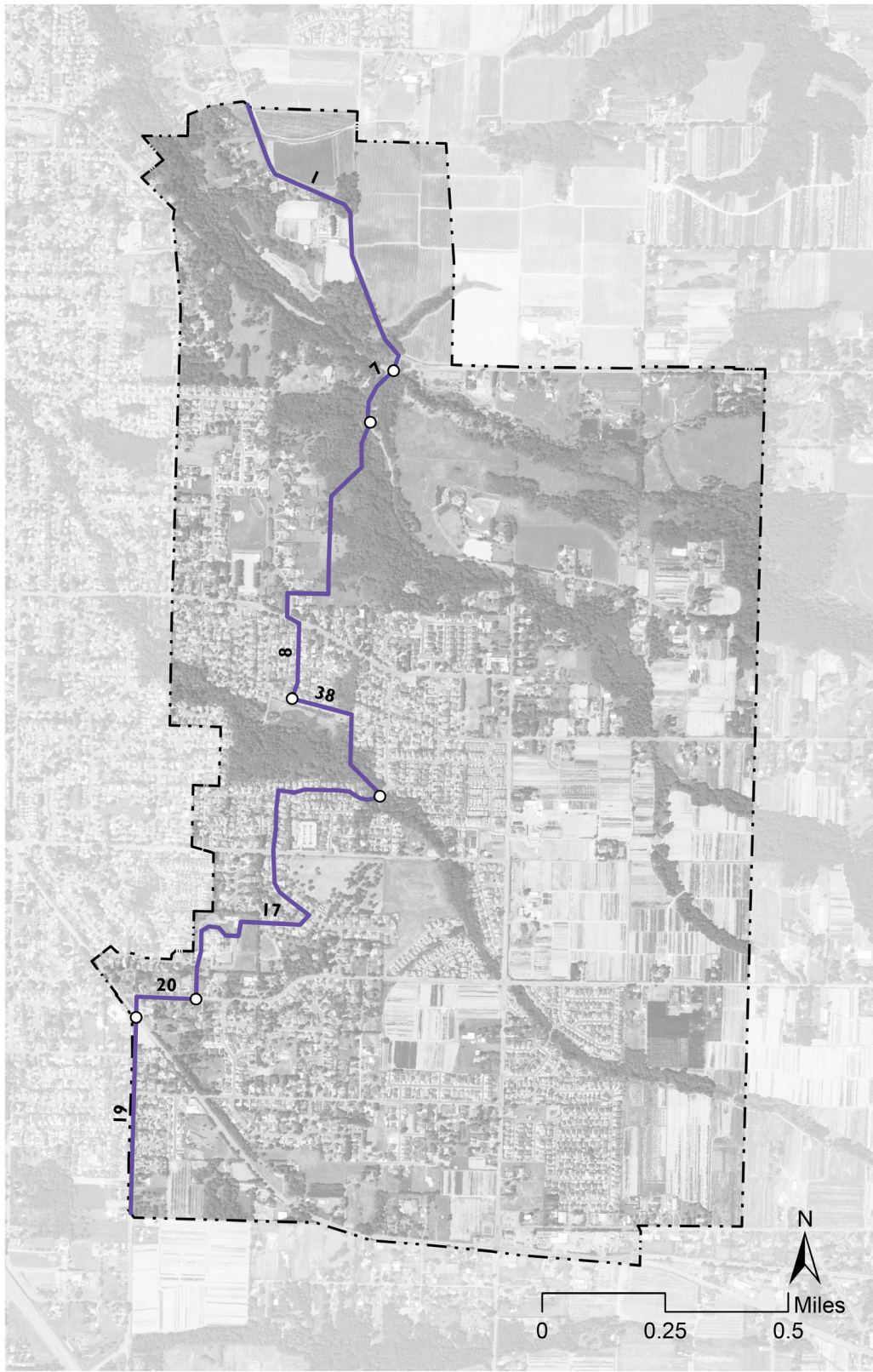
- 1 Construct flashing crosswalk across collector road at Troutdale/Division St.
- 2 Construct flashing crosswalk from collector road across SE Powell Valley Rd.
- 3 Construct bike/ped bridge over Kelly Creek
- 4 Construct flashing crosswalk across Salquist Rd.
- 5 Construct flashing crosswalk across SE Chase Rd.
- 6 Construct flashing crosswalk across major intersection at SE Orient Dr.

Figure 3S: Cost-Effective Projects

## Conclusion

The final results of the analysis are the three proposed alternative trail alignments: low cost, quality, and cost-effective. The quality alignment is the recommended option if financially and politically viable. Following Metro and the City of Gresham's direction, detailed design studies for the quality alignment are offered in greater detail in Chapter 5. This work proposes refined design alignments made at one hundred foot per inch scale design resolution. Photo-simulated views and section elevation drawings are also offered in Chapter 5 at selected proposed project interventions along the quality alignment through the Kelly Creek Study Area.





**Figure 3T:** Colored hierarchy of weighted impact assessment criteria, cost-effective trail alignment



agriculture and low-density homes, with current zoning as primarily multiple use agriculture. However, in the future, the zoning will change to Springwater Industrial Use (IND-SW) as described in the Springwater Community Plan.

## **Precedent Study**

The Columbia Slough Trail, located east of the Portland International Airport and South of the Columbia River Levy serves as a precedent for the Springwater study area. The Columbia Slough Trail is a natural and ecologically engaged trail link that is adjacent to industrial land uses. While visiting the Columbia Slough Trail, its layout, construction, site furnishings, trail experience, accessibility and context were all studied. Those field observations were used as a reference in planning the trail links for the Springwater study area.

Goals and objectives for the Springwater trail system were developed after reviewing the City of Gresham's existing plans for the future of the study area. Gresham's goals and policies can be found in the Springwater Community Plan on page 11. These general topics are to create community, economic development, sustainability, livability, transportation and natural resource conservation. Based on these general goals, and the other elements of Gresham's Comprehensive Plan, the goals and objectives for the Springwater study area are listed in Figure 4B.

### **GOALS & OBJECTIVES**

**1. Link West Springwater and Kelly Creek study areas.**

1a. Design an overpass or underpass across Highway 26.

**2. Create a trail system that is used and appreciated by surrounding neighborhoods.**

2a. Ensure that the new trail provides a variety of amenities such as park/ picnic areas, benches etc.

**3. Connect trail experience to local natural systems.**

3a. Locate alternative trails in open space and natural habitat areas.

**4. Develop a cost-conscious, implementable design.**

4a. Use existing infrastructure right of ways and easements where possible.

4b. Locate alternative trails in ESRA zones with lower land acquisition cost.

4c. Locate trail links on the edge of large tax lots to minimize reduction in development value.

**5. Optimize other trail qualities, such as noise, universal access, safety, education, land owner privacy etc.**

5a. Conduct thorough environmental impact assessment covering these other topics.

**Figure 4B:** *Goals and objectives for the Springwater trail system*

## Potential Trail Link Mapping

Six current METRO RLIS data layers were employed to identify potential trail links to assemble into alternative alignments across the study area (Figure 4C). These included (1) existing roads and highways, (2) existing structures, (3) existing riparian habitats, (4) Title 13 river protection areas, (5) existing zoning and (6) proposed zoning after urban growth boundary expansion. All possible trail links were mapped based on judgments derived from these maps, the team's goals and objectives, and Gresham's proposed new roads alignments (Springwater Transportation System Plan, 2005).

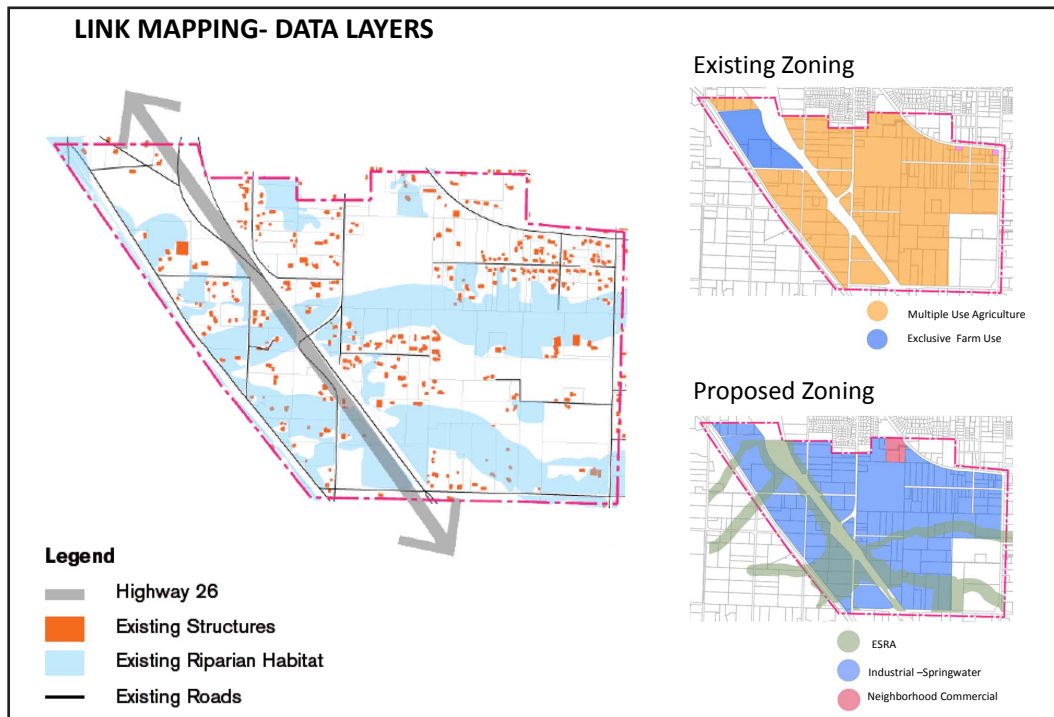


Figure 4C: METRO RLIS layers used to identify potential trail links

As shown in Figure 4D, data layers were overlaid and all possible trial links were defined and numbered. Possible links were those along existing rights-of-way, existing tax lot boundaries, existing trails, through lands zoned for public use, along unused buy platted rights-of-way, and which trended in the right direction within about 45 degrees.

After assessing each possible link's qualities, and reviewing the project goals and objectives, some links were removed. Many were removed because nearby links that met the same travel purpose along existing rights-of-way existed as better options than acquiring rights of way along tax lot boundaries. Others were also removed because they do not support the initial goal of creating more direct

connections between the Springwater Trail and the Kelly Creek study area to the north. The map at the bottom of Figure 4D shows all the best potential links.



All Possible Links

Figure 4D: Link Mapping Process

## Link Impact Assessment Methods

The class-wide impact assessment methods were used to rate each link across 13 categories. The assessed results for each link across all categories were rated as very good, good, poor, very poor or not applicable. In Figure 4E these results have a corresponding numeric value and color gradient with a five being the best and a zero being the worst. The four most relevant impact assessments for the Springwater study area are Universal Accessibility, Zoning and Real Estate, Construction Costs, and Habitat Value. This is because they are the most relevant to this area, not having many steep slopes and being in a future industrial area.

Figure 4F illustrates just one example of a method for link assessment, as defined by the entire class. This example is for the likely Universal Accessibility of a potential trail or path link built in a location as mapped in Figure 4G. The focus of this method is based on longitude slope along the trail as it affects the ability of differently able people to climb slopes, and the gradient breaks between categories are published in national universal access trail planning manuals (principally that of the U.S. Forest Service). Ranges of slopes were measured from the RLIS high-resolution topography data and used to measure the

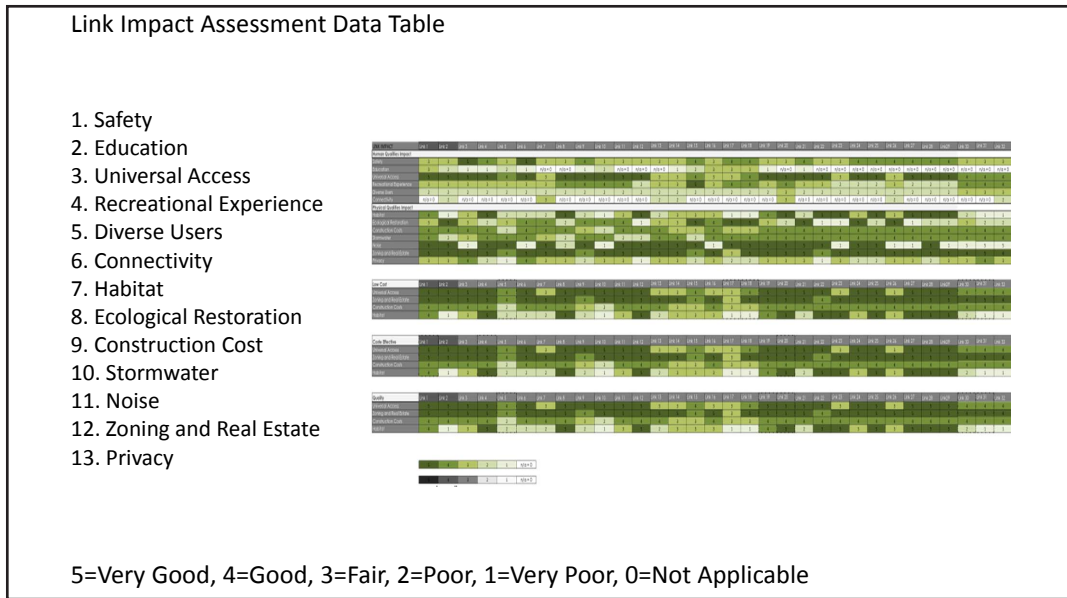



Figure 4E: Link Impact Assessment Methods

## Universal Access Compatibility

**Definition:**

This impact category assesses, to the greatest extent possible, a universal design that ensures the integration of all people, without the separate and segregated access for people with disabilities.



**5-Very Good:** All portions of the link does not exceed 1:20 (5 percent) is considered Universally Accessible to all people. *(Low Friction Trail)*

**4-Good:** A link that is between an estimate of 1:20 (5 percent) to 1:12 (8.33 percent) is still considered Universally Accessible to most people. *(Low Friction Trail)*

**3-Fair:** Any portion of the link that is between an estimate of 1:12 (8.33 percent) to 1:10 (10 percent) is typically only accessible to able bodied people and typically not accessible for people with disabilities. *(Low or High Friction Trail)*

**2-Poor:** Any portion of the link that is between 1:10 (10 percent) to 1:7 (14.29 percent) is typically only accessible to athletic able bodied people. *(Low or High Friction Trail)*

**1-Very Poor:** Any portion of the link that does exceed 1:7 (14.29 percent) is typically not safely accessible. *(Low or High Friction Trail)*

Figure 4F: Link Impact Assessment Example

impacts, and thereby define areas most appropriate for implementing trails just considering universal access. Figure 4G maps the potential trail links by three colors corresponding to the three universal access levels that applied in this relatively flat study area.

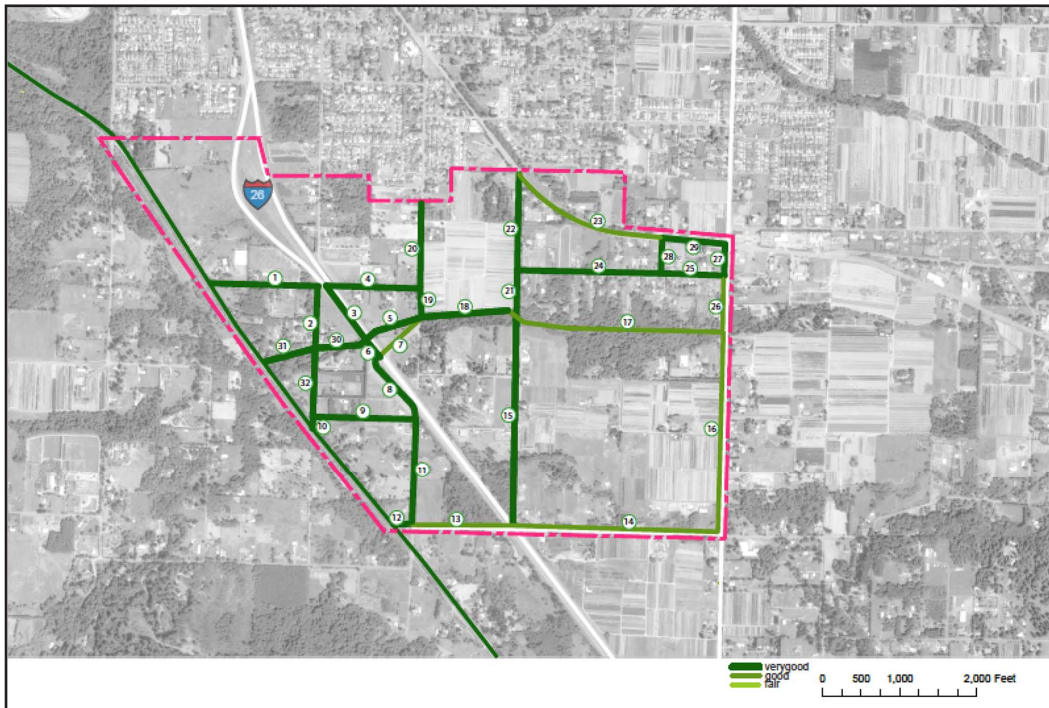


Figure 4G: Rated Universal Access Impact Links

## Comprehensive rating and assembly of trail links

After assessing the 13 categories of impacts for all potential trail links, all the potential links were rated according to different averaged scores depending upon the weight given to different impact categories. The ratings of links with all impact categories weighted equally results were mapped using a color gradient (Figure 4H). The darker the color is, the better the link is in terms of meeting the assessed criteria.

Weighting different assessment categories more or less discovered different final alternative links that added up to viable whole trail alignments. The assessment rating and the application of project goals and objectives informed these weightings and the final alternative links, as described below.

### Low Cost Trail Option

By using existing built roads, bridges and highways the driving impact categories in assembling this trail were not based on how good or bad the experiential or environmental impact of the trail would be. Instead, a strong weight was given to no- or low-cost right-of-way acquisition and trail construction. The trail would have to be built along side of existing highways, at existing highway crossings (highly problematic for crossing Highway 26) or hikers and bicyclers would simply use existing rural roads. When the new city is built these trails would either be incorporated into new expanded street and arterial designs to be built along the indicated routes (Figure 4I) or along new street locations and types that might emerge with the construction of the new city.

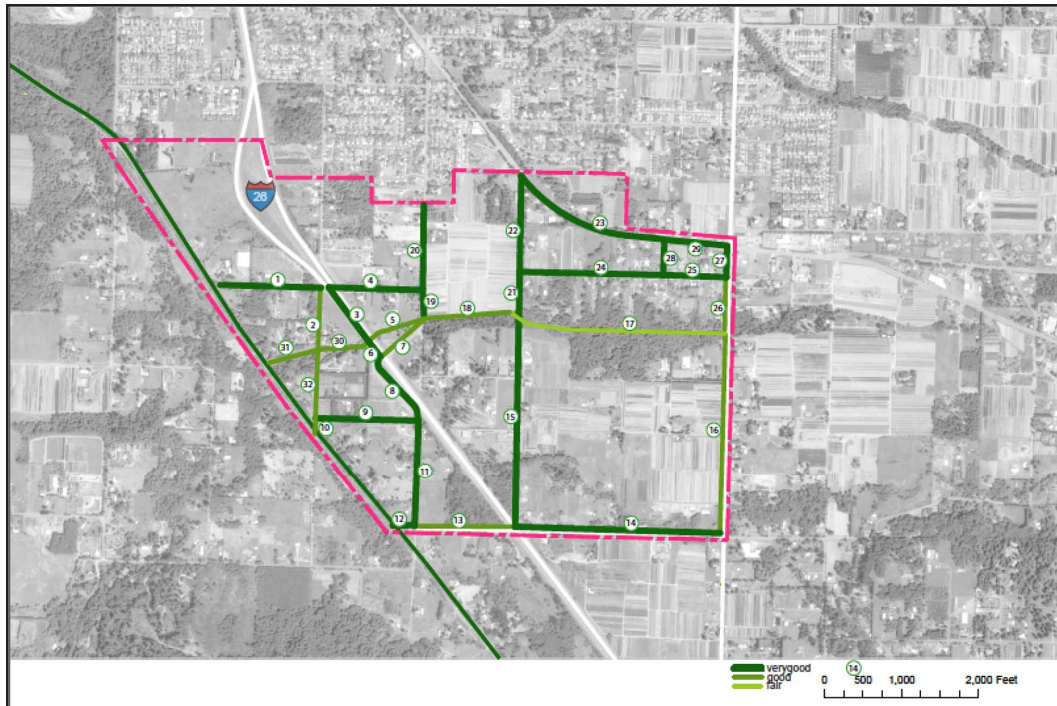


Figure 4H: Rated Links

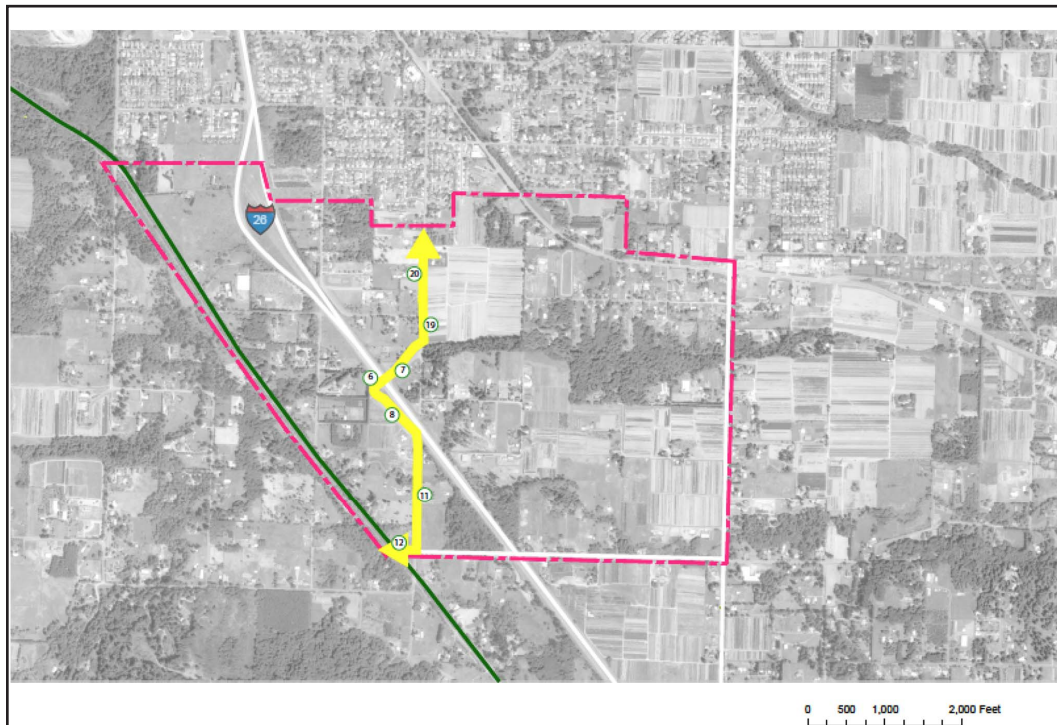


Figure 4I: Low Cost Trail Option

## Quality Trail Option

A “Quality Trail” is multi-modal, a minimum of eight feet wide, avoids bad initial impact assessments that cannot easily be fixed, and takes advantage of or enhances good initial impacts related to trail experience, diversity of users and environmental enhancement – with no regard for financial costs. This quality trail alignment is mapped in Figure 4J. Recreational experience is important

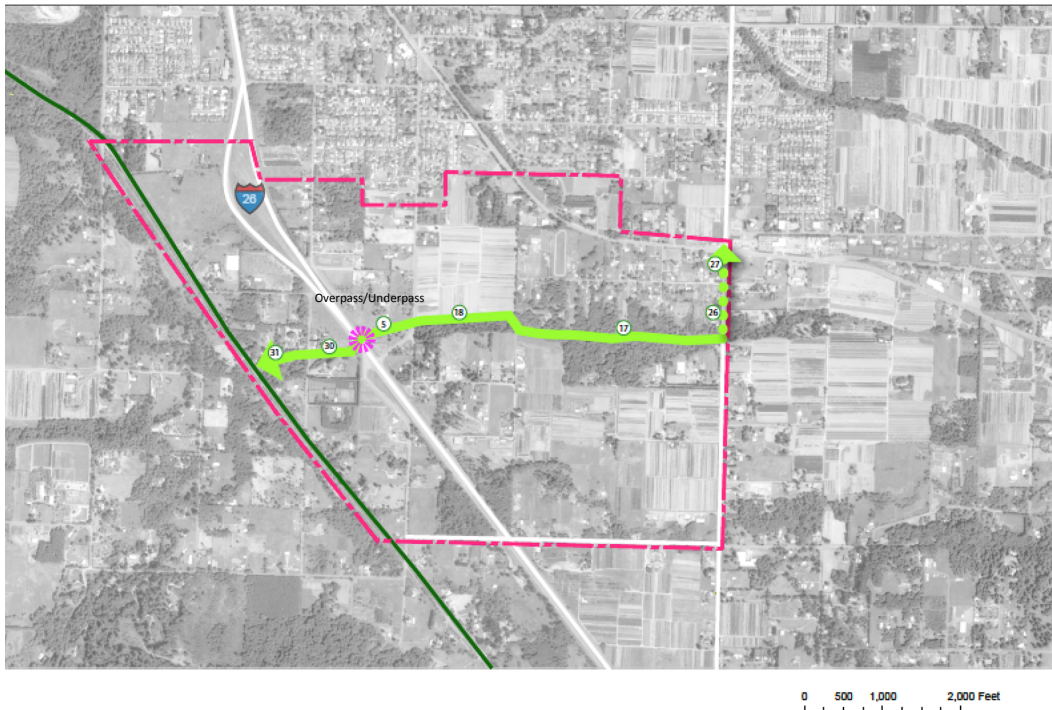


Figure 4J: Quality Trail Option

to this trail, along with enhancing riparian habitats as part of trail design and implementation.

The Quality Trail crosses the Springwater Study area from the existing Springwater Trail at Johnson Creek, along the north fork of Johnson Creek, to SE 282nd Avenue – that it turns northward. The trail could follow the creek within a wide Title 13 buffer zone where no industrial or other new development would occur. This would provide a wild and rule experiential context for trail users. Ecological restoration projects within this buffer could enhance riparian, wetland and fish habitat while providing more “wild” scenery for trail users. This alignment then connects northward along SE 282nd Avenue to the Kelly Creek’s study team’s Quality Trail alignment. A quality trail here would entail acquisition of a shoulder trail right-of-way and construction of a two-way bike path there while walkers would use sidewalks along the arterial street. An improved crosswalk would be needed where this trail crosses SE Orient Drive. This trail alignment would require an underpass or overpass at Highway 26 to avoid crossing traffic



to avoid hazardous and slow crossings of Highway 26. An overpass would provide a more scenic and safer highway crossing while allowing the creek to pass under Highway 26 without trail-user impacts there.

### Cost Effective Trail Option

The Cost Effective Trail is a hybrid between the Low Cost and the Quality Trail (Figure 4K). It seeks to optimize experiential and environmental quality but at reduced financial cost. This trail would use the same proposed overpass or underpass to save money as the Quality Trail, based on the same objectives. In order to make this trail more readily implementable at lower cost, the trail would not follow 282nd Ave northward. Instead, after the Highway 26 crossing and following the creek a bit further, this trail proceeds North along the existing 267th Avenue and unused easements for the same street to connect to the Kelly Creek study area.

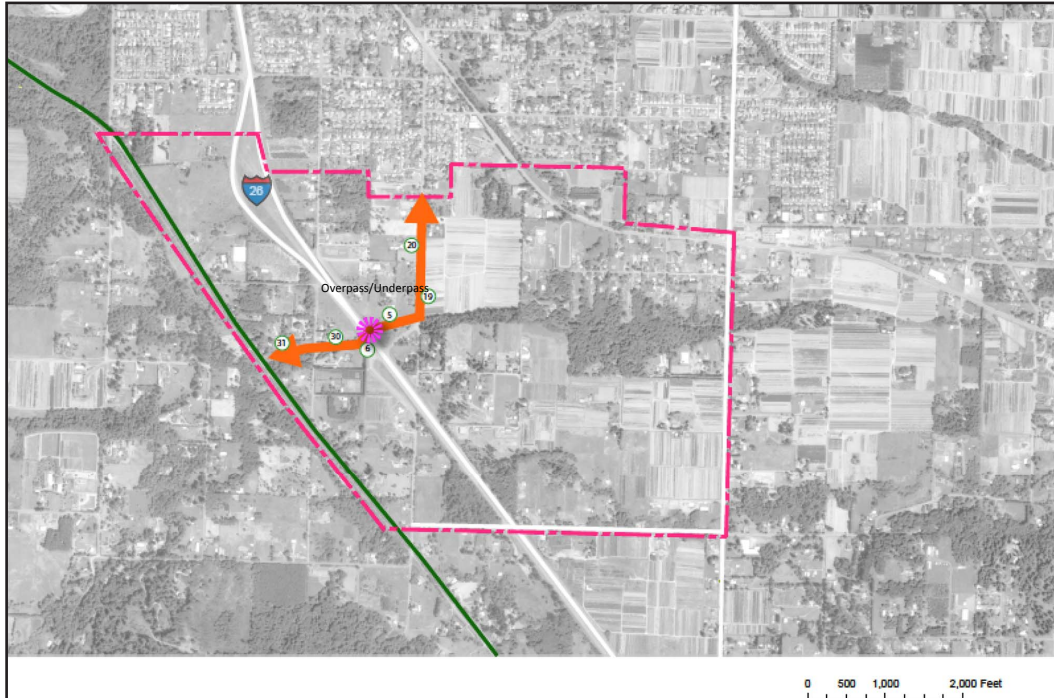


Figure 4K: Cost Effective Trail Option

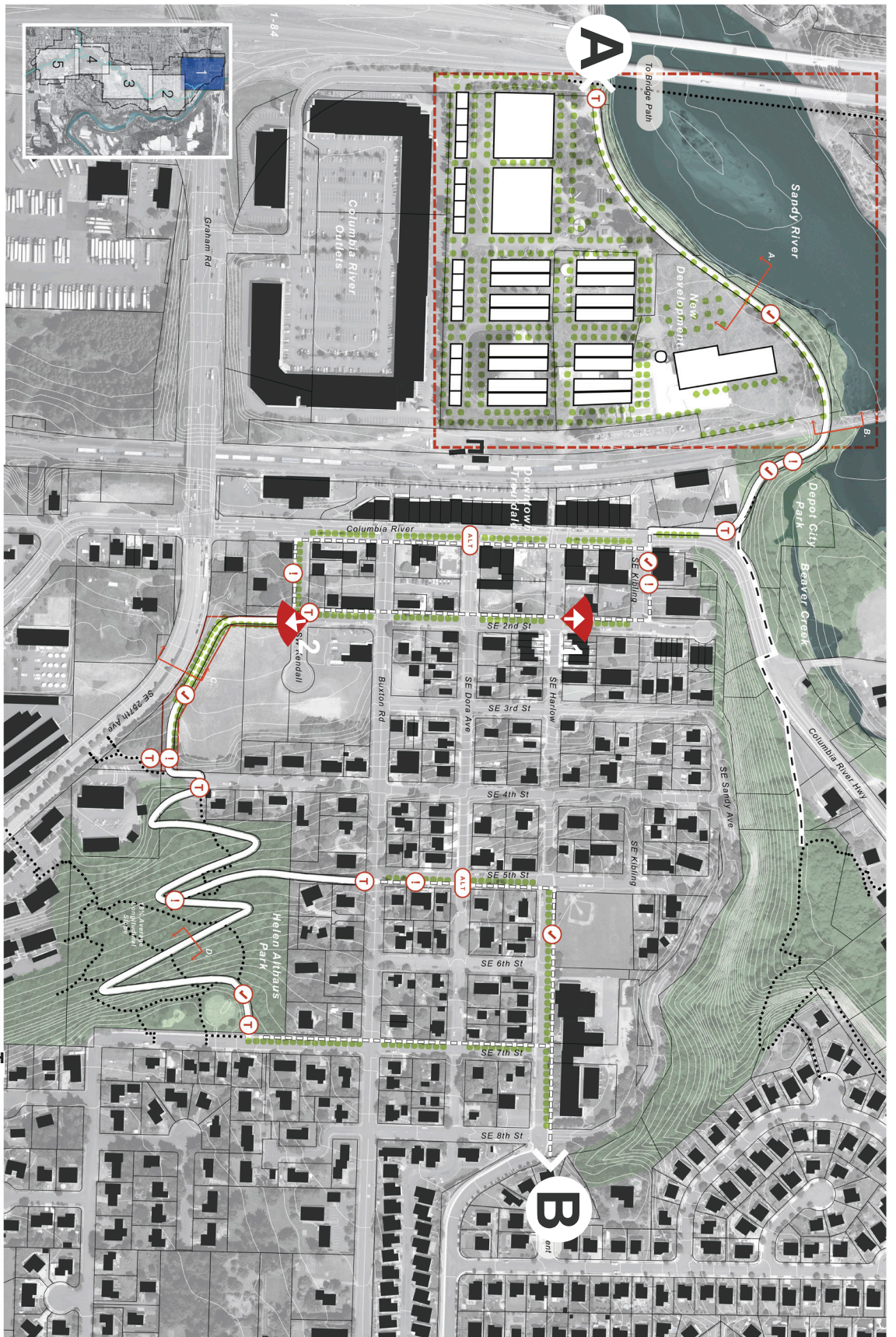
# Chapter 5: Sandy River to Springwater Trail Alignment Study

## Eastside Connection Trail Planning: Corridor Selection Planning Studies

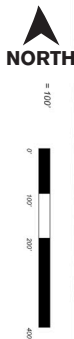
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- Proposed Path
  - Proposed Trail
  - Proposed Paved Trail
  - Existing Trail
  - Existing Building
  - Proposed Building
  - Existing Taxi Boundary
- 
- Section Cut
  - Perspective View
  - Focus Area
  - Tree
  - Alternate Route
  - Trailhead
  - Steep Longitudinal Slope: Special Project Required
  - Recreation/View Area





Existing, SE Second Ave



Proposed, SE Second Ave Path



Existing, SE Kendall Ave

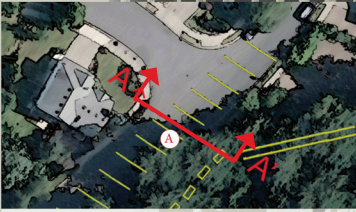


Proposed, SE Kendall Trailhead





**B**



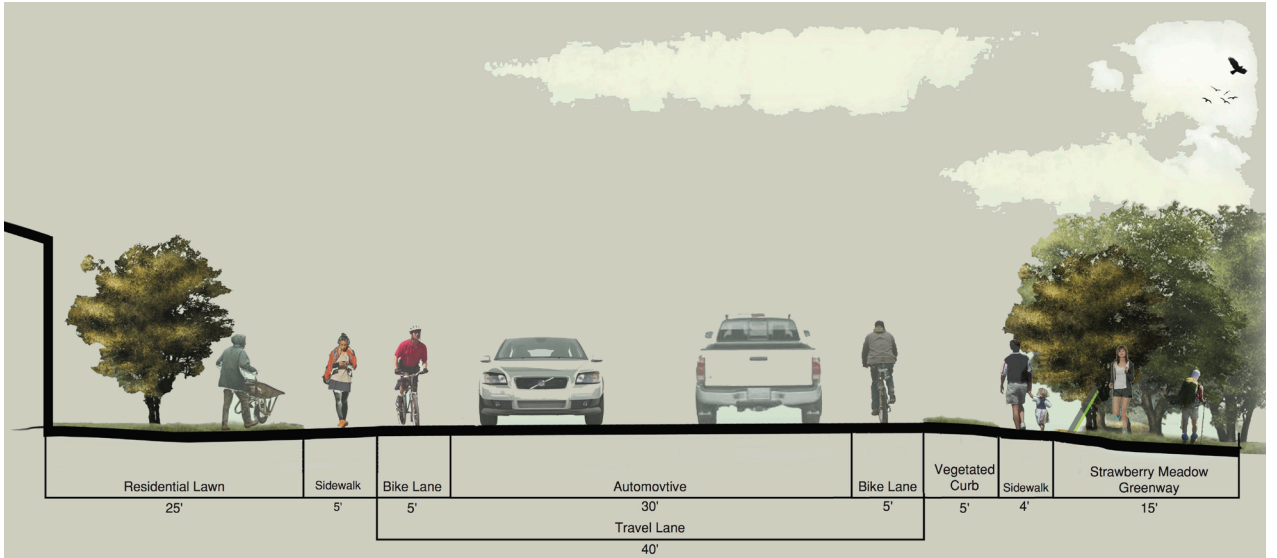
SE Beaver Creek Ln - A multi-modal route connecting with natural trails system while guiding users through the 40-mile loop of troutdale.



View of users a long Proposed bridge from Beaver Creek Ln.

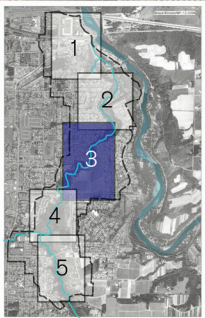
**C**





Section AA' - Proposed, SE Beaver Creek Lane





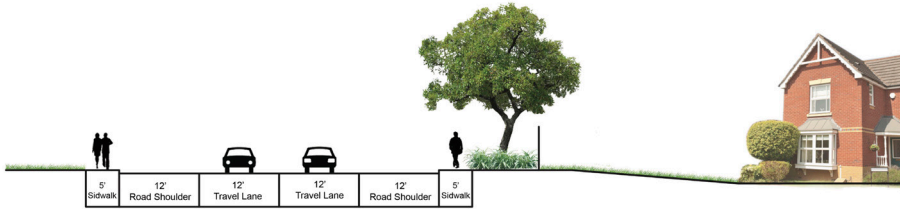
Steep topography through Beaver Creek made trail proposals through the creek difficult. The path was realigned through residential neighborhoods on SE Beaver Creek Ln and onto S Troutdale to accommodate various grade changes.

**LEGEND**

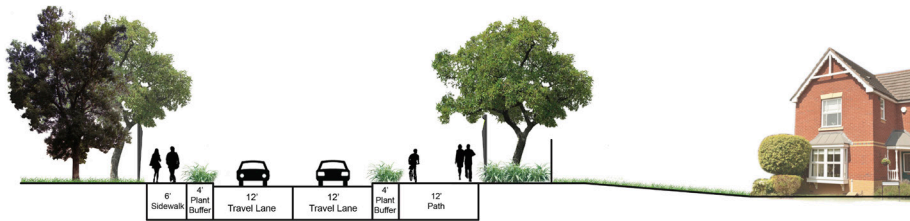
- Path
- Bike On Street
- Cross Sections
- Perspectives

**D**

**C**



Section AA' - Existing, South Troutdale Rd



Section AA' - Proposed, South Troutdale Rd

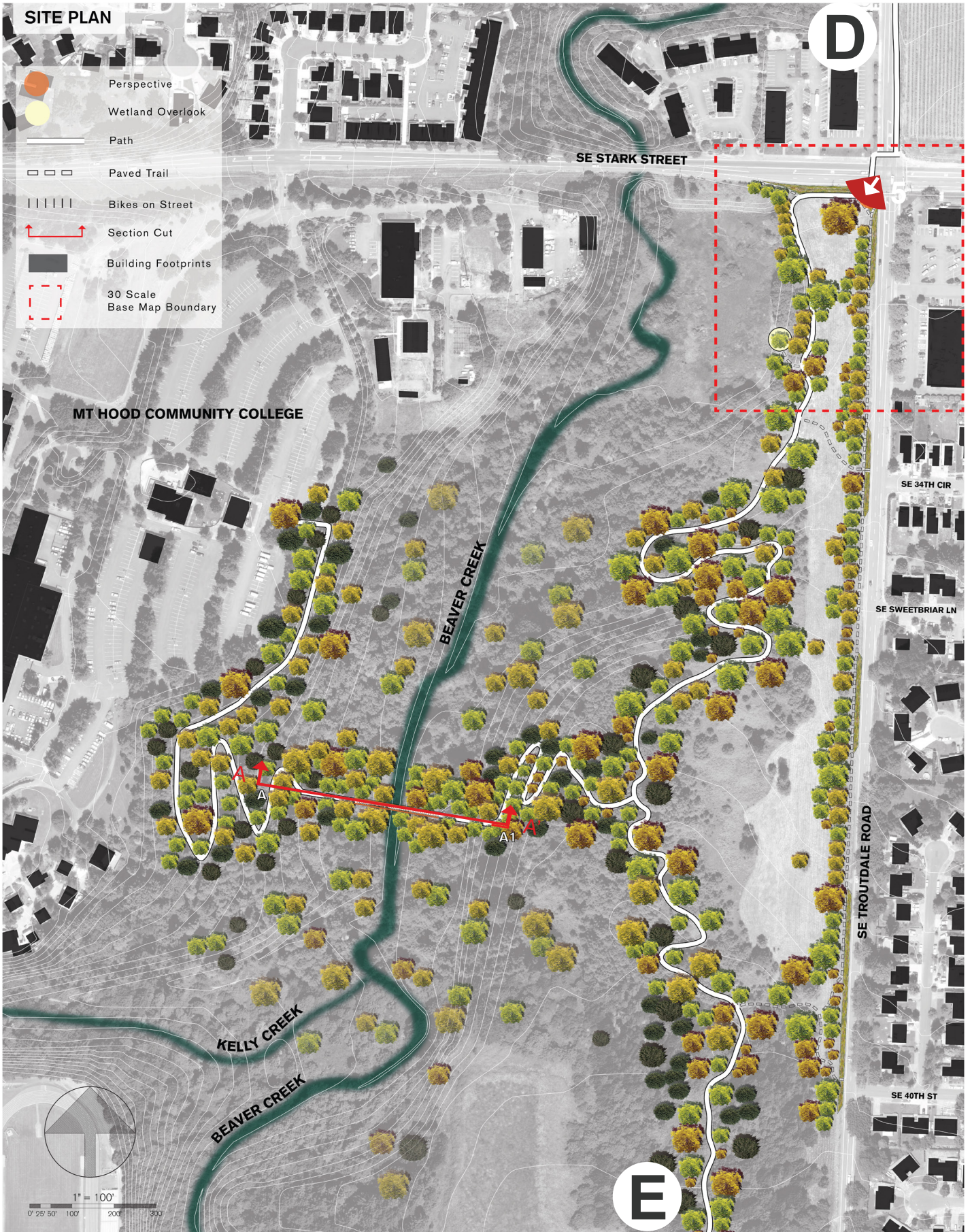


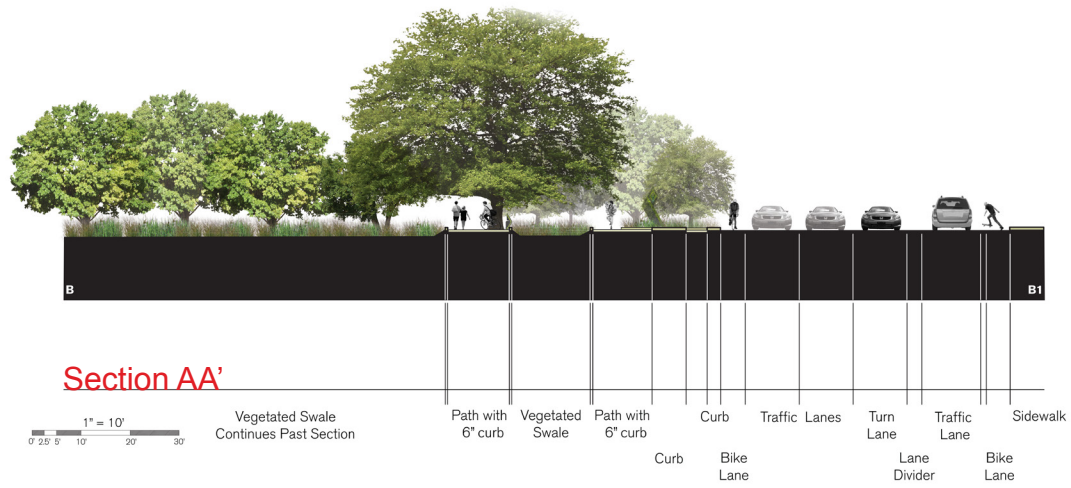
Existing, South Troutdale Rd



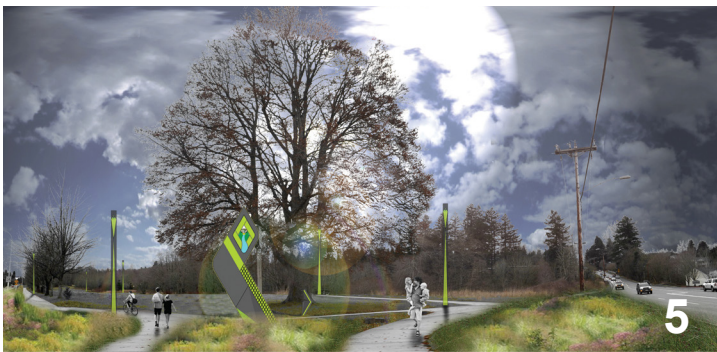
Proposed, South Troutdale Rd







Existing, Entry to the site



Proposed, Entry to the site





### Map Layers & Legend

Path connectors to adjacent segments

**Proposed Path Alignment**  
This alignment is derived from many iterations of site analysis using GIS data, planning documents, and site visits. It is intended to inform further study of site development and is designed to reflect the site planning goals and objectives.

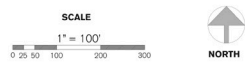
**Beaver Creek:** The proposed path alignment avoids Title 15 designated habitat and is designed to allow for a meaningful recreational connection to this waterway without compromising its ecological health or biological diversity. The 'light touch' with design elements is intentional to respect the sensitivity of the site.

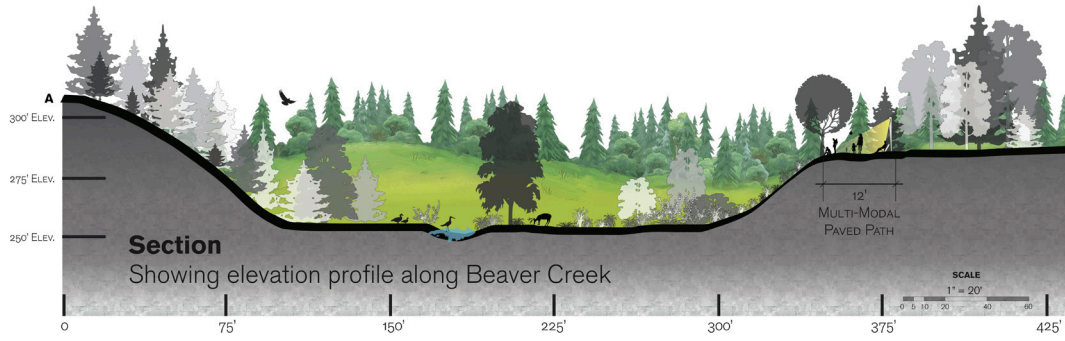
**Building Footprints:** These figure/ground building footprints show the existing structures on the site and indicate the density and character of the surrounding neighborhoods.

**Taxlots:** Taxlot data were used to prioritize the use of public lands and open space in this path alignment and to minimize potential acquisitions of expensive or problematic lands based on zoning.

**Topography:** 5' contours were used to ensure the path alignment does not exceed 2% longitudinal slope along any section of trail.

**Site Plan** Showing existing conditions and proposed paved path alignment through green parkway





**Section AA'** - Proposed, Beaver Creek Elevation Profile

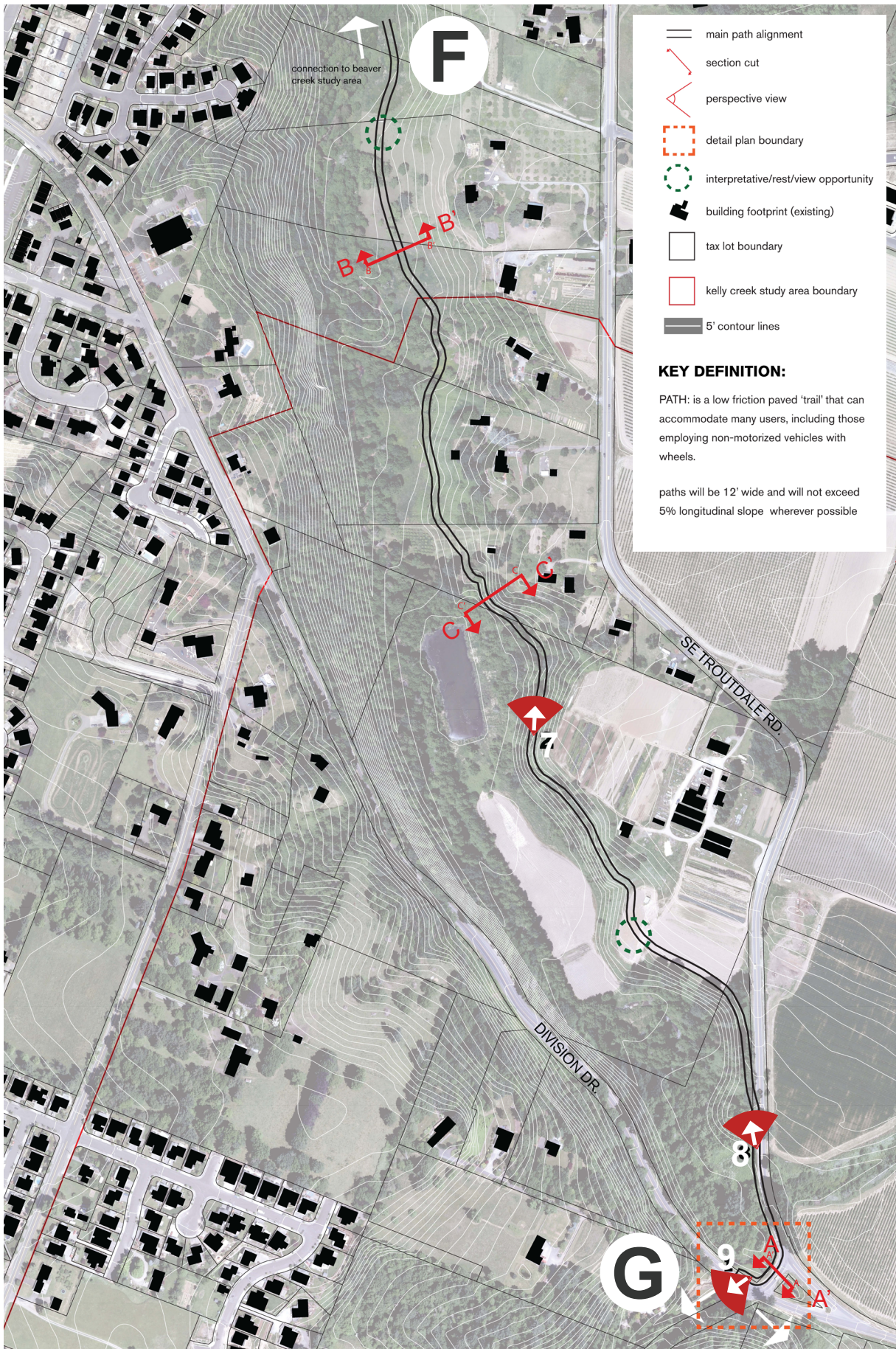


Existing, site Condition



Proposed, Trail Alignment





- main path alignment
- section cut
- perspective view
- detail plan boundary
- interpretative/rest/view opportunity
- building footprint (existing)
- tax lot boundary
- kelly creek study area boundary
- 5' contour lines

**KEY DEFINITION:**

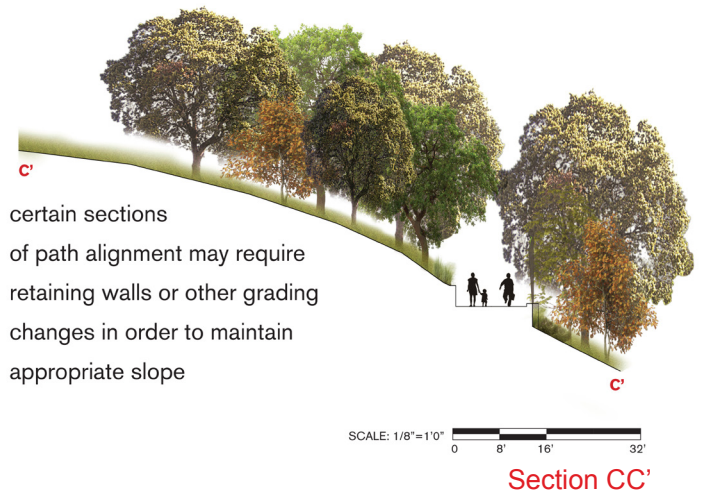
PATH: is a low friction paved 'trail' that can accommodate many users, including those employing non-motorized vehicles with wheels.

paths will be 12' wide and will not exceed 5% longitudinal slope wherever possible

SCALE: 1"= 100'

0 100' 200' 400'





Existing, Intersection Condition

Proposed Pedestrian Crossing



Existing, Site Condition

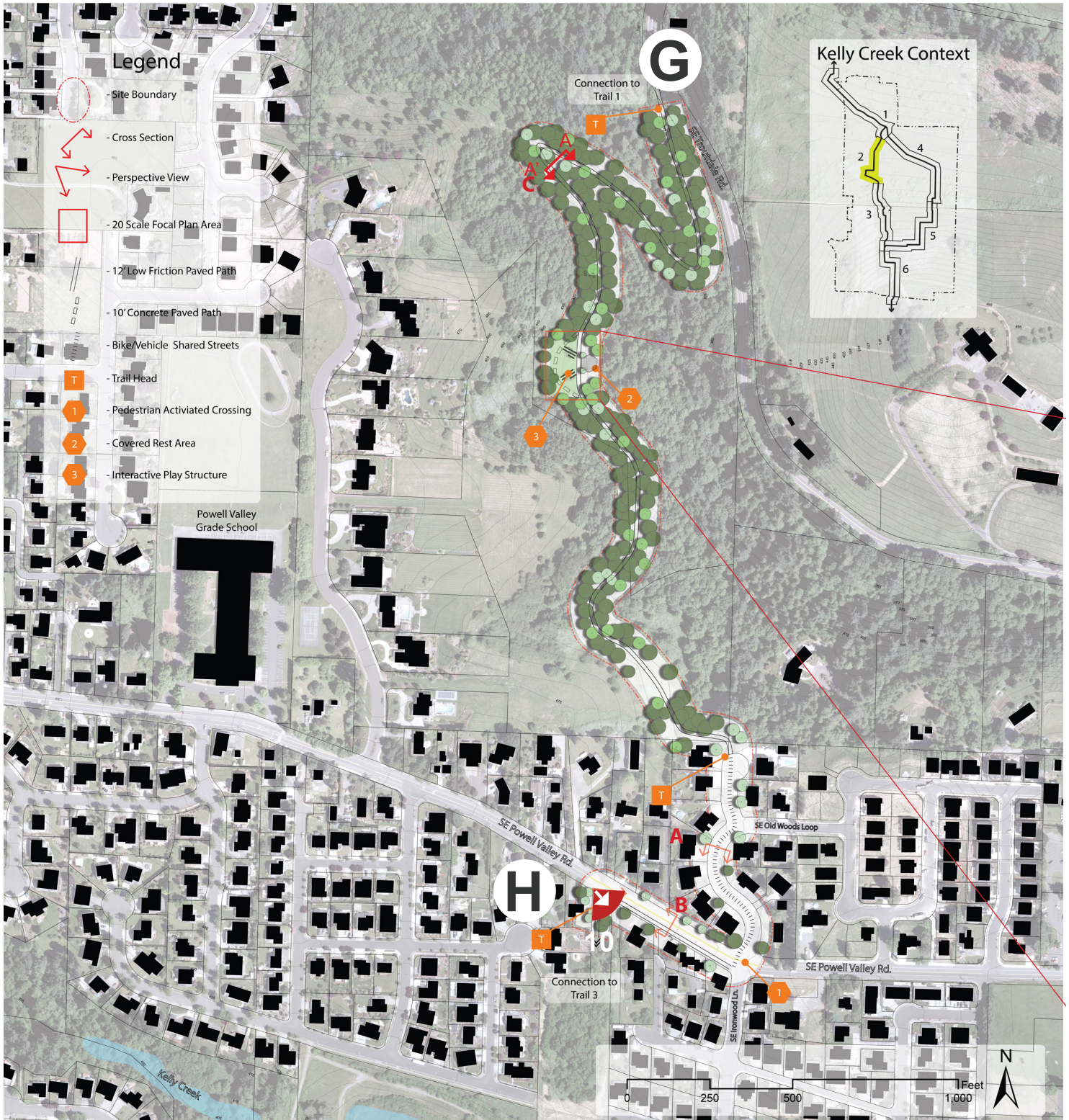
Proposed, Trail



Existing, Site Condition

Proposed, Trail





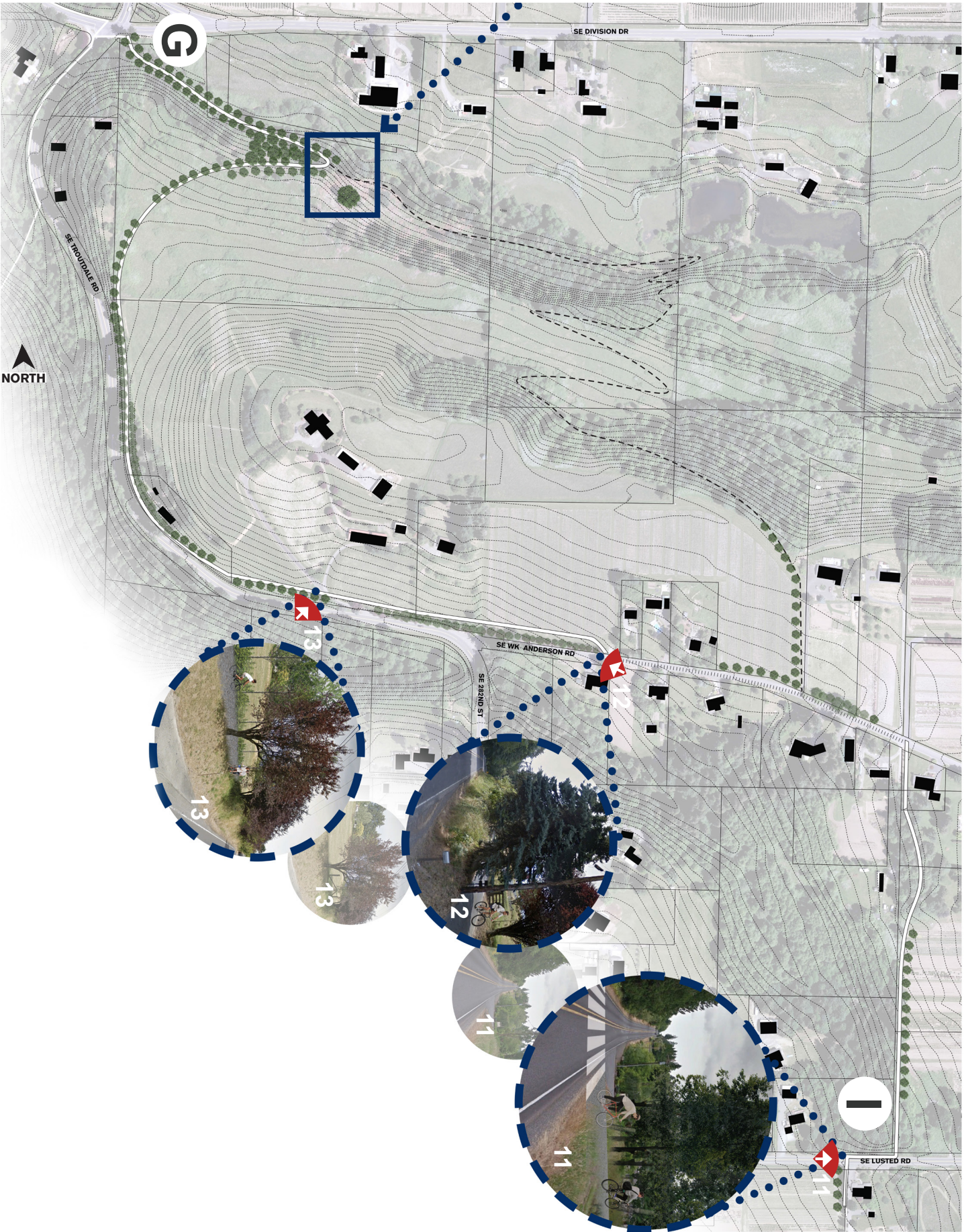


Existing, site Condition



Proposed, Trail Alignment



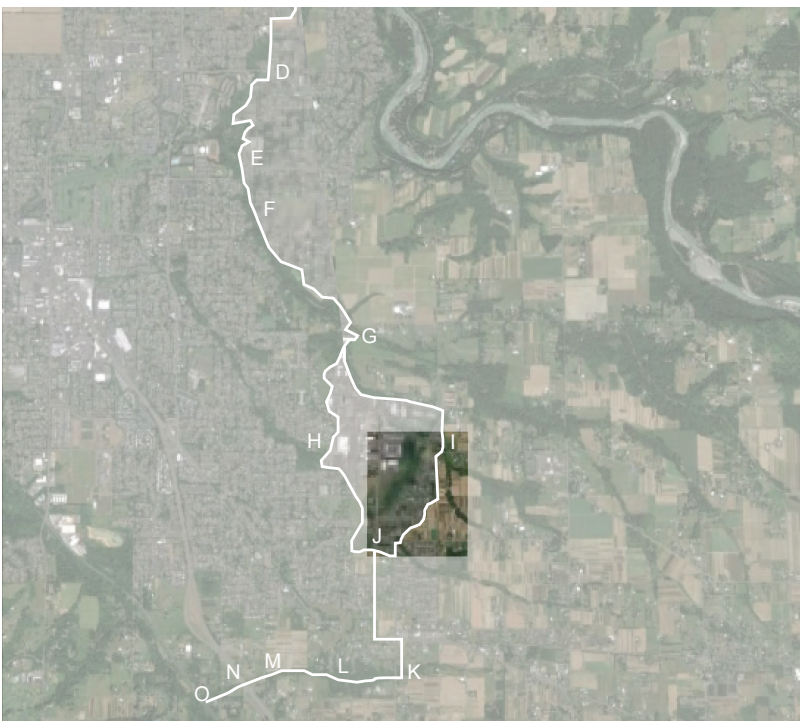


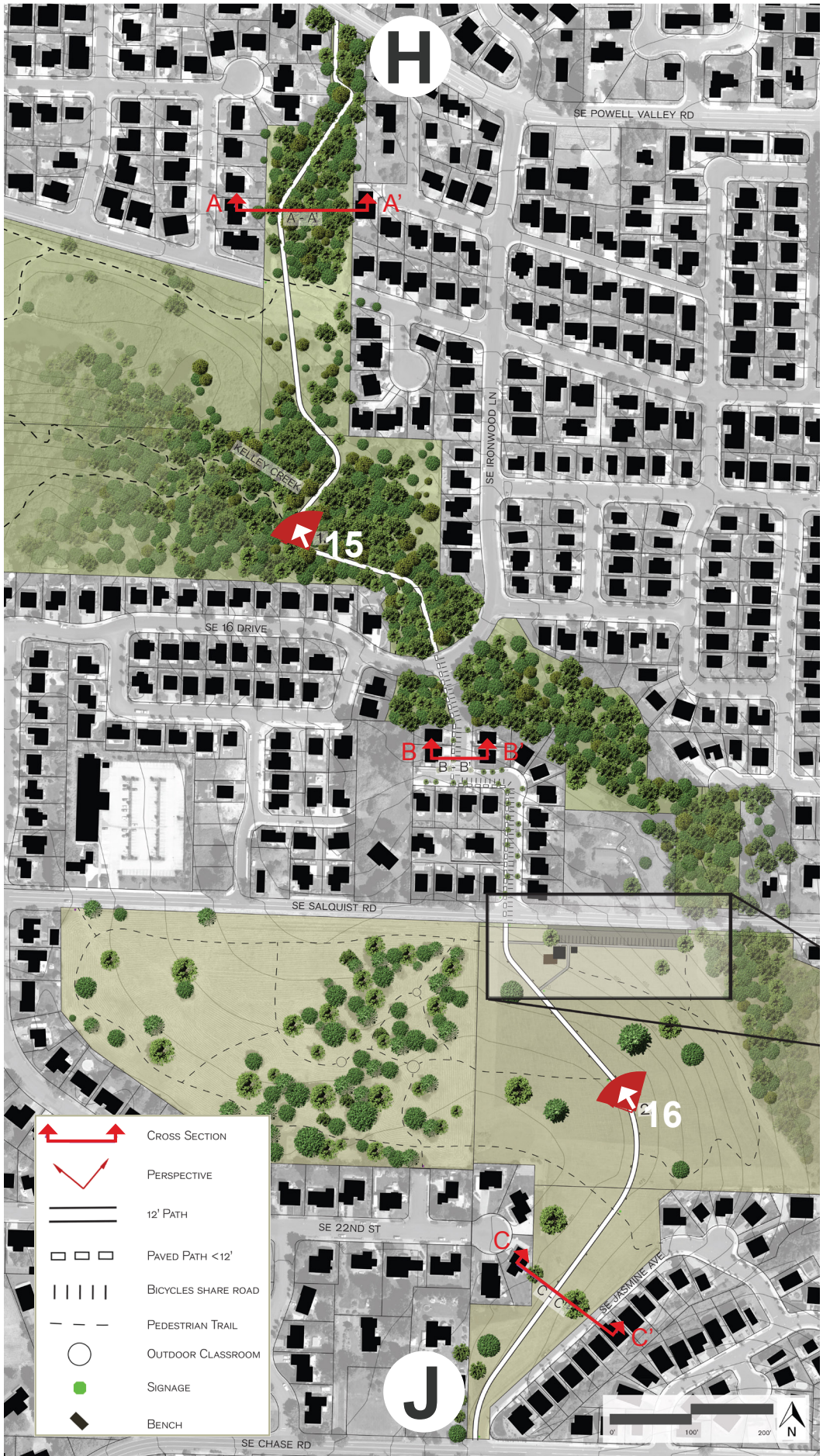






VAYPOINT THROUGH THE SEASONS...

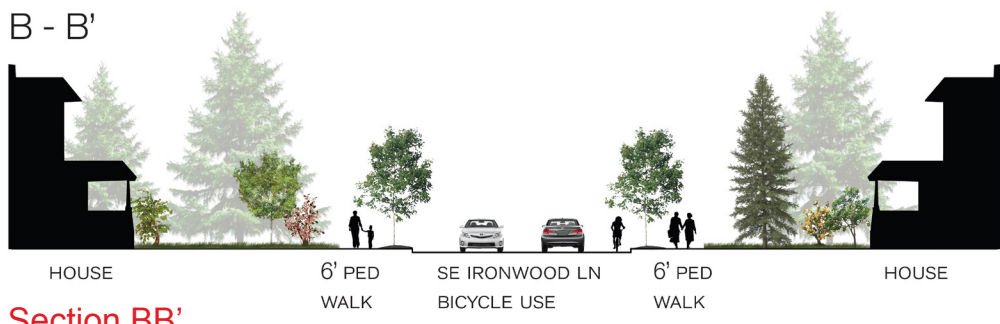




	CROSS SECTION
	PERSPECTIVE
	12' PATH
	PAVED PATH <12'
	BICYCLES SHARE ROAD
	PEDESTRIAN TRAIL
	OUTDOOR CLASSROOM
	SIGNAGE
	BENCH



Section AA'

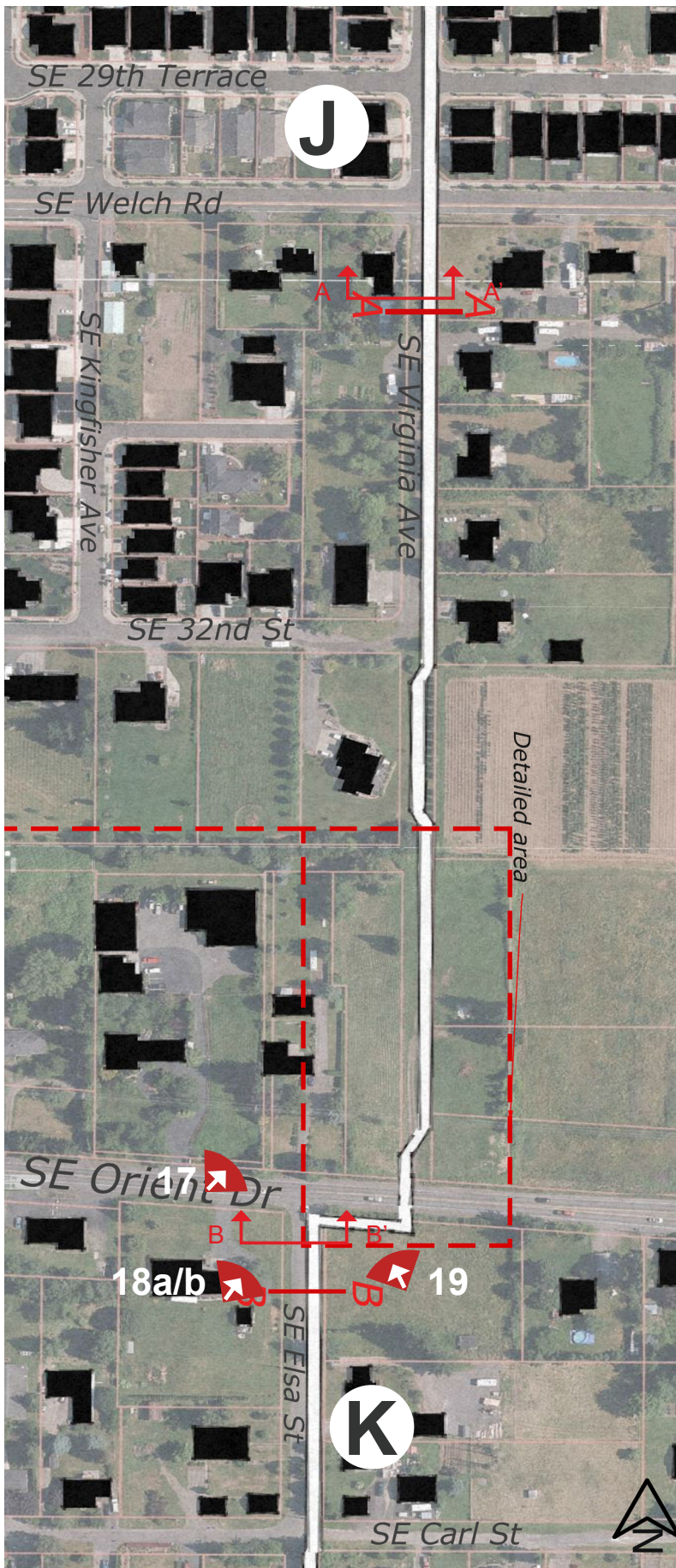


Section BB'



Section CC'

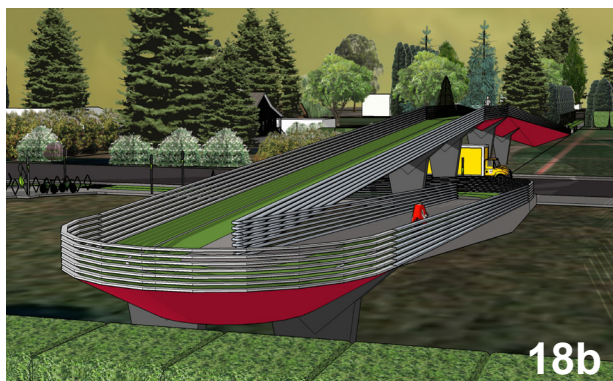




Proposed rail alignment without bridge



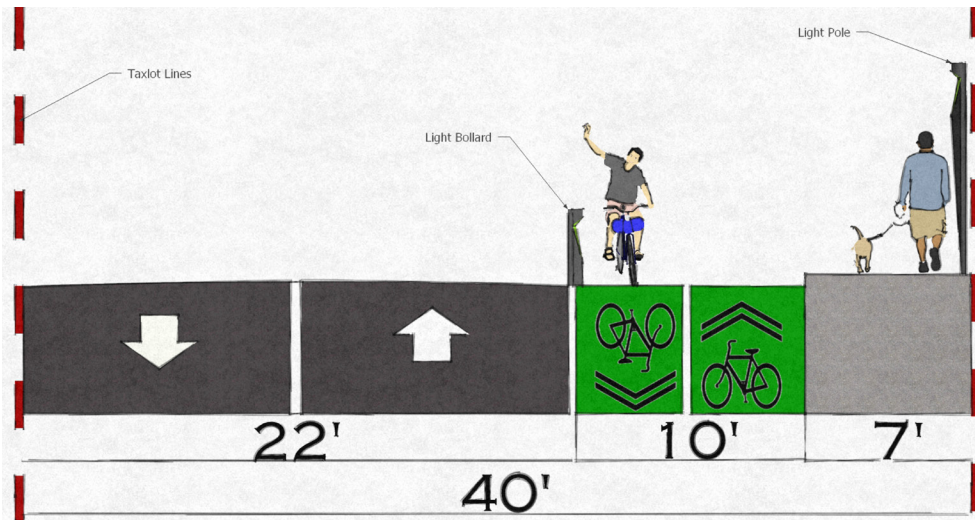
Proposed rail alignment without bridge, High view



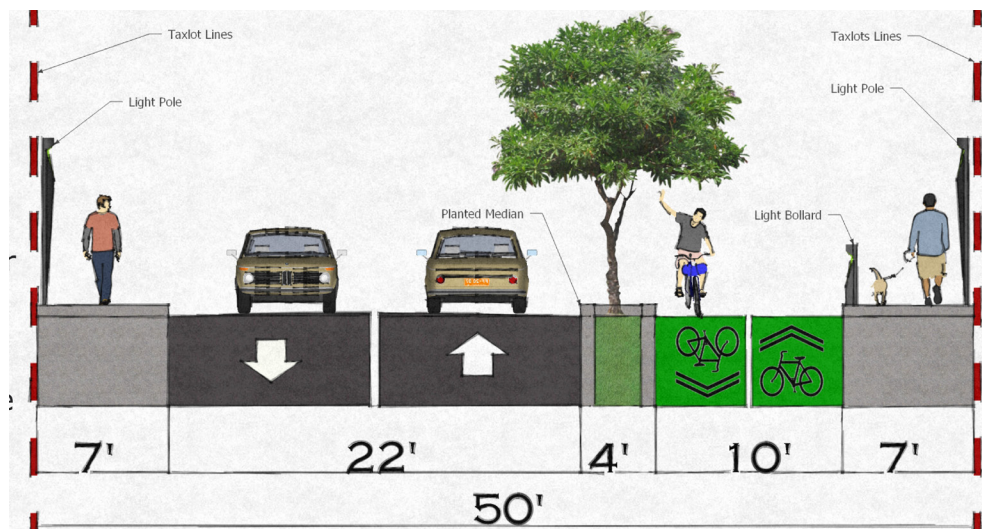
Proposed rail alignment with bridge, Low view



Proposed rail alignment with bridge

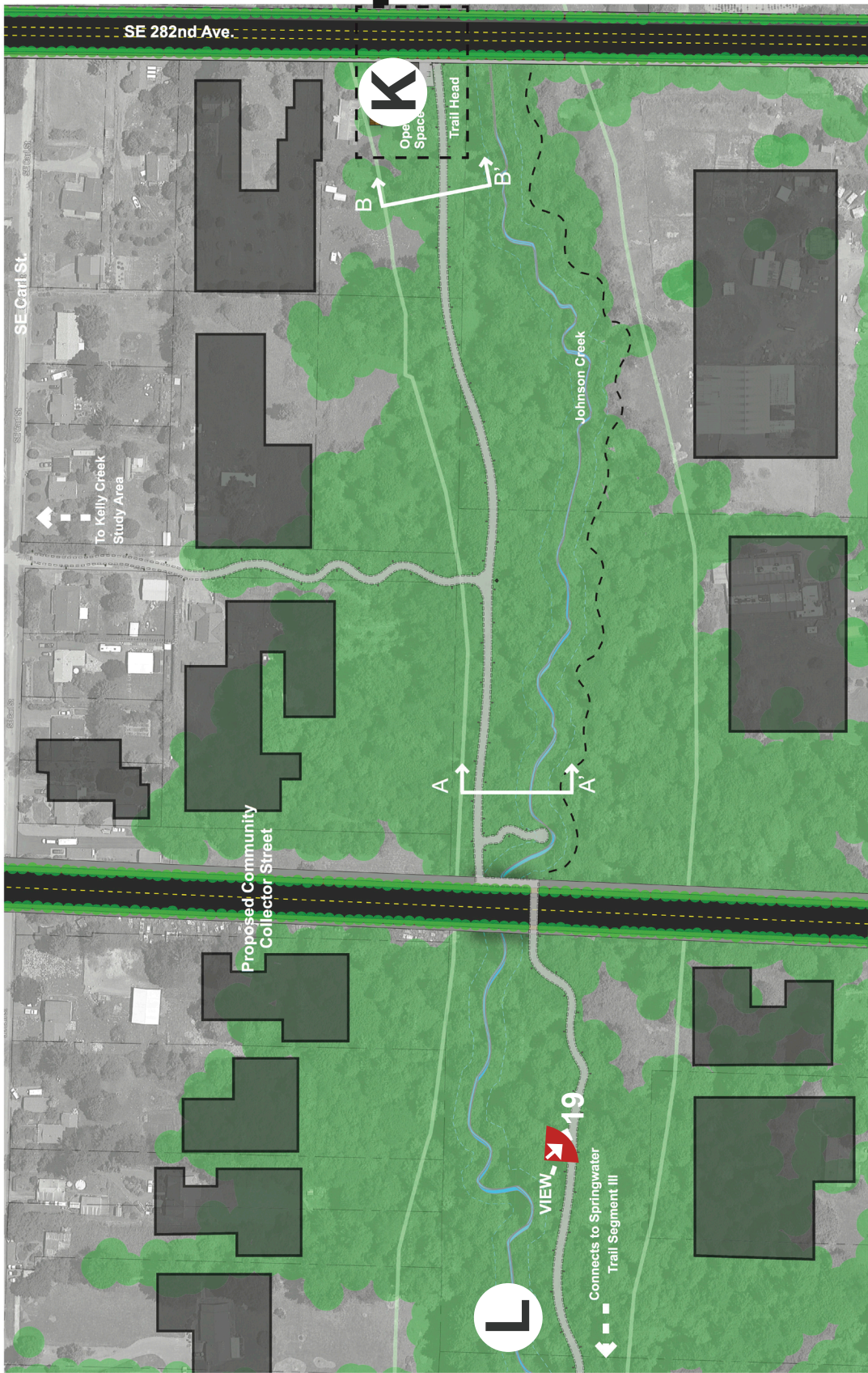


Section AA' - Proposed, SE Virginia Ave.

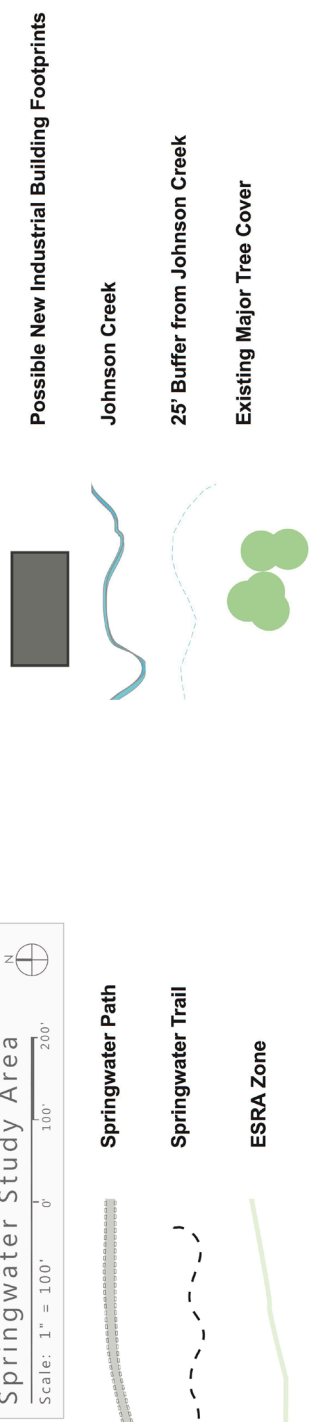


Section BB' - Proposed, SE Elsa St.





**Springwater Study Area**  
 Scale: 1" = 100' 0' 100' 200'





Existing, Site Condition



Proposed, Trail Alignment





# MASTER PLAN



Existing, Site Condition



Proposed, Trail Alignment

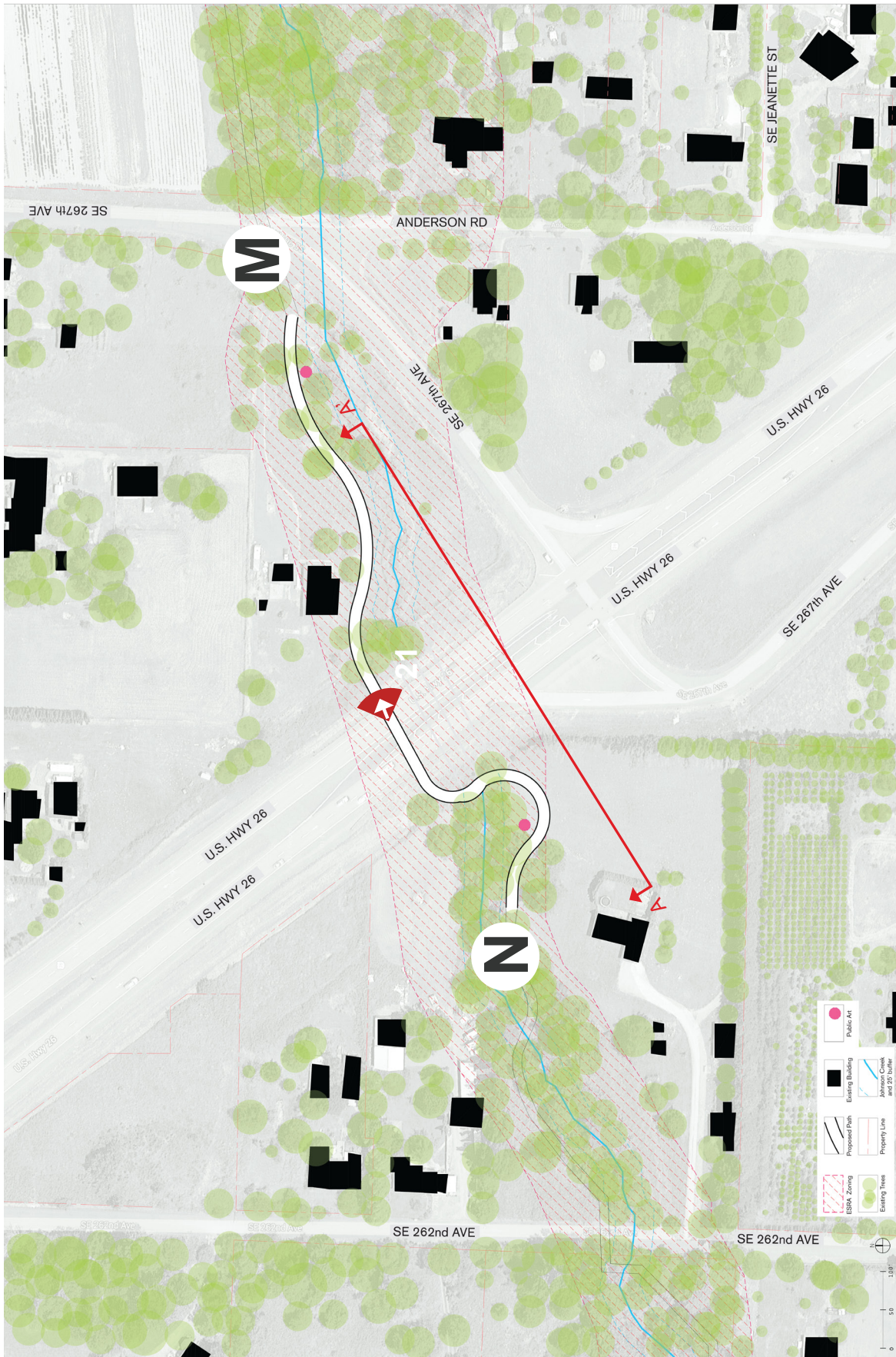


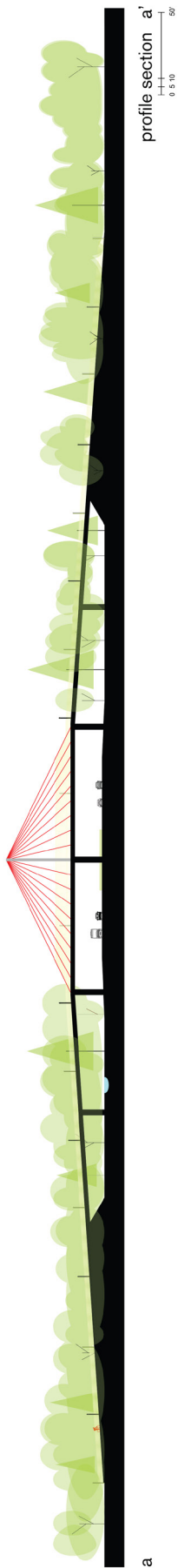
Section AA' - Proposed, Recreational Area Detail



Section BB' - Proposed, Wetland Restoration Area Detail





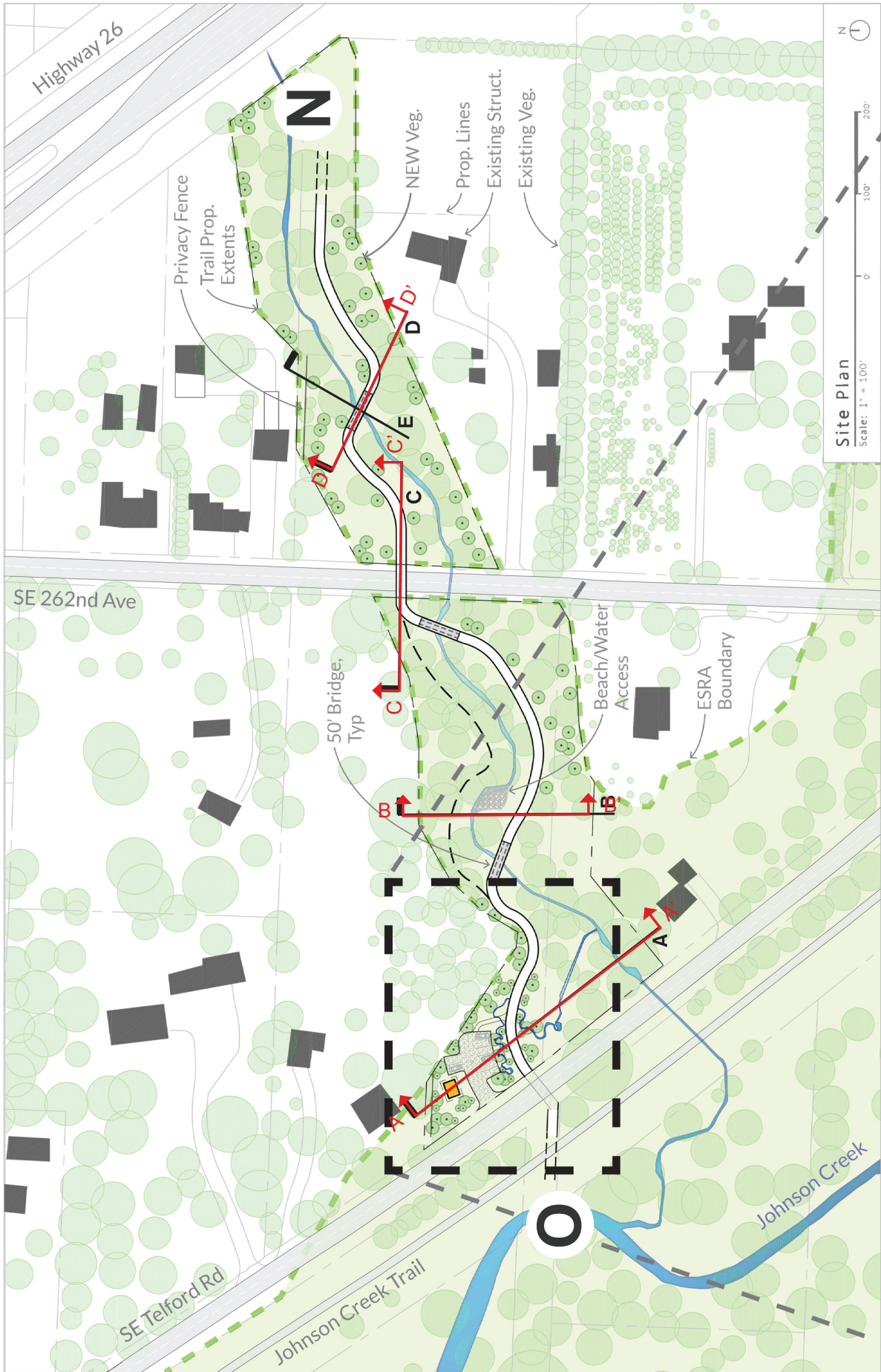


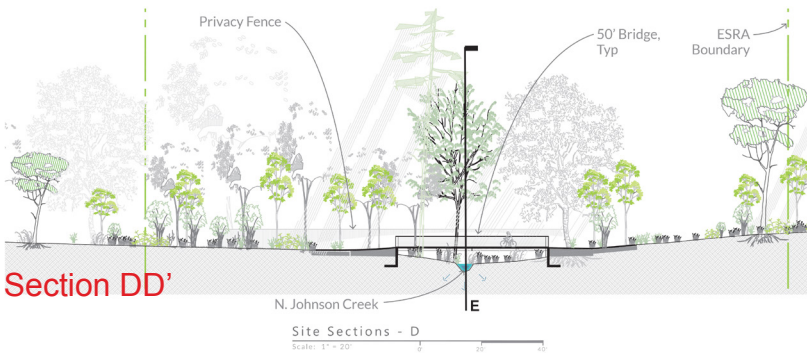
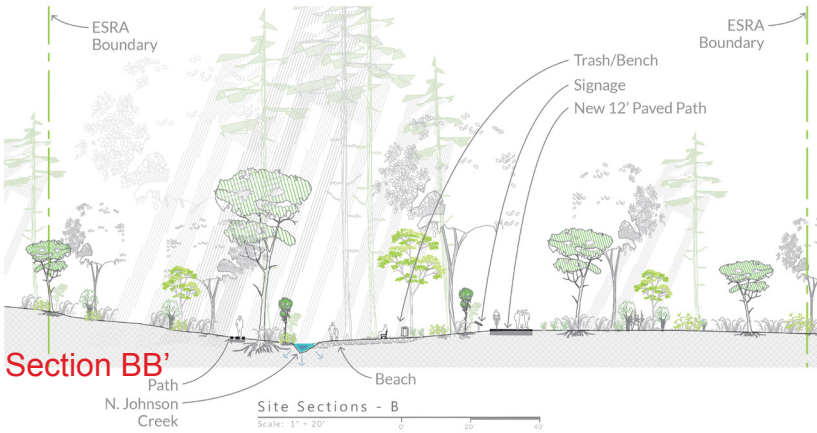
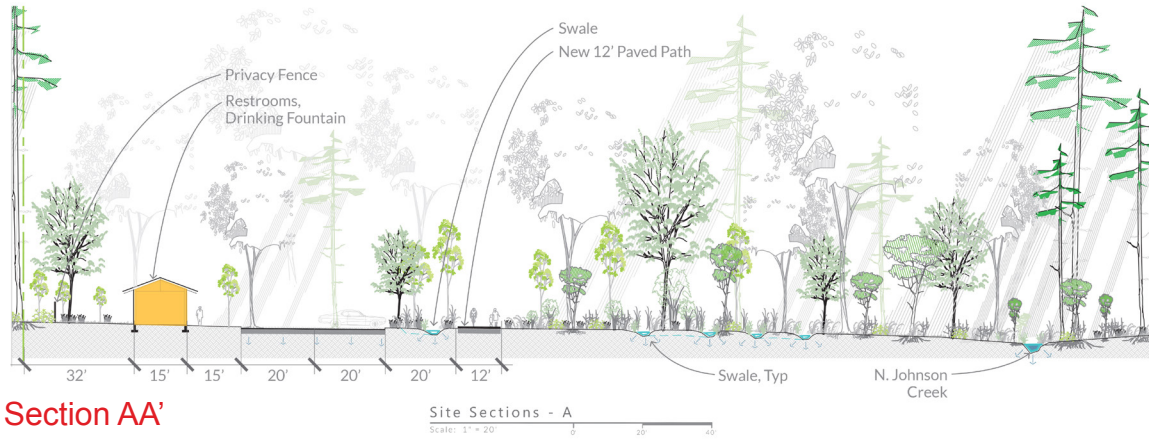
Section AA' - Proposed, Overpass Profile Across Highway 26



Proposed, Trail Alignment







# Chapter 6: Pleasant Valley to Springwater Trail Alignment Study

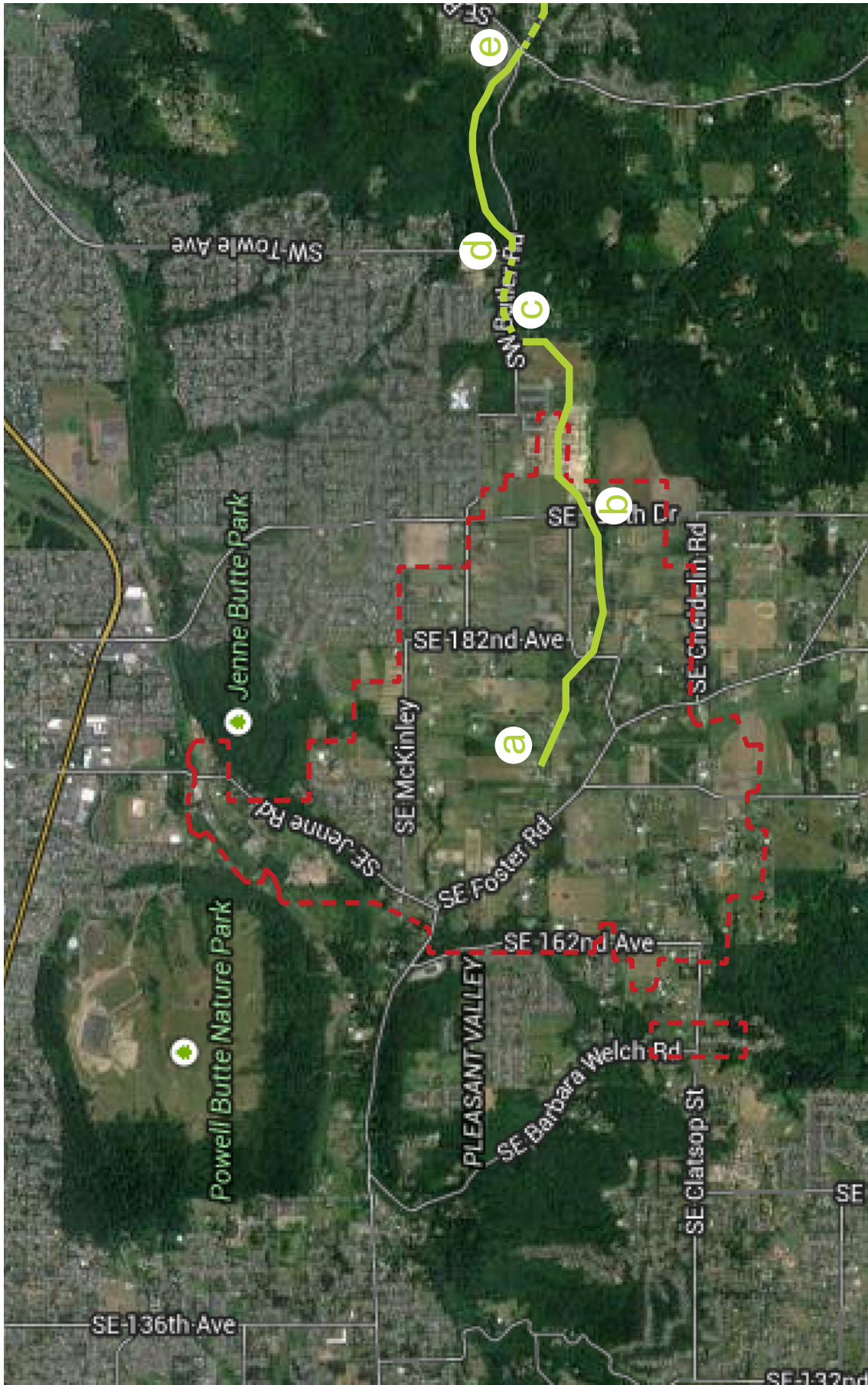
## Eastside Connection Trail Planning: Maps of Speculative Trail Alignment

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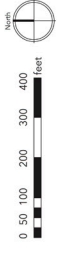
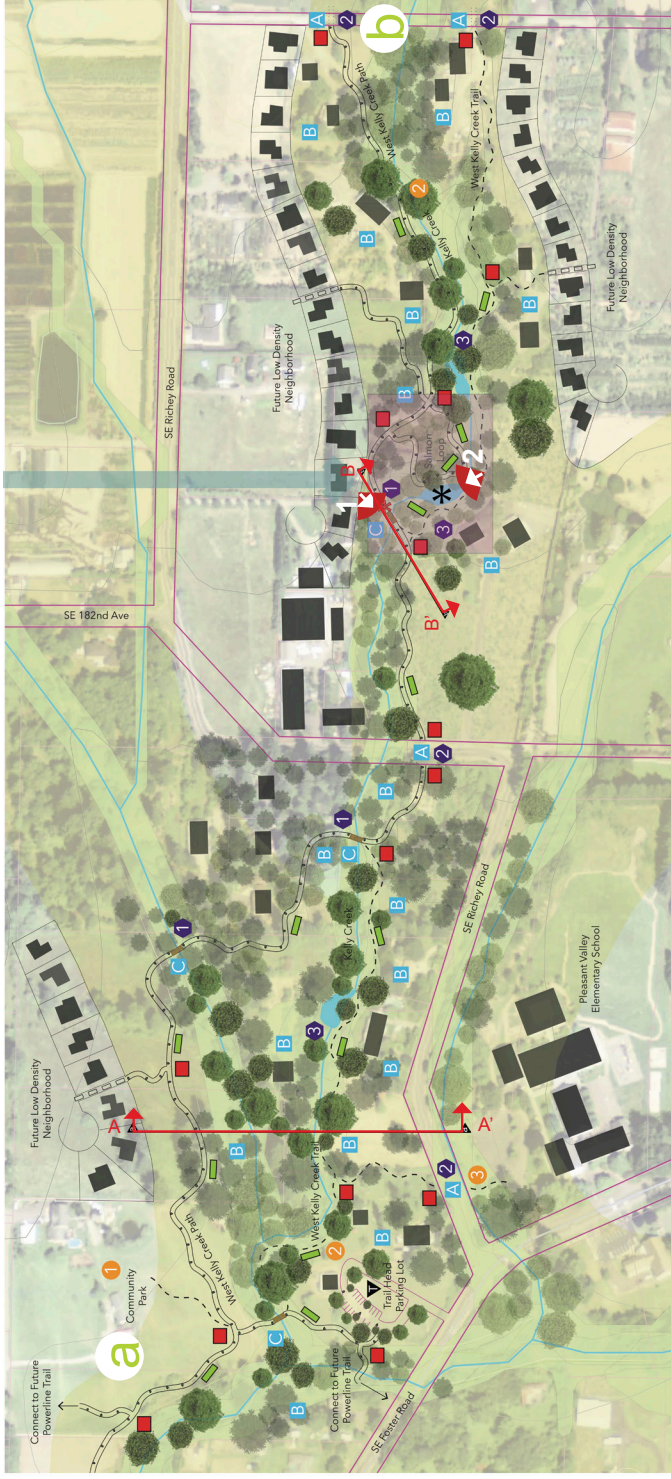
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### Introduction

This feasibility study summarizes the Kelly Creek to Springwater trail planning project. After analyzing the City of Gresham's Pleasant Valley Concept Plan, students proposed two trail alignments for the study area: Kelly Creek segment from point a to point b and Kelly Creek segment from point b to point c (see Figure 1). Students also proposed a trail alignment to bypass the unsafe portion of Butler Road goes through the ravine to Springwater. This segment goes from point d to point e as shown in Figure 1. These three desired trail alignments were proposed based on existing site condition analysis, future impact assessment studies, and possible trail alignment evaluations. The design work is included in the following pages. They depict proposed trail master plans, detailed trail designs, sections, and perspective renderings of before and after landscapes.

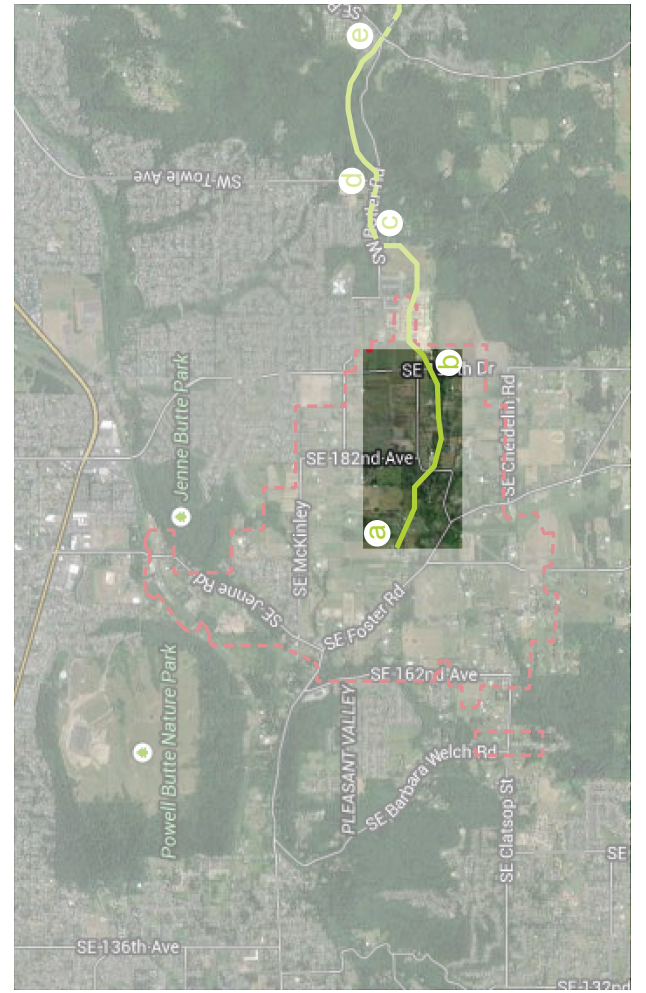


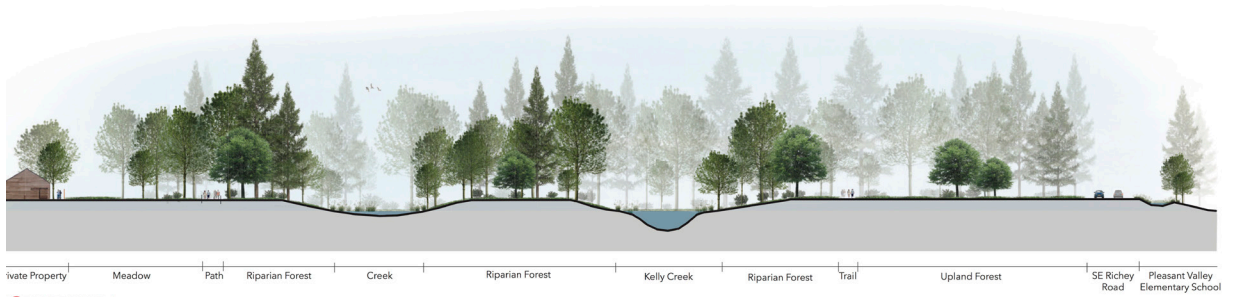




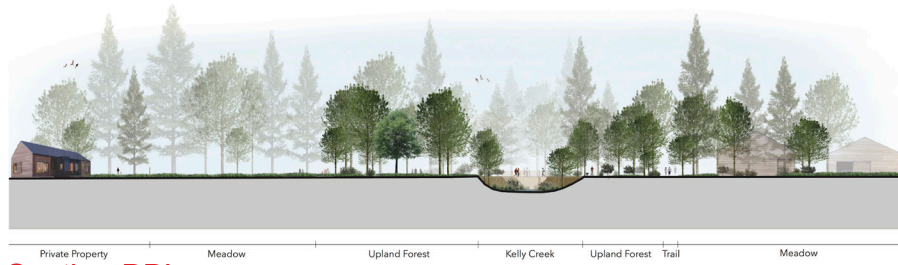
- Path
  - Trail
  - Paved Trail
  - Bridge
  - Creek
  - EZRA Zone
  - Existing Trees
  - Proposed Trees
  - Existing Buildings
  - Future Low Density
  - Trail Head
  - Trail Markers
  - Lights
  - Seating Areas
  - Salmon Habitat Interpretive Area
  - Focal Area
- Views from Perspective Illustrations
- OPPORTUNITIES**
  - 1 Use Existing Public Land
  - 2 Kelly Creek Buffer As a Corridor
  - 3 School Connections
  - 4 Salmon Habitat Restoration Area
- CONSTRAINTS**
  - A Arterial Street Crossings
  - B Privately Owned Property
  - C New Bridge Crossing
- PROJECTS**
  - 1 Bridge
  - 2 Arterial Crossing
  - 3 Salmon Habitat Restoration Area
  - 4 Trail Heads

## KELLY CREEK TRAIL





Section AA'



Section BB'

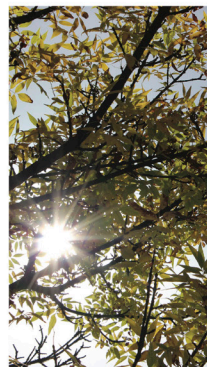
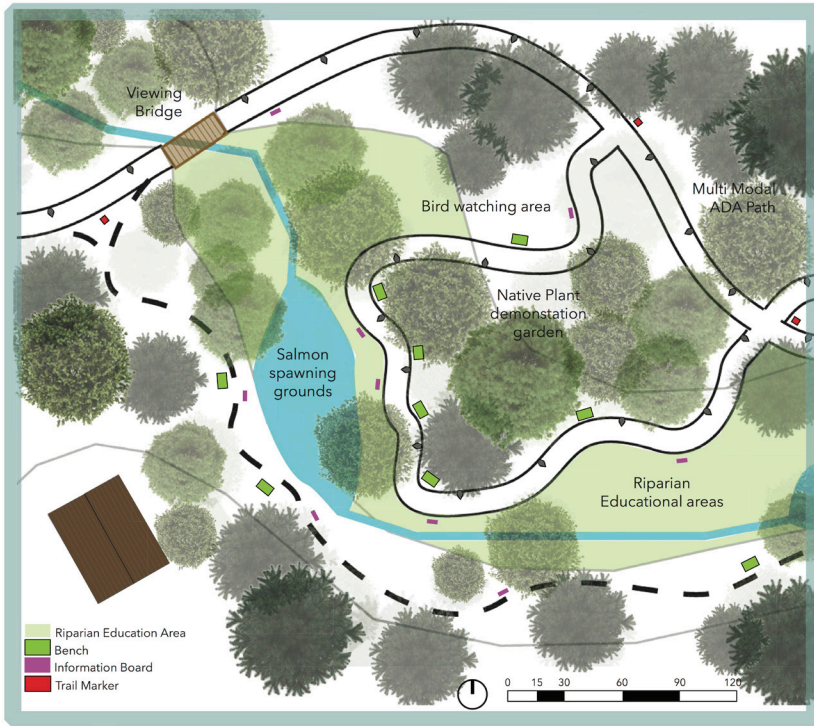
\* SALMON LOOP



\* EVERGREEN BRIDGE CROSSING



# KELLY CREEK SALMON LOOP





**Native Planting Plan Proposal:**

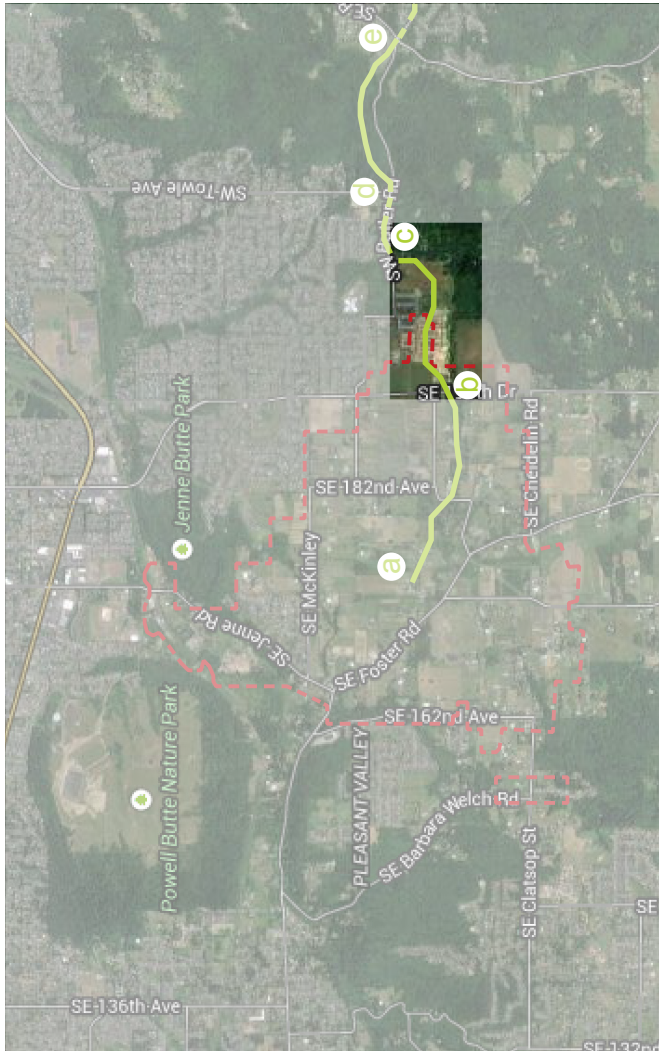
An opportunity exists to undertake a restoration of the Kelly Creek Stream Corridor with the construction of a new path and trail system. Currently the stream corridor is filled in many places with non-native, invasive species. Enhancing the imageability, water quality, and recreational experience of the Kelly Creek Stream Corridor would be an asset to the community. Two main planting zones are considered for the Kelly Creek area. Native prairie/savanna plantings and riparian zone planting.

**Native Prairie/Savannah:**

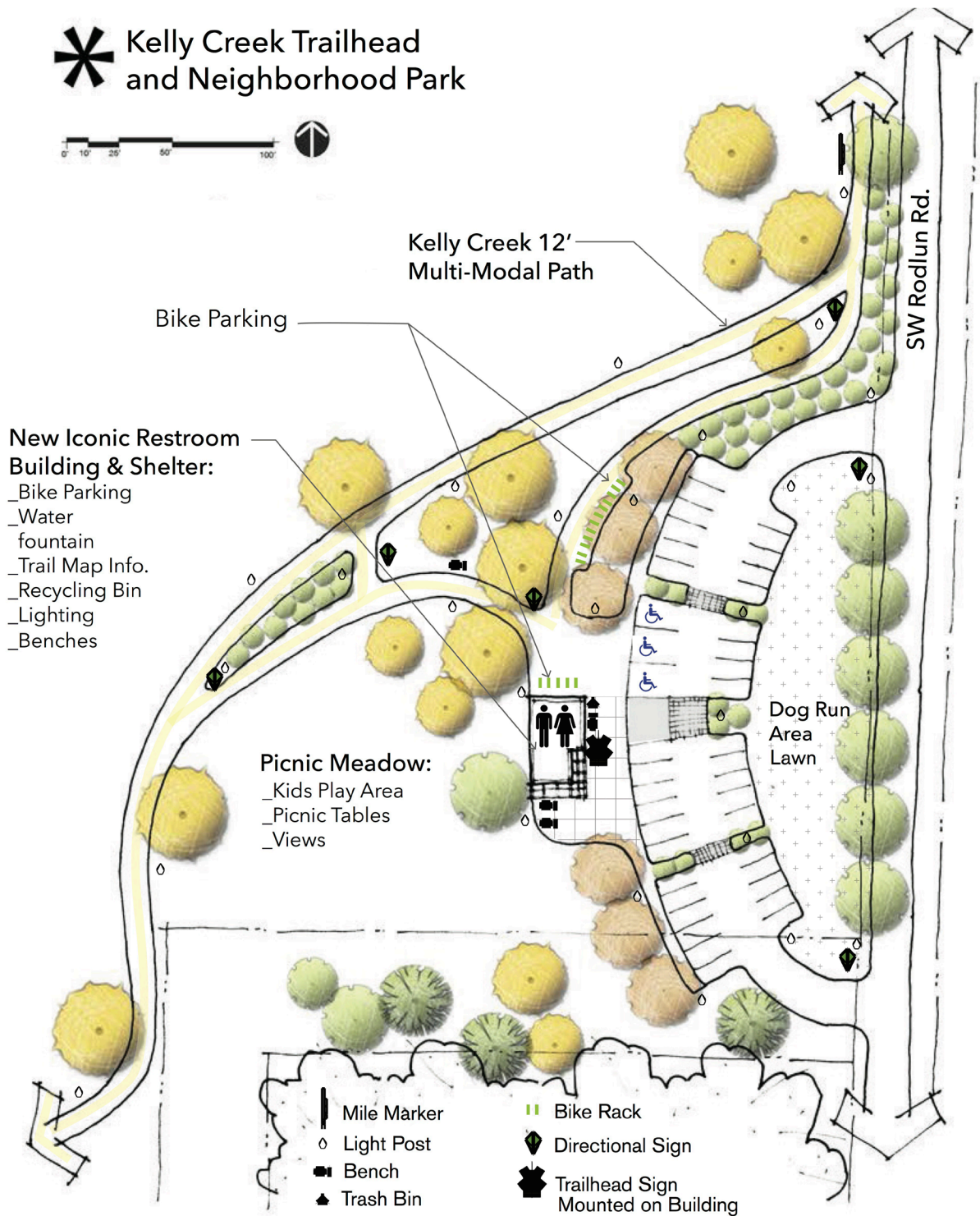
- \_ Maintain the entire corridor outside of the riparian zone as a native prairie/savanna.
- \_ New trees are positioned to screen existing and new residential development from the path and trail, and to enhance the imageability of a native savanna.
- \_ Native trees to be considered for these areas include: *Pinus ponderosa*, *Thuja plicata*, *Acer macrophyllum*, *Fraxinus latifolia*, *Quercus garryana*.

**Riparian Zone:**

- \_ Remove all non-native invasive species.
- \_ New plantings will be native species to enhance water quality, habitat and imageability of the stream corridor.
- \_ Native trees to be considered include: *Alnus rubra*, *Alnus thombifolia*, *Populus trichocarpa*, *Salix sp.*
- \_ Native shrubs to be considered include: *Corylus cornuta*, *Rhamnus purshiana*, *Crataegus douglasii*, *Oemleria cerasiformis*, *Physocarpus capitatus*, *Sambucus racemosa*, *Holidiscus discolor*, *Cornus sericea*, *Spiraea douglasii*, *Symphoricarpos albus*.
- \_ Native grasses and sedges to be considered include: *Carex unilatralis*, *Carex densa*, *Carex deweyana*, *Juncus ensifolius*, *Deschampsia cespitosa*, *Glyceria occidentalis*, *Festuca roemerii*.



# Kelly Creek Trailhead and Neighborhood Park



## Kelly Creek Trailhead & Neighborhood Park



Location: 19th Ave and Kelly Creek- Before



Location: 19th Ave and Kelly Creek Trail, Multi-Modal  
After : Map view 1



## The 'Green' Heart of the City: Kelly Creek Interpretive Center for Water Quality & Stream Restoration | Map View 2

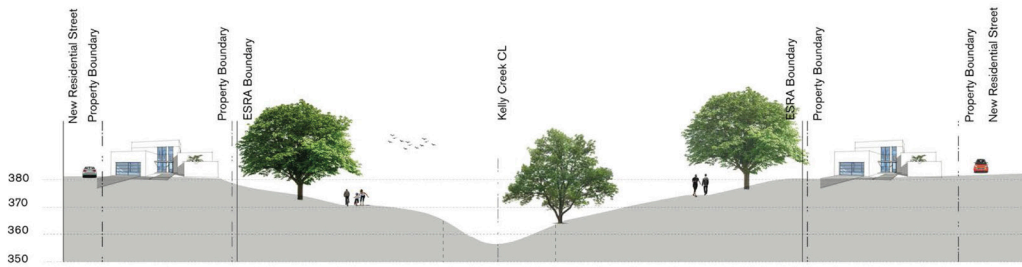
**Kelly Creek Interpretive Center for Water Quality, Stream and Habitat Restoration:** This could become a valuable community resource for learning about the importance of water quality and habitat restoration in the region. Kids at the local elementary, middle and high schools would eventually be able to take a walking or biking field trip here as part of an ecology/environmental science curriculum. Self sustaining and off- grid, the Kelly Creek Interpretive Center could be the 'green' heart of the city. Holding community meetings, classes and events has the potential to earn additional income to help finance the center. Programming elements could include:

- ..Maintains native plant display gardens and nursery.
- ..Educates the public about water quality issues and stormwater management.
- ..Demonstrates to homeowners how to install cisterns and rain gardens.
- ..Teaches about the history of salmonid and cut throat trout and how to preserve their habitat.
- ..Informs the community how the history of water has shaped the land and the unique geology of the Gresham Buttes.

These old buildings located within the Kelley Creek Buffer area will become non-conforming uses and could be targeted for adaptive re-use. Using the existing farm/industrial vernacular architecture, a new inventive interpretive center is proposed.

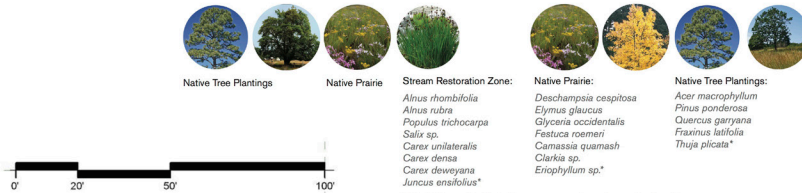
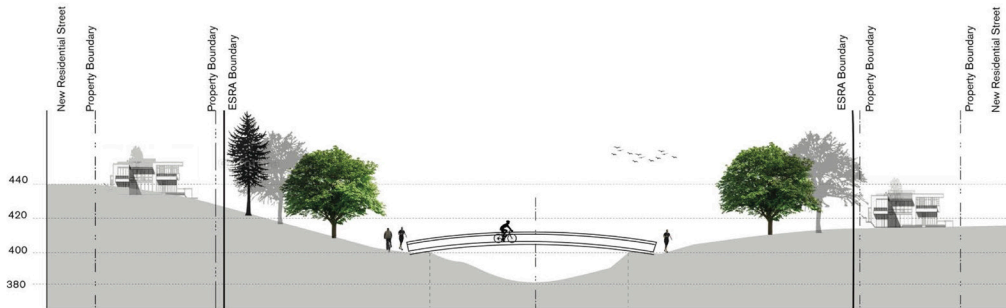
**Kelly Creek Trail head and Neighborhood Park:**

Sited on a gently sloping high point, overlooking the Kelly Creek Trail Corridor to the east, this area offers a unique opportunity for the City of Gresham to develop a new neighborhood park and trail head for the growing community. Being located at the beginning of the Kelly Creek Path and Trail Corridor, this site offers an ideal point to locate a trail head and resting spot with restroom facilities, parking, bike parking, picnicking, kids play area and room for dogs run. Designing the restroom facility as a community landmark would create a strong identity for the neighborhood.



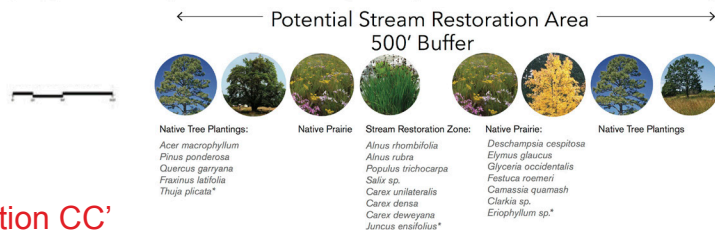
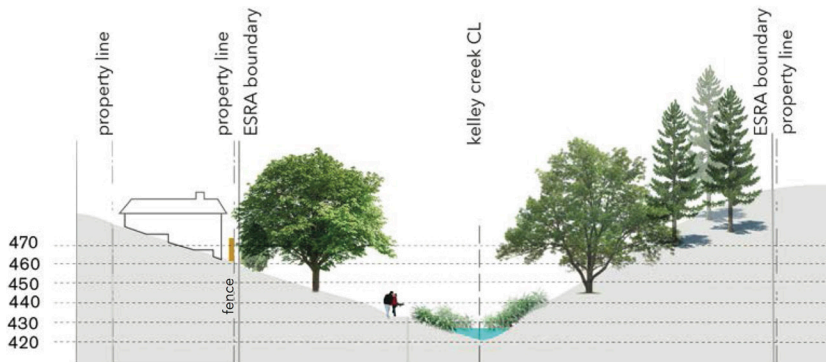
### Section AA'

\*Plant lists are for illustrative purposes only and are not exhaustive.



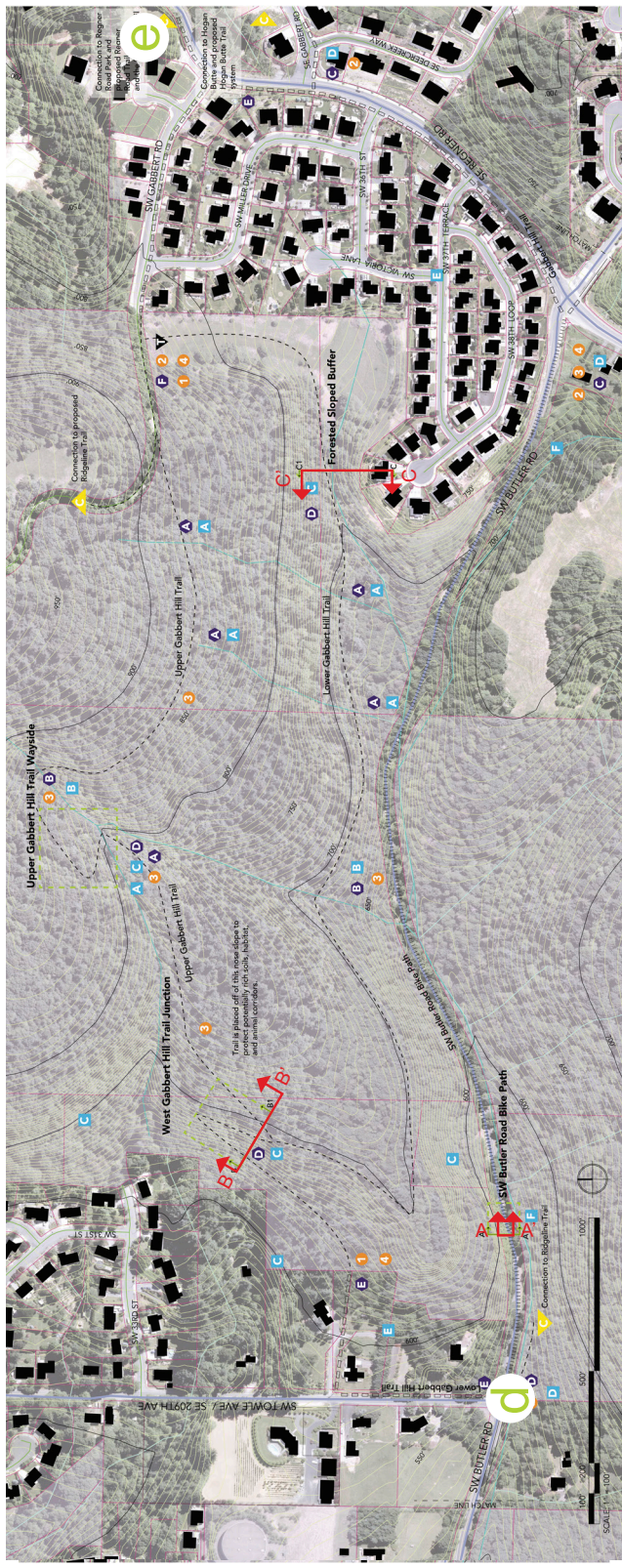
### Section BB'

\*Plant lists are for illustrative purposes only and are not exhaustive.

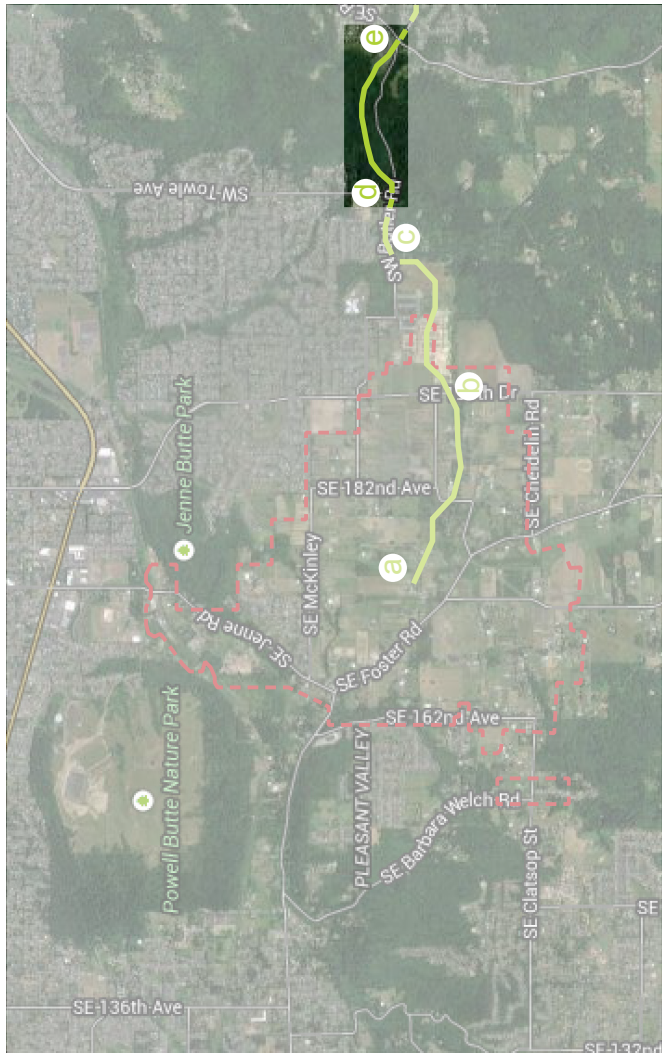


### Section CC'



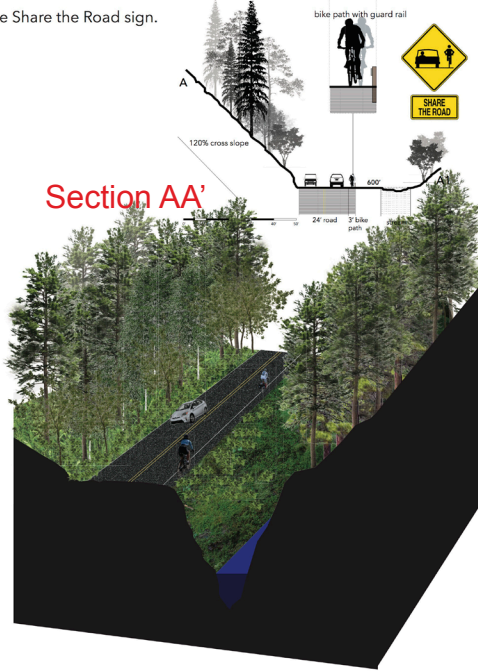


- on-street
    - off-street
    - paved trail
    - unpaved trail
    - arterial streets
    - neighborhood and collector streets
    - ephemeral/intermittent streams
    - alignment connections
  - 1
    - 2
    - 3
    - 4
  - A
    - B
    - C
    - D
    - E
    - F
  - A
    - B
    - C
    - D
    - E
    - F
    - G
    - H
- Opportunities**
- trail uses existing public land
  - alignment runs along existing ROW
  - potential scenic view of forest or stream
  - alignment is in close proximity to neighborhood
- Constraints**
- ephemeral stream crossing
  - intermittent stream crossing
  - steep cross slopes
  - arterial crossing
  - divert route around private property
  - existing ROW is narrow (due to color of gravel)
- Projects**
- ephemeral stream crossing needed to preserve riparian and stream function
  - intermittent stream crossing needed to preserve riparian and stream function
  - arterial crossing needed
  - grading of steep cross slopes needed (for trail safety and erosion control)
  - construct new sidewalk
  - build new trail wayside for build new trailhead along and nearby existing trailhead



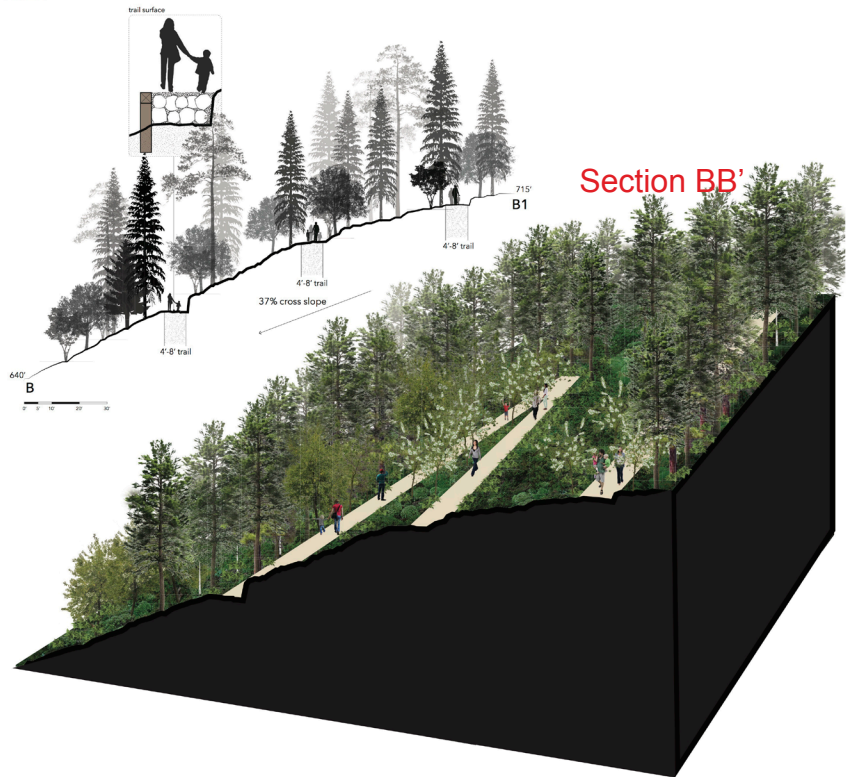
## sw butler road bike path

From the Butler Creek Connection, follow Butler Road from the west. Butler Road is a two-way two lane road with a 3 foot bike path heading east. Users may travel this portion of the trail by bicycle only. Views along the trail include steep dropoffs towards Butler Creek. Advanced cyclists experience a challenging 230' climb in elevation on the uphill side of the road. Users are not permitted to ride along the downhill slope. Vehicle drivers know to slow down and watch for cyclists as they see the Share the Road sign.



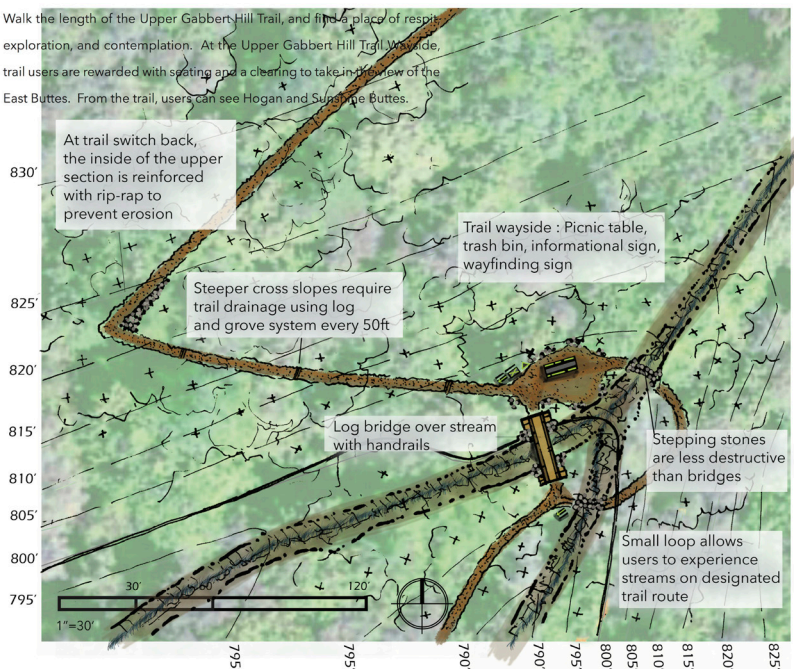
## west gabbert hill trail junction

The Upper and Lower Gabbert Hill Trail diverge at this junction. The Upper Gabbert Trail has potential scenic views of forested stream areas, and challenges the user with steep terrain. The Lower Gabbert Trail has less elevation change and is a more direct route.



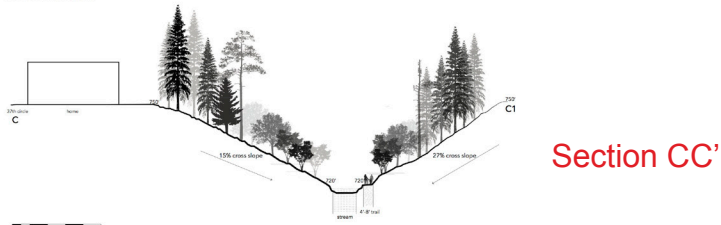
## upper gabbert hill trail wayside

Walk the length of the Upper Gabbert Hill Trail, and find a place of rest, exploration, and contemplation. At the Upper Gabbert Hill Trail Wayside, trail users are rewarded with seating and a clearing to take in the view of the East Buttes. From the trail, users can see Hogan and Supreme Buttes.

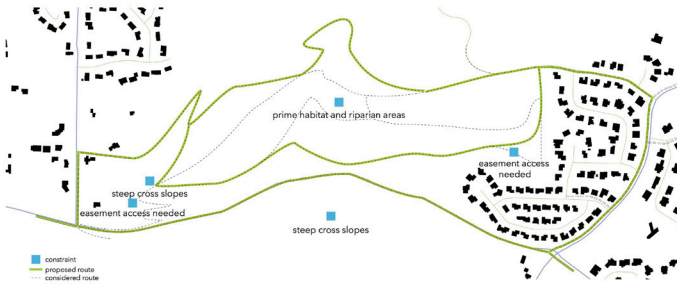


## forested slope buffer

Neighbors of the Gabbert Hill Trail have a 100' buffer between their homes and the trail.



## alignment alternatives

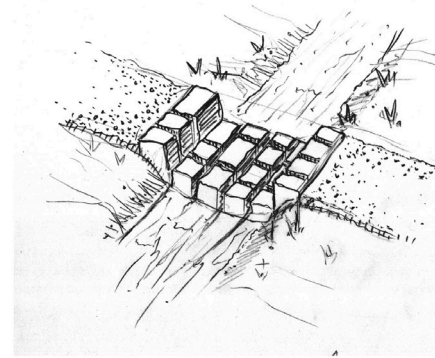


## sensitive habitat

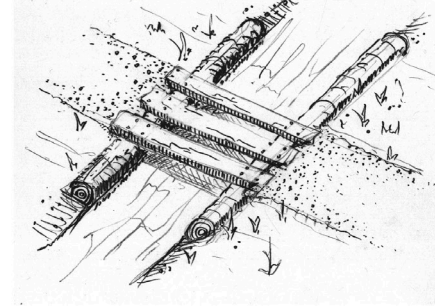


## stream crossing options

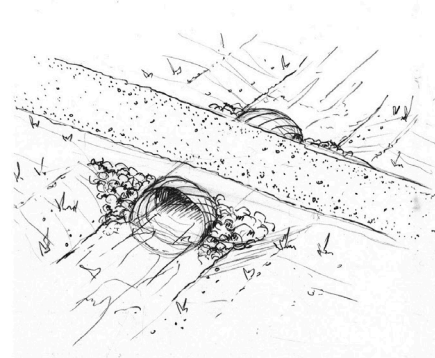
### open top rock culvert



### open top log culvert



### pipe culvert



### log bridge

