

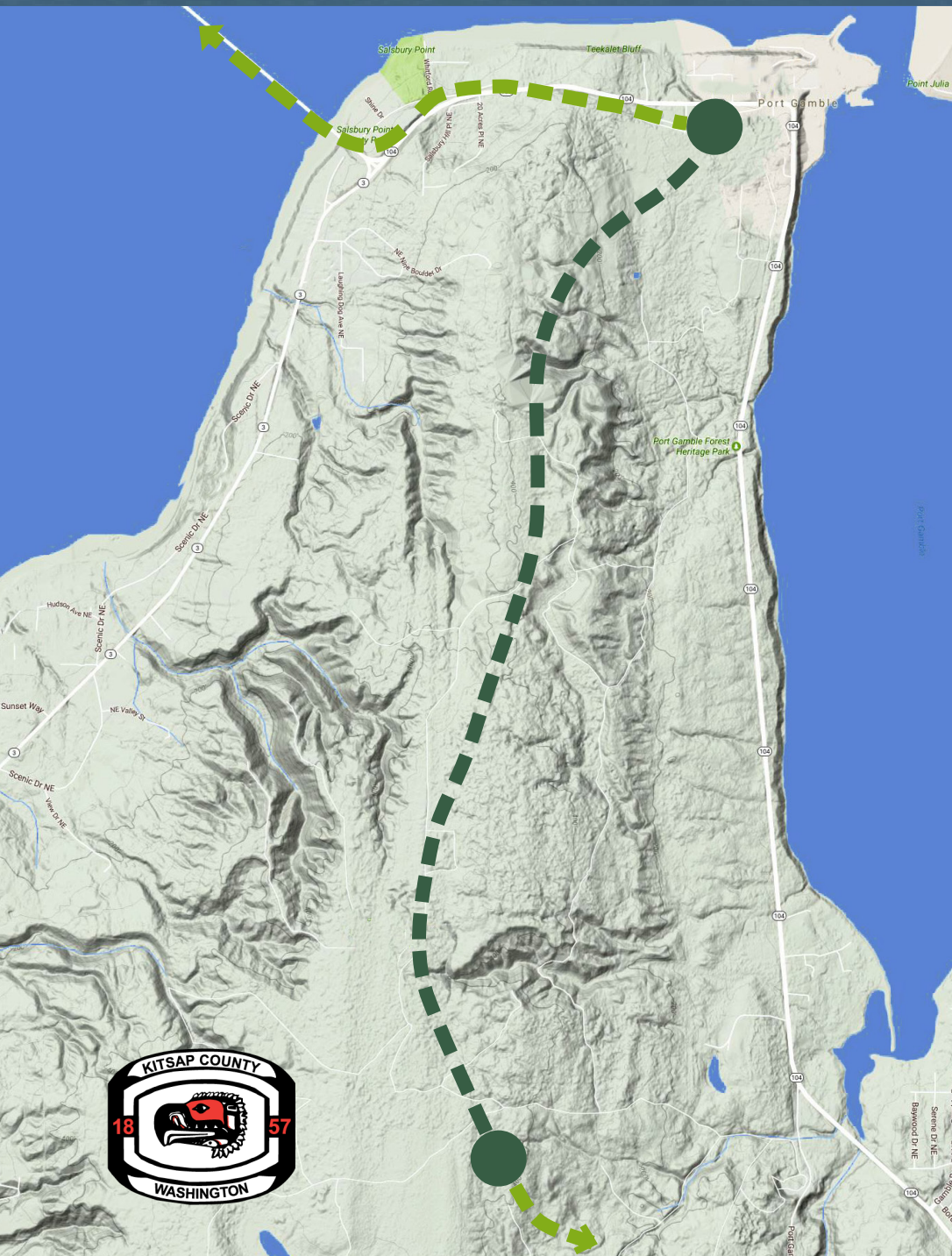
Port Gamble Trail

Stottlemeyer Road to Port Gamble Town

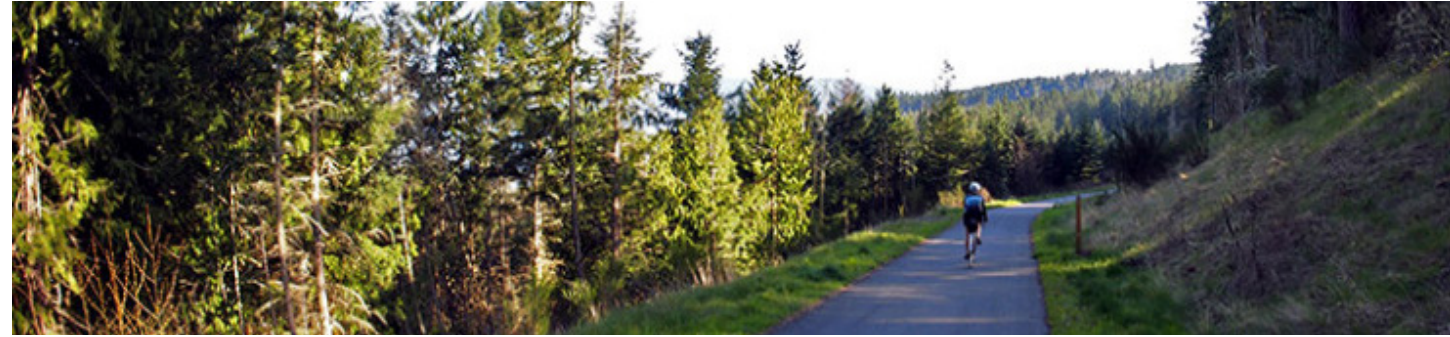
Final Feasibility Study

April 2018

Kitsap County Public Works



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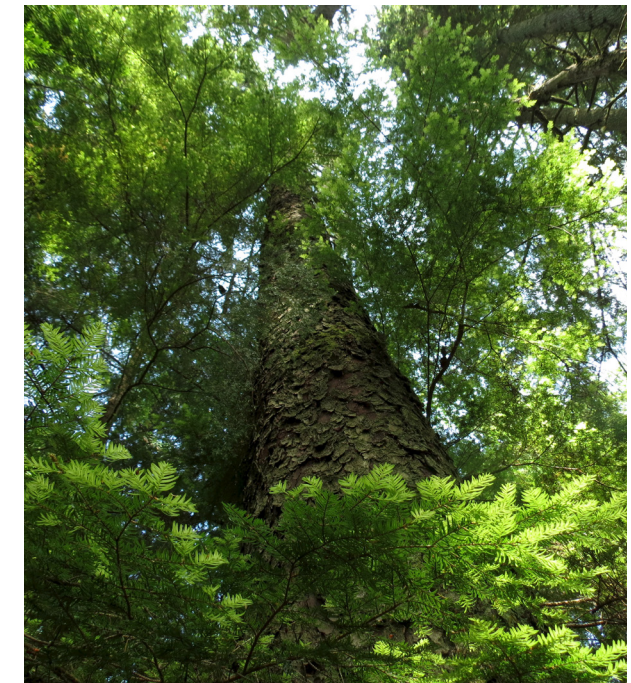
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Executive Summary

INTRODUCTION

Kitsap County Department of Public Works (County) was interested in finding a cost effective route for constructing a shared-use path between Stottlemeyer Road and the Town of Port Gamble located in North Kitsap County. North Kitsap Trail Association (NKTA) prepared preliminary alignments that were used as the starting point for the study. The proposed shared-use path is part of a larger regional trail system, the Sound to Olympics Trail, designed to serve residents and visitors and provide transportation options and recreation opportunities. Ultimately the trail will connect the Bainbridge and Kingston ferry terminals on the east side of the county to the Hood Canal Bridge on the west side of the county. Approximately one mile of STO trail has already been implemented starting at the Bainbridge Island ferry terminal.

This report summarizes a “preferred” trail alignment (shown with blue and black lines in Figure A) and an “additional” trail segment (shown with a green line in Figure A). The preferred alignment is referred to as the “Combo” alignment throughout the report and is 6.7 miles in length. The additional segment, referred to as the “Upper” route, could potentially be an alternative to the northern segment (blue line) in the preferred route or be developed as an additional recreational trail to create a loop system for this area. The additional Upper alignment (green line) is 1.9 miles in length.

The difference in alignment occurs at the north end of the project area: the Combo alignment follows Road 1000 then Road 1100 east to lower elevations whereas the Upper alignment follows Road 1300 to the north, then descending adjacent to a future private development road on OPG property. This report highlights the opportunities and constraints associated with each of them. Each would be feasible as a shared-use path and each were selected to minimize both environmental impact and cost. Whichever northern alignment is ultimately selected and implemented, another 4.2 miles of path (shown with a black line in Figure A) extends south to Stottlemeyer Road.

GOAL

The goal for this study was to determine if this shared-use path is feasible and can be designed to the applicable federal, state and local standards. This will make the trail eligible for federal and state funding and grants. Design criteria that are highly applicable to this route include connectivity, safety and ease of implementation. Objectives of this study are to closely examine the preliminary route identified by the County to confirm feasibility, identify applicable design standards, environmental review processes and/or mitigation requirements, and to estimate probable costs. The goal is for the project to be included in the County’s Transportation Improvement Plan (TIP) and Capital Facilities Plan (CFP). Please note that the term shared-use “path” and “trail” may be used interchangeably in this report, both terms imply the same thing with regard to federal standards required for a shared-use path.

PARTICIPANTS

The County retained a consultant team led by Fischer Bouma Partnership (FBP), a landscape architecture and community planning firm, to prepare the trail feasibility study. Sub consultants include MAP Limited (MAP) for civil engineering and Ecological Land Services (ELS) for wetlands science. The approximate 15-month planning process for the feasibility study commenced at the beginning of 2017. An advisory committee, referred to as the Working Group, was formed with representatives from the County (Public Works, Parks and the Non-motorized Committee), Olympic Property Group (OPG), Port Gamble Stewardship Committee (PGSC) and North Kitsap Trail Association (NKTA). The Working Group participated in all meetings, field visits and work sessions during the project.

THE SITE

The trail would be located in a large undeveloped block of land owned by the County and OPG that totals more than 4,000 acres in size. The land has been managed as timber land for decades by OPG and has been open to the public for a variety of trail and passive use recreation activities for years. A recent conservation initiative helped the County acquire more than 3,000 acres of OPG land that will continue to be managed forest and passive recreation in what is called Port Gamble Forest Heritage Park. This initiative is known as the Kitsap Forest and Bay Project. The majority of the study area has been maintained

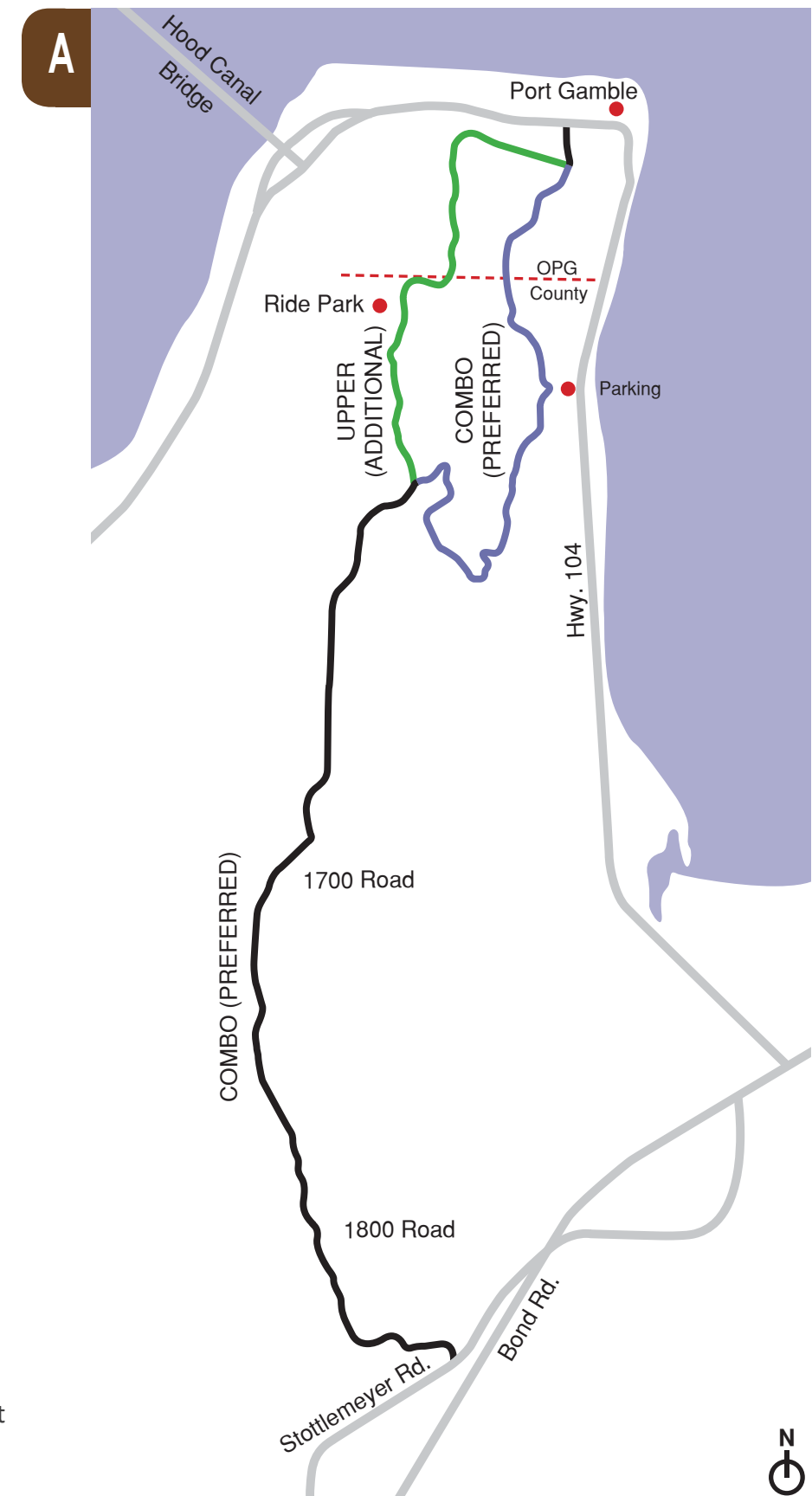


Figure A: Proposed Alignments

as timber land planted with Douglas fir and western red cedar. The northern portion of the project area is composed of undulating terrain from the low north end to the high ridge at the south end. The top of the ridge is relatively level upland forest. Logging has left most of the areas vegetated with mature stands of Douglas fir. There are several well-established beaver pond wetlands at the north end at lower elevations. The central portion of the project area is characterized by very level terrain on top of the ridge where the alignment is proposed. Several east/west ravines carve deep into the slope creating topographical and critical areas challenges.

THE STRATEGY

To minimize implementation costs and disturbance, the study adopted a strategy to use, where possible, existing logging roads as the base for the new, paved shared-use path. Active logging and forest management will periodically occur in the project area, both by the County and OPG. To accommodate logging activity traffic on various segments, the width of the shared-use path was increased from 10’ wide to 14’ wide. As such, portions of trail will need to be closed during logging. Closure would be infrequent based on discussions with OPG. These trails/roads will never be open to public vehicular use.

DESIGN STANDARDS

The preferred alignment is designed using American Association of State Highway and Transportation Officials (AASHTO) standards for travel speeds, turning radii, preferred 5% longitudinal grades and 2% cross slopes. The state legislature adopted HB 1700-2012 authorizing the use of AASHTO Design Standards for Shared-use Path on Washington State Department of Transportation (WSDOT) funded projects in response to Federal Highway Administration (FHWA) shared-use path standards that aren’t always achievable due to the terrain of the Pacific Northwest. AASHTO acknowledges that certain conditions such as physical restraints (existing terrain or infrastructure, notable features) or regulatory restraints (such as critical areas) may prevent full compliance with the five percent maximum grade. As such, AASHTO references the Advanced Notice of Proposed Rulemaking (ANPRM) on Shared Use Path Accessibility Guidelines, which outlines mitigation measures for steeper sections of shared-use path. AASHTO also outlines seven specific mitigation measures for excessive grade (greater than 5% slope) on shared-use paths.

The trail will be designed for an 18 mph speed. It is proposed to be either 10 feet wide or 14 feet wide, paved with a 2% maximum cross slope, and 2 foot wide soft surface shoulder on one side and a 4 foot wide soft surface shoulder on the other. Areas of disturbance in the corridor will range from 14 feet to 40 feet in width. Ideal slopes are those that are less than 5%. Steeper slopes between 5% and 8.3% (1:12) are allowed but with mitigation. AASHTO standards require that a landing be provided every 200 linear feet along steeper segments. Slopes of over 8.3% are only allowed where the trail runs adjacent to a road and follows the same slope as the road.

TRAIL SLOPES

For the preferred Combo alignment eighty-seven percent (87%) of the trail will be under 5% in grade. Thirteen percent (13%) of the 6.7 mile trail will be between 5% and 8.3% in grade. None of the trail will be over 8.33%. Almost all of the steep grades are at the northern and southern ends. The central portion of the trail is relatively flat as it follows a ridge line.

For the 1.9 miles of the additional Upper segment, seventy-five percent (75%) will be under 5% in grade. Six (6%) of the segment will be between 5% and 8.3% in grade. Nineteen (19%) of the segment will be over 8.33% (between 9% and 10%) along the proposed OPG development road.

THE COST

Project costs are estimated in 2018 dollars and consist of both soft costs, such as design, environmental, engineering and construction management and hard costs, which are the construction costs. The following table summarizes the cost for the preferred Combo alignment and the additional Upper segment.

Alignment	Linear Feet	Miles	Total Cost	Cost/Foot
Preferred	35,315	6.7	\$5,517,389	\$156
Additional	10,209	1.9	\$1,858,866	\$182

The cost of the additional Upper segment is higher per linear foot because it includes the extra cost of a 1,230 LF paved road from the OPG property line to the Ride Park, a necessity for this segment of trail to be implemented.

No land acquisition costs are anticipated or included in the estimate. There may be costs associated with obtaining easements from OPG for trail use on their land at the north and south ends of the project. Costs are assumed to be minimal based on preliminary discussions with OPG. Costs are provided by trail segment in the report to give decision makers the information needed to acquire funding for portions of the project due to the overall size of the trail. OPG development schedule on the north end, the County Ride Park project and STO funding opportunities (both transportation and recreation related) may impact what trail segments are built when.

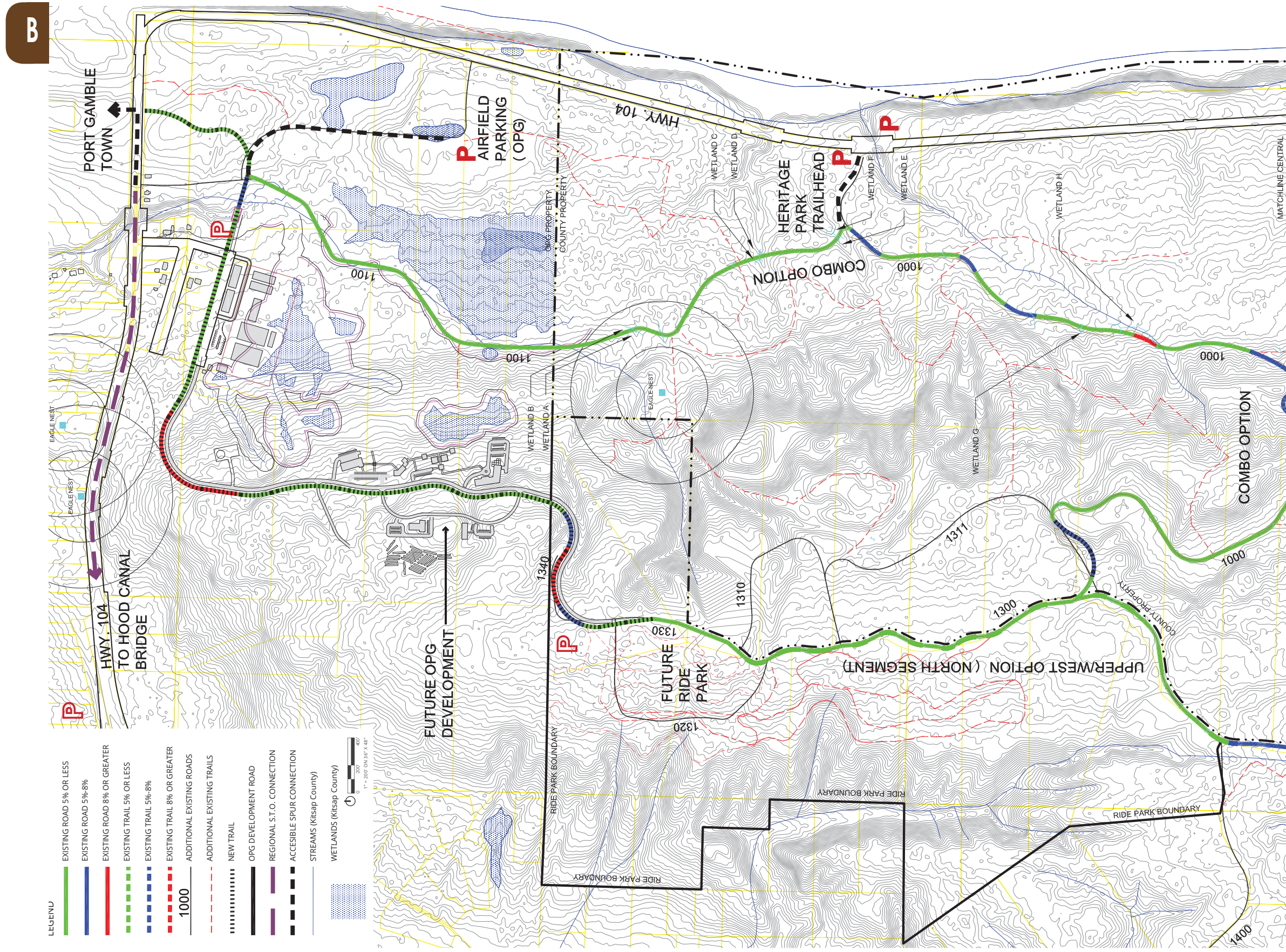
NEXT STEPS

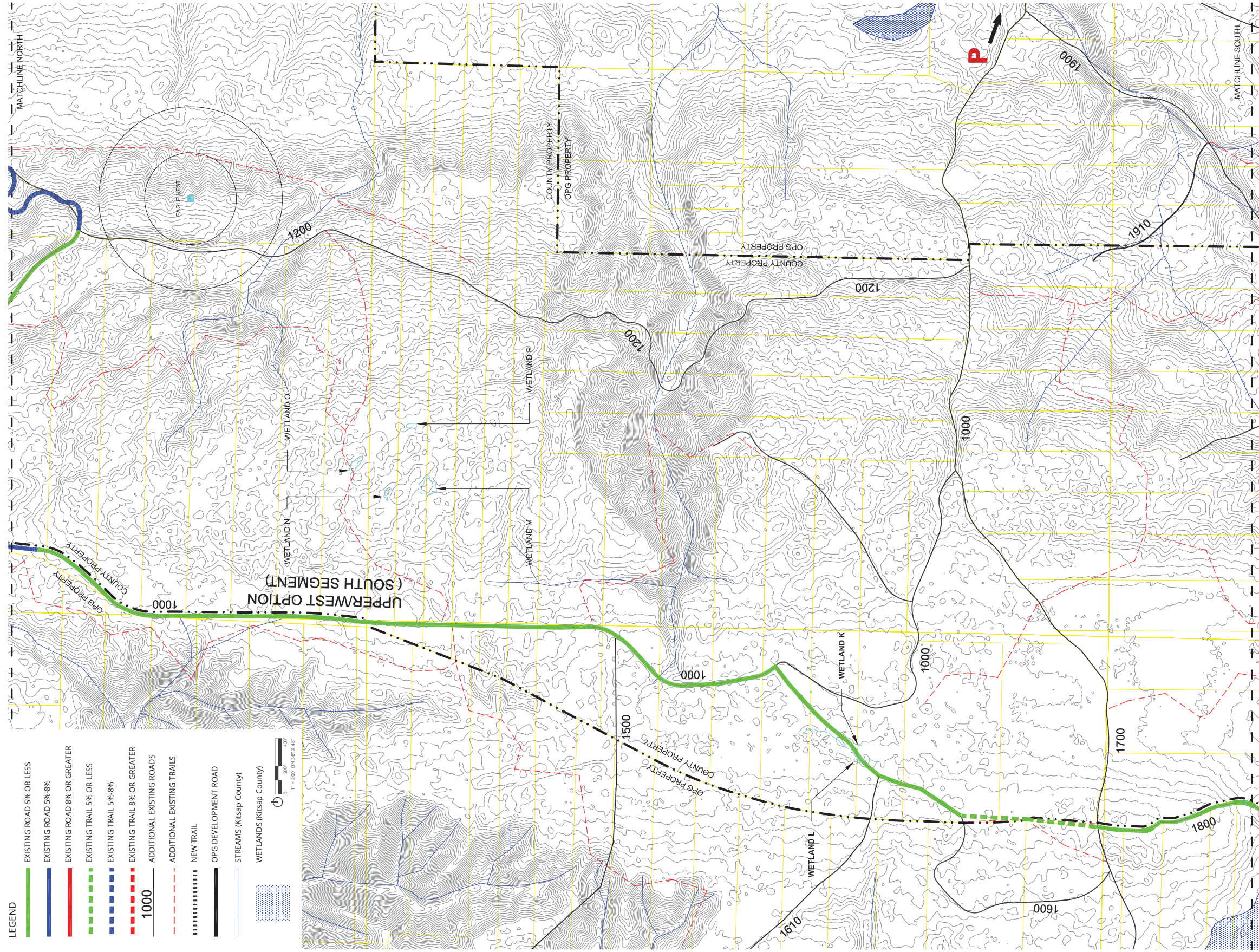
Adoption of this study by Kitsap County Commissioners and inclusion in the County’s TIP will allow additional planning and implementation to commence. The preliminary plans in this document were developed using existing LIDAR topographic information provided by the County. The horizontal and vertical trail alignments are based on 2-foot contour intervals. Final engineering of the trail alignment will require a detailed land survey and additional field work. Land use and environmental permits, easements and construction permits will need to be acquired during detailed engineering prior to implementation. Implementation of this segment of trail will require ongoing cooperation between the County and OPG. Memorandum of Understandings (MOU’s) will need to be developed and negotiated to clearly define funding, management and maintenance responsibilities. Specific easements will need to be defined and executed.

CONCLUSION

This study demonstrates that a shared-use path within the project area can be engineered to meet local, state and federal shared-use path design standards, allowing the project to be eligible for the fullest extent of funding possible. Due to the existing terrain, steep trail grades will be necessary. However, the trail can be engineered and mitigation measures applied to meet applicable standards. Implementation would come at considerable cost- \$5,517,389 for the preferred Combo alignment and an additional \$1,858,866 for the Upper segment. Most routes utilize existing maintenance and logging roads to reduce cost and minimize environmental impact. The proposed trail alignment would provide for a successful transportation corridor and recreation amenity for the community.

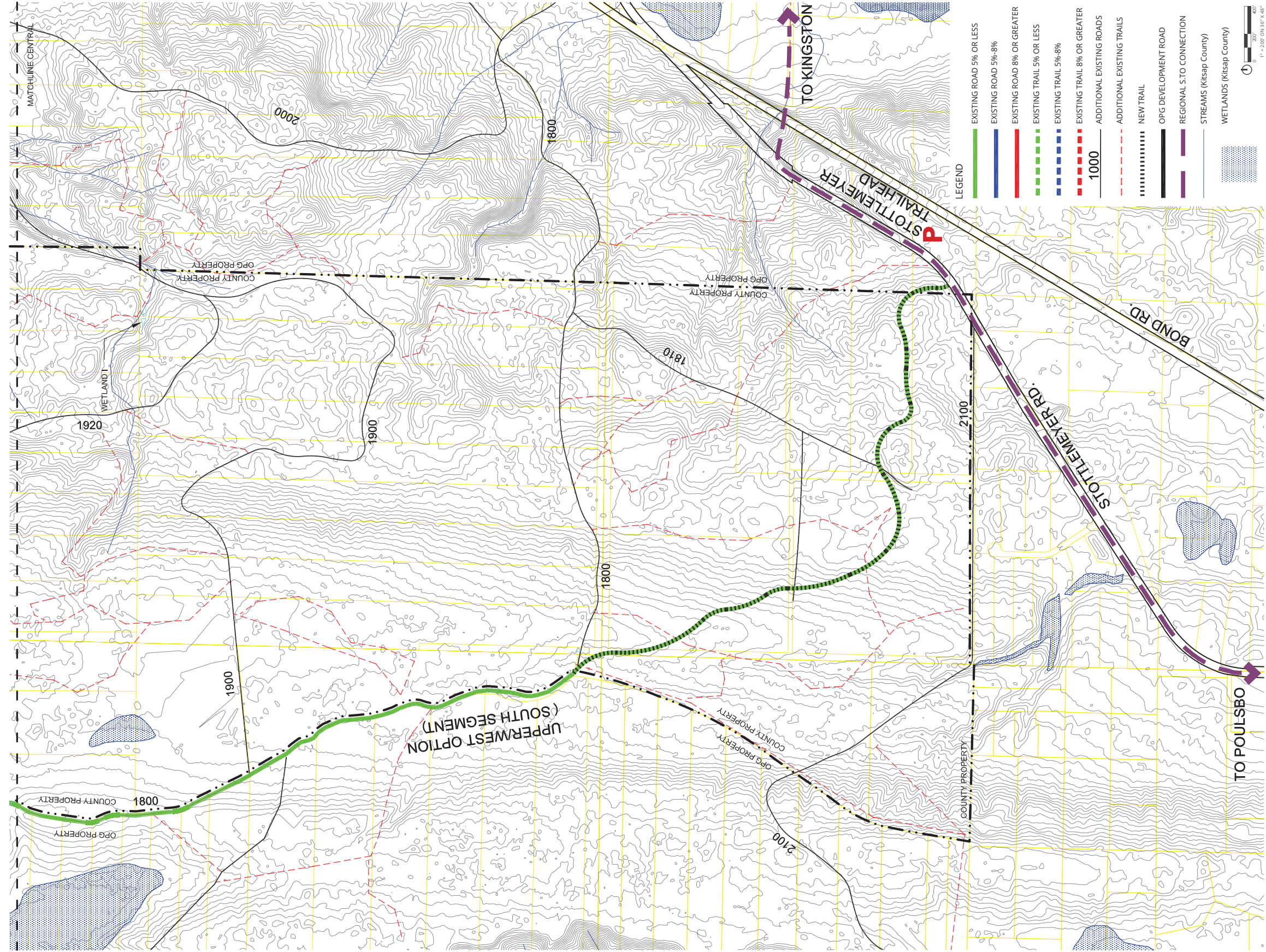
Alignments (North)





- LEGEND**
- EXISTING ROAD 5% OR LESS
 - EXISTING ROAD 5%-8%
 - EXISTING ROAD 8% OR GREATER
 - EXISTING TRAIL 5% OR LESS
 - EXISTING TRAIL 5%-8%
 - EXISTING TRAIL 8% OR GREATER
 - ADDITIONAL EXISTING ROADS
 - ADDITIONAL EXISTING TRAILS
 - NEW TRAIL
 - OPG DEVELOPMENT ROAD
 - STREAMS (Kitsap County)
 - WETLANDS (Kitsap County)

Alignment (South)





PROJECT GOALS

A



Figure 1A: Existing Logging Road/Trail Use for Various Recreation Activities (Photo by Don Willott)

CHAPTER 1: PROJECT GOALS

Kitsap County Department of Public Works (County) was interested in finding a cost effective route for constructing a shared-use path between Stottlemeyer Road and the Town of Port Gamble located in North Kitsap County. North Kitsap Trail Association (NKTA) prepared preliminary alignments that were used as the starting point for the study. The proposed shared-use path is part of a larger regional trail system, the Sound to Olympics Trail, designed to serve residents and visitors and provide transportation options and recreation opportunities. Ultimately the trail will connect the Bainbridge and Kingston ferry terminals on the east side of the county to the Hood Canal Bridge on the west side of the county.

The goal for this study was to determine if this shared-use path is feasible and can be designed to the applicable federal, state and local standards. This will make the trail eligible for federal and state funding and grants.

Design criteria that are highly applicable to this route include connectivity, accessibility, safety and ease of implementation. Objectives of this study are to closely examine the preliminary route identified by the County to confirm feasibility, identify applicable design standards, environmental review processes and/or mitigation requirements, and to estimate probable costs. The premise of the study was that shared-use path design standards would be applied in order for federal grant eligibility to be maintained. The goal is for the project to be included in the Transportation Improvement Plan (TIP) and Capital Facilities Plan (CFP).

1.1 Study Area

This feasibility study addresses more than six miles of potential multi-purpose shared-use path in Kitsap County located between Stottlemeyer Road to the south and the town of Port Gamble to the north. The trail would be constructed in an undeveloped block of land owned by the County and Olympic Property Group (OPG) that totals more than 4,000 acres in size. A recent conservation Initiative helped the County acquire thousands of acres of OPG land that will be managed as forest and passive recreation. This initiative is known as the Kitsap Forest and Bay Project. The effort has enormous community support, with over 30 community partner organizations participating. The trail segment addressed in this study is a north-to-south link in a comprehensive trail system planned to connect North Kitsap’s unique communities. This segment is close to the northeastern terminus of the Sound to Olympics Trail which is the Hood Canal Bridge. The Sound to Olympics Trail will be a paved shared-use path connecting Kingston, Port Gamble, Poulsbo and Bainbridge Island to Seattle to the east. To the west, it will connect with the Hood Canal Bridge, the Olympic Discovery Trail and continue on west to the Pacific Ocean.

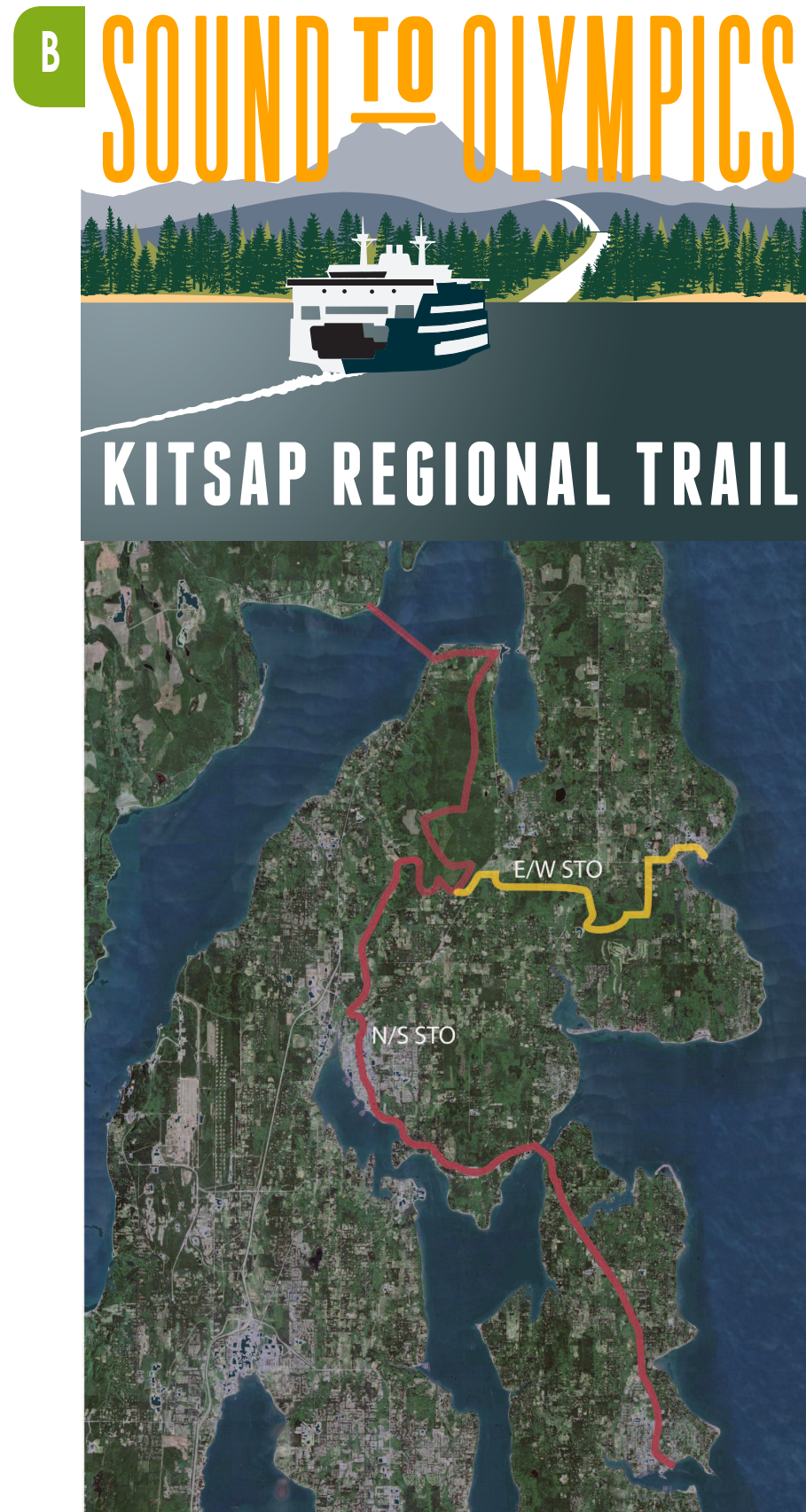


Figure 1B: Proposed Sound to Olympic Trail in Kitsap County



Figure 1C: Hillshade of Site and Regional Connections



PLANNING PROCESS AND CONTEXT

A

Figure 2A: Existing Road on OPG Property at North End of Project

CHAPTER 2: PLANNING PROCESS AND CONTEXT

The approximate 15-month planning process for the feasibility study commenced at the beginning of 2017. Chapter 2 presents the team that completed the study and summarizes the planning process. A summary of the planning process prior to this study is also included to provide context to this study. This chapter also summarizes the design standards that were the parameters for the planning and preliminary engineering design that occurred as part of the study. Existing conditions are discussed in detail including topography, road grades and condition, timber harvest schedules, land ownership and ecological resources. The latter has an additional critical areas report associated with it included within Appendix B. Finally, a discussion of a few of the alternative alignment segments is included in the chapter.

B

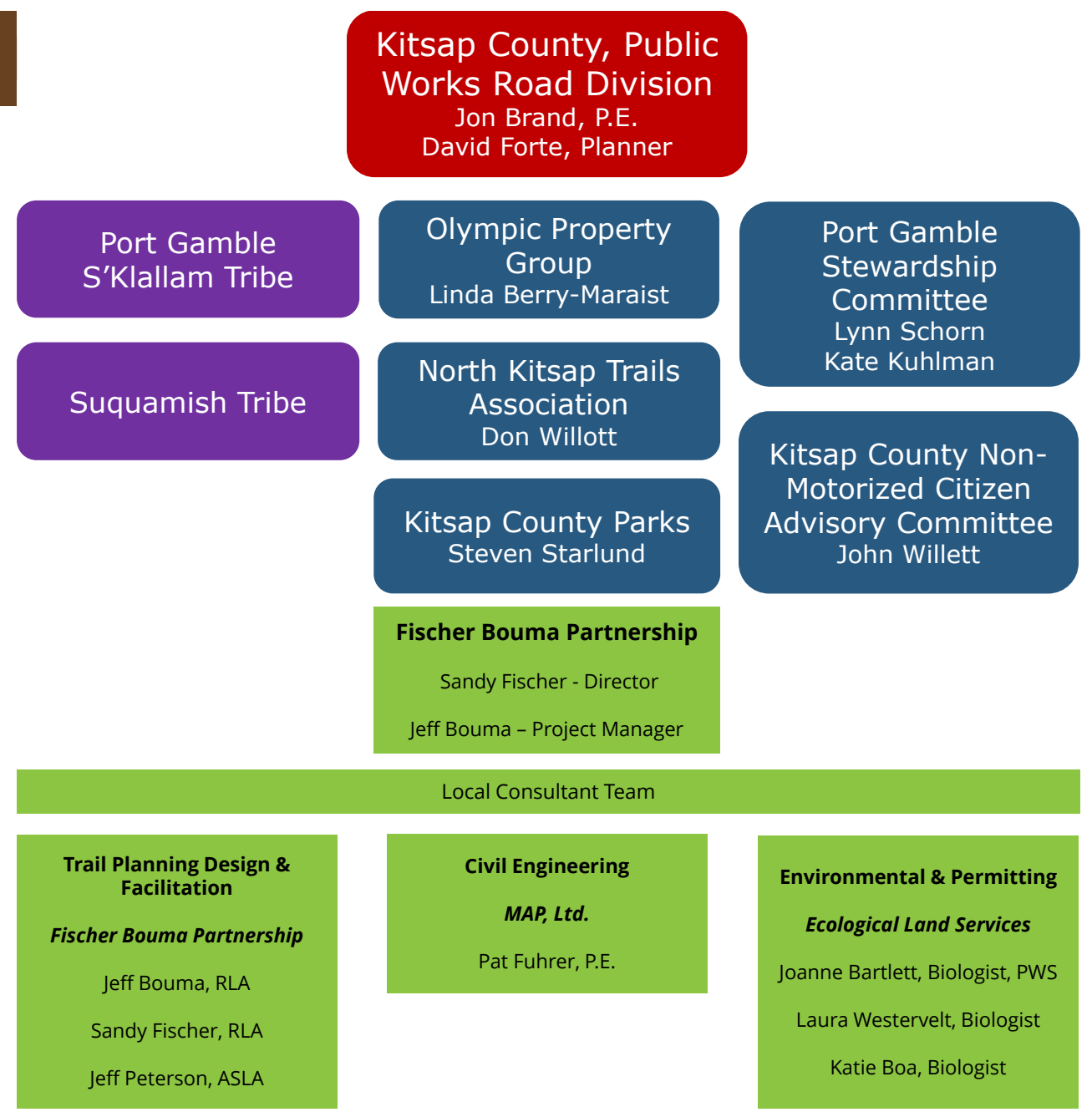


Figure 2B: Team Chart

2.1 Participants

The County retained a consultant team led by Fischer Bouma Partnership (FBP), a landscape architecture and community planning firm, to prepare the Trail Feasibility Study. Sub-consultants included MAP Limited (MAP) for civil engineering and Ecological Land Services (ELS) for wetlands science. The contract was administered by the Kitsap County Public Works Roads Division with periodic participation from the Board of Commissioner Special Project Team and the Department of Community Development. A Working Group was established including members from Olympic Property Group (OPG), North Kitsap Trails Associations (NKTA), Kitsap County Parks, Port Gamble Stewardship Committee (PGSC), Greater Peninsula Conservancy (GPC) and the Kitsap County Non-motorized Citizen Advisory Committee. Working Group meetings were held throughout the planning process and included members from each of these entities. A public meeting was held in March 2017 to present the preliminary findings to County residents and to gather feedback on the proposed route. A second public meeting, to present the Draft Report and identified alignments, is scheduled for March 2018.

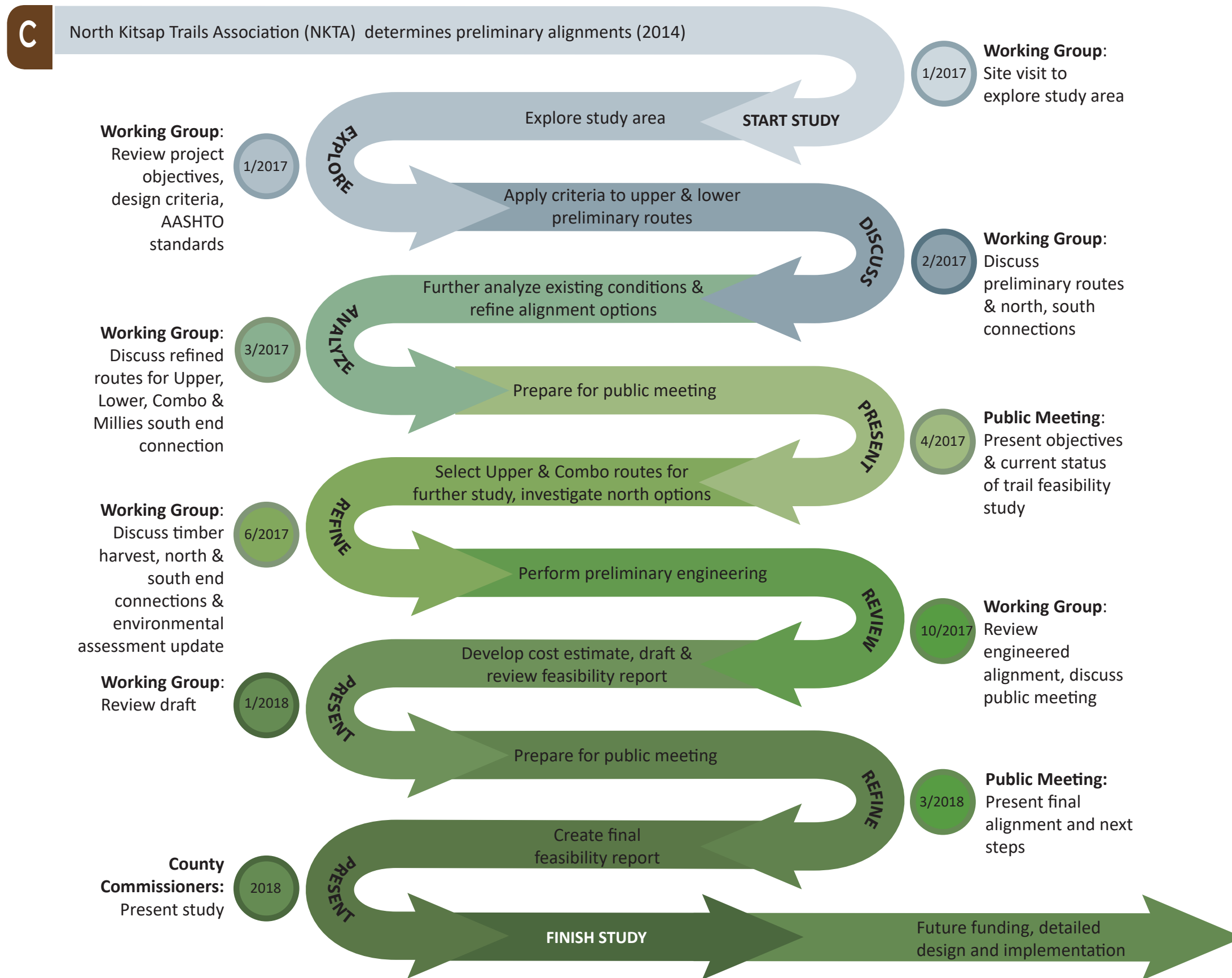


Figure 2C: Planning Process Diagram

2.2 Summary of Planning Process

Planning Steps

A preliminary alignment, identified by NKTA prior to this study, was used as the basis for analyses in this study. Figure 2C provides a graphic summary of the feasibility study process. The process included:

- Exploration of the preliminary alternatives/field work
- Discussion of design standards to apply
- Development of base maps
- Analyses including slopes, horizontal grades, critical areas, road types and conditions, harvest schedules, ownership and land use
- Development of specific trail sections that apply to existing road types
- Identification of a preferred alignment based on modifications to the preliminary alignment
- Exploration of alternative segments at the “problem areas”
- Refine the preferred alignment and identify alternative segment
- Present at a public meeting
- Develop preliminary engineering
- Field verify and modify alignment
- Develop cost estimate and
- Complete study report- draft and final

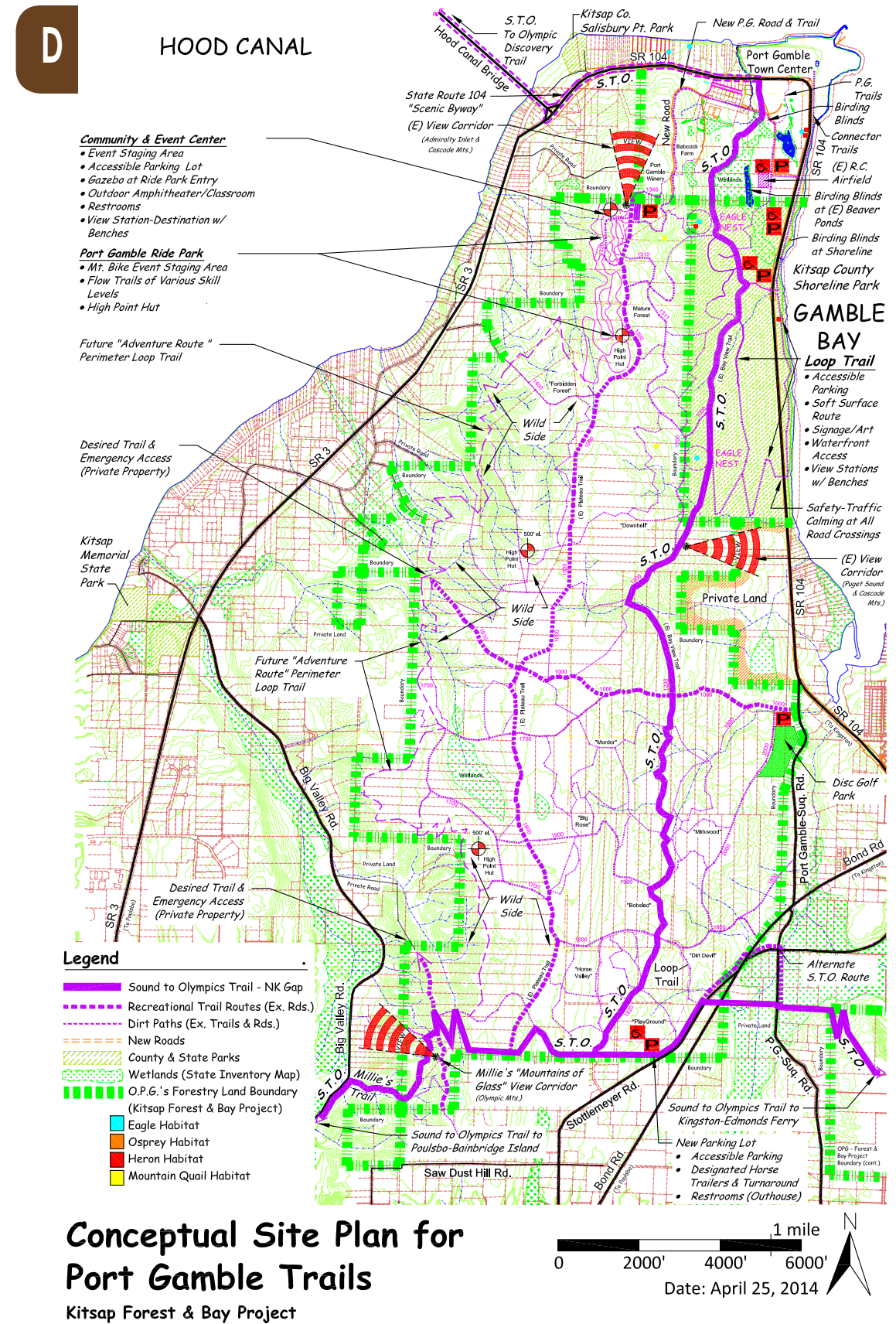


Figure 2D: NKTA Preliminary Alignments Used as the Basis for the Study

2.3 Routes Studied

Initial NKTA Route Alternatives

Trail planning efforts by NKTA resulted in two initial alternatives for trail locations (Figure 2D). The Bay View alternate was located on the east side of the project area at lower elevations. The Plateau alternate was on the west side of the project area at higher elevations along the top of the ridge. In summary, the alternates studied included:

- Bay View Alternate
- Plateau Alternate

Study Route Alternatives

The preliminary routes identified by NKTA were the starting point of this study. The general alignment of the Bay View alternate became known as the Lower / East alternate. The Plateau alternate became known as the Upper / West alternate. A third alternate emerged utilizing the northern 1/3 of the Lower alternate and the southern 2/3 of the Upper alternate, connected by the 1000 Road. This alternate became known as the Combo alternate. Eventually the Lower /East was deemed infeasible due to grades and preliminary engineering and cost estimates were developed for the Upper / West alternate and the Combo alternate. In summary, the alternates studied included:

- Lower / East Alternate
- Upper / West Alternate
- Combo Alternate

The study area is divided into three areas for the purpose of organization, mapping and clarity of discussion (Figure 2E). These areas include:

- North Segments - OPG owned land near the Town of Port Gamble and County owned land south of that, terminating at Highway 104.
- Central Segment - primarily County owned land (recently acquired from OPG).

- South Segment - primarily County owned land (recently acquired from OPG), terminating at the Stottlemeyer Road trailhead parking area.

The following chapter highlights the trail design standards used for the final alignments, summarizes existing conditions of the study site, summarizes each of the preliminary alignments studied, and discusses the computer modeling process that helped to refine alignment alternatives.

The study was comprised of a planning phase and an engineering phase. The maps, diagrams and data tables associated with the planning phase may not correspond exactly with the engineering plans that were subsequently developed and can be found in the Appendices of the report. The quantities and cost information presented later in Chapter 3 is based on the more recent and specific engineering plans.

2.4 Design Standards

The alignments are designed using American Association of State Highway and Transportation Officials (AASHTO) standards for travel speeds, turning radii, preferred 5% longitudinal grades and 2% cross slopes. The state legislature adopted HB 1700-2012 authorizing the use of AASHTO Design Standards for Shared-use Path on WSDOT funded projects in response to FHWA shared-use path standards that aren't always achievable due to the terrain of the Pacific Northwest.

Grades

AASHTO Guide for the Development of Bicycle Facilities, Section 5.2.7 states that grades above 5% are undesirable and should be limited to a 5% maximum. However, it references the Advanced Notice of Proposed Rulemaking (ANPRM) on Shared Use Path Accessibility Guidelines for allowable grades in various situations. The link is: <https://www.access-board.gov/guidelines-and-standards/streets-sidewalks/shared-use-paths/background/advance-notice>

AASHTO acknowledges that the ANPRM suggests that certain conditions such as physical restraints (existing terrain or infrastructure, notable features) or regulatory restraints (such as critical areas) may prevent full compliance with the five percent maximum grade.

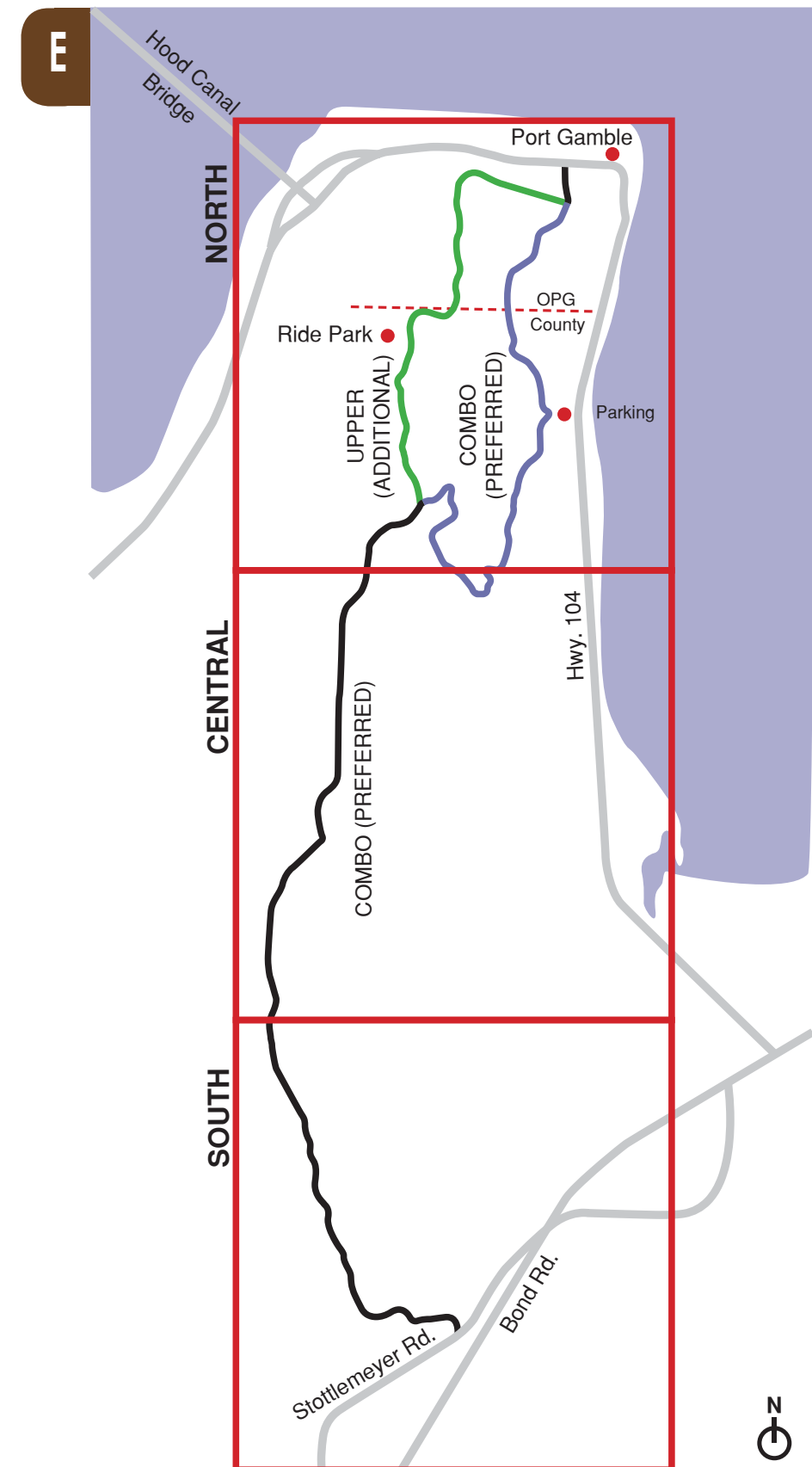


Figure 2E: Planning Areas

F SHARED USE PATH DESIGN GUIDANCE & BASIS OF ALIGNMENT ANALYSIS

Source: AASHTO Shared Use Path Design Standards

Design Element	Desired Standard	Minimum Standard	Notes	Implication for this Project	Technical Deviation Required?
Design Speed	18 MPH w/ 20° lean angle	12 MPH	12 MPH lowest speed recommended w/o extensive signing	Design for 18 mph to fullest extent	No
Pavement Width	12' W desirable	8' min. for short distances	10' W acceptable	Goal is 10' width, minimum	No
Bridge Width	14' W desirable	10' min.	Design for 14' W to accommodate std size pickup truck	At least one short bridge (20'?) likely	No
Shoulders	2% cross slope desired, max. 6H:1V	2' min. each side	2' uphill and 5' downhill side to accomodate runners & horses	Design for 2' wide gravel shoulders min.	No
Cross Slope on Paved Surface	1.5%	Max. 2% slope	Crown undesirable	Will meet this standard- 2% max.	No
Cross Slope Transitions	Longer distances better	Min. 5' for each % of grade	Example: (5% = 25' transitions)	Will meet this standard	No
Radii	60' min. for 18 MPH	27'R which requires 12MPH & signage	Signage required for < 18MPH, Min. 27' radii to be used	Will meet minimum standard	Possibly- mitigate with signs
Side Slopes (shoulders)	6H:1V or greater	If steeper than 3H:1V:	provide 5' separation (5' shoulder)	Will meet this standard	No
Vertical Drop at Edge	6H:1V or greater		< 30" use 4" curb , > 30" fence or barrier required	Will meet this standard if needed	No
Gradient	5% or less	5% or less	Need 2% max. landing every 200' on or off trail if over 5%	May be a couple short segments over 5%	Possibly- mitigate with landings
Vertical Clearance	10' height	8' min. height		Will meet this standard	No
Horizontal Clearance		2' min. from pavement edge		Will meet this standard	No
Stopping Site Distance		50' uphill @ 5%-300 (downhill at 5%) feet	Refer to AASHTO tables 5-17	Will meet this standard	No
Road Separation	5' minimum without barrier	Less than 5' with physical barrier	Standard height guardrail required if less than 5'	Will meet this standard	No
Drainage			TBD in final design and in consultation with geotech	Will meet drainage standards	No
Other Standards / Guidance		Standard	Notes		
Street Crossing		PROWAG		Will meet standards for road crossings	No
Accessibility		ANPRM	see www.access-board.gov	Will meet accessibility guidelines	No
Loading		Per AASHTO by geotech & civil	Design loads for standard size pick-up/utility vehicle	Will design for appropriate loading	No
Signage		MUTCD-Part 9		Will design per MUTCD	No
Striping		MUTCD-Part 9	Center line recommended on tight curves / poor site distance	Will design per MUTCD	No

Equestrian Accommodations

2' -5' wide shoulders

No equestrian standards that allow a formal equestrian trail to be built without separation/a buffer between paved shared-use path and equestrian path.

As such, recommend informal accommodation and a policy that does not prohibit use by horse riders (at rider's own risk).

Table 2F: WSDOT Shared-Use Path Design Criteria Summary and Basis of Analysis

The ANPRM outlines mitigation measures for steeper sections of shared-use path:

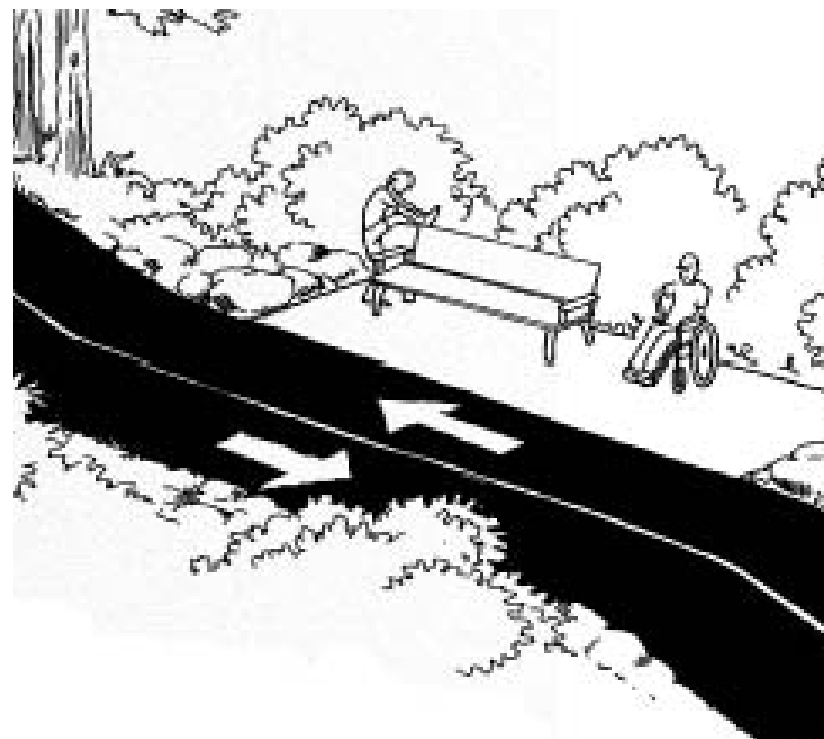
**Steeper than 1:20 But not Steeper than 1:12 (5% to 8.3%):
Maximum Length of Segment: 200 feet**

**Steeper than 1:12 But not Steeper than 1:10 (8.3% to 10%):
Maximum Length of Segment: 30 feet**

**Steeper than 1:10 But not Steeper than 1:8 (10% to 12.5%):
Maximum Length of Segment: 10 feet**

*** No more than 30 percent of the total length of a trail shall have a running slope steeper than 1:12.**

AASHTO Section 5.2.7 also outlines seven specific mitigation measures for excessive grade (greater than 5% slope) on shared-use paths.



AASHTO Standards were used for this study with the understanding that technical deviations will be required in several locations where the longitudinal grade of the trail exceeds 5% but is under 8.3%. This occurs in several locations where proposed trails will follow existing logging and maintenance roads. In these cases, the longitudinal run of the steep trail segment will be less than 200 linear feet as per ANPRM requirements at which time there will be a landing or adjacent pullout as shown in the figure to the left. More detailed information on pullouts is provided on page 50 of this report.

A meeting to discuss this specific issue and confirm this strategy was held with Neal Campbell of WSDOT Local Programs on 12/17/2014 for a similar project. The conclusion was that AASHTO standards and WSDOT technical guidance provide less stringent standards than the FHWA and that projects utilizing this design strategy are still eligible for federal funding. If deviations from the standards are pursued, maximum extent feasible documentation will be provided and could potentially impact funding depending on the source.

2.5 Planning Context

Previous Planning Efforts

Trail planning efforts were initiated by NKTA with deep grass roots support. NKTA, a non-profit that was formed in 2007 shortly after OPG announced they would be divesting themselves of their North Kitsap properties. NKTA adopted a mission “To unite North Kitsap County with a regional system of land and water trails that promotes stewardship of natural resources and enhances our communities’ livability.” The North Kitsap String of Pearls Trail Plan (adopted 2011) focuses on connecting communities, open space, trails and connecting people to nature and each other.

The trail addressed in this feasibility study will create a missing link in a system of trails and open space connecting North Kitsap communities in this vision described as “The String of Pearls.” NKTA’s top priority is to conserve public access to and through thousands of acres of OPG’s land; private land that makes up a significant portion of the open space and trails in North Kitsap County.

The Kitsap Forest and Bay Coalition includes Kitsap County, Port Gamble S’Klallam Tribe, Suquamish Tribe, Pope Resources, Forterra, GPC, and 30 local and state agencies, business and community groups. Kitsap County bought 535 acres in 2014 to create the Port Gamble Forest Heritage Park on the west shore of Port Gamble Bay. During the planning process (December 2016) 1,356 more acres of Pope Resources property was acquired by the County. The purchase was covered by the state Department of Ecology. The land preservation group Forterra negotiated the purchase agreement with Pope Resources. A significant portion came from money the state budgeted to clean up the bay and preserve habitat around it. The remainder came from the Washington Wildlife and Recreation Program, Washington Aquatic Lands Enhancement Account and the National Coastal Wetlands Conservation Program. Already open to the public, the property has a large network trails and logging roads frequented by hikers, runners, equestrians and mountain bikers.

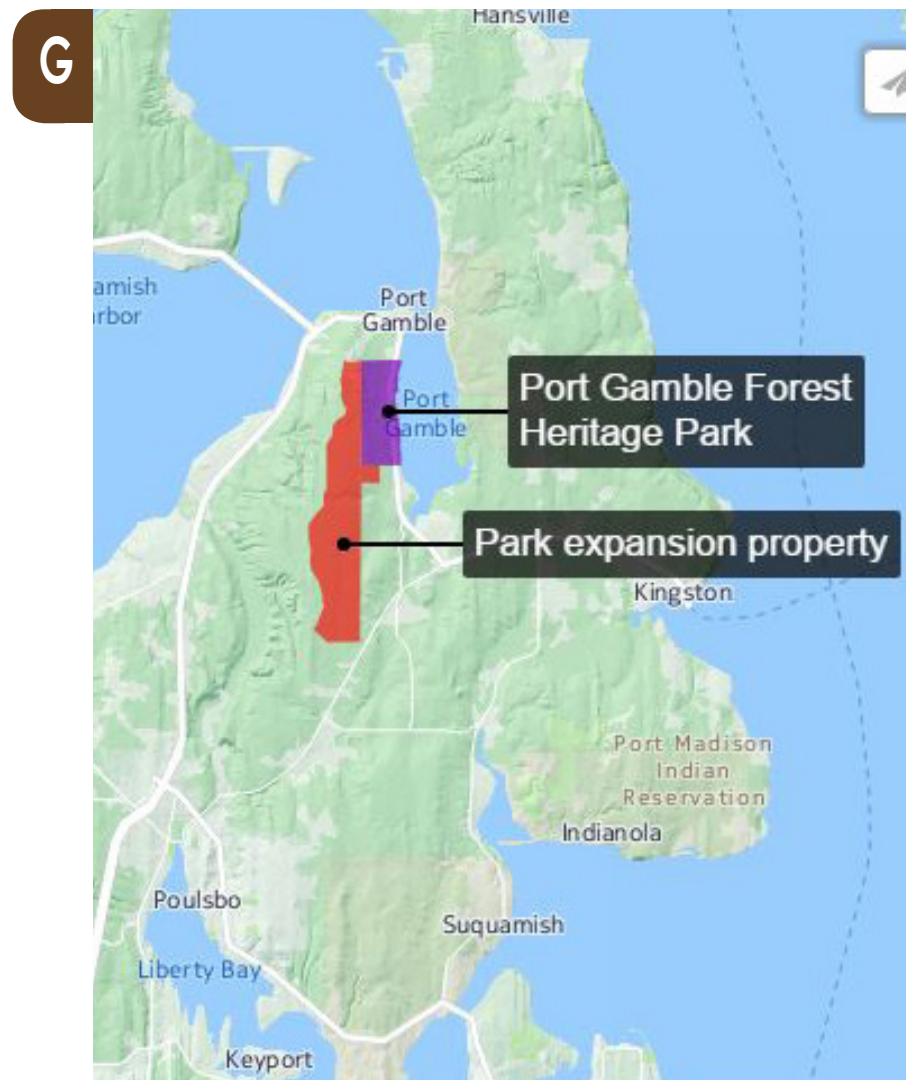


Figure 2G: Map Courtesy of Kitsap Sun Showing 2016 Purchase

Forterra led a fundraising campaign targeting private donors and foundations and raised approximately \$4 million to purchase an additional 1,500 acres at the end of 2017. The 1,500-acre addition was added to the existing 1,900-acre Port Gamble Forest Heritage Park, bought in phases in 2014 and 2016. The Port Gamble Forest Heritage Park, shown in Figure 2H, is now more than 3,400 acres in size and contains more than 65 miles in trails. A coalition of tribes, government agencies, nonprofit groups, businesses and community organizations supported the project.

Pope Resources plans to divide the property into about a dozen sections and log them over the next 25 years (retaining one-

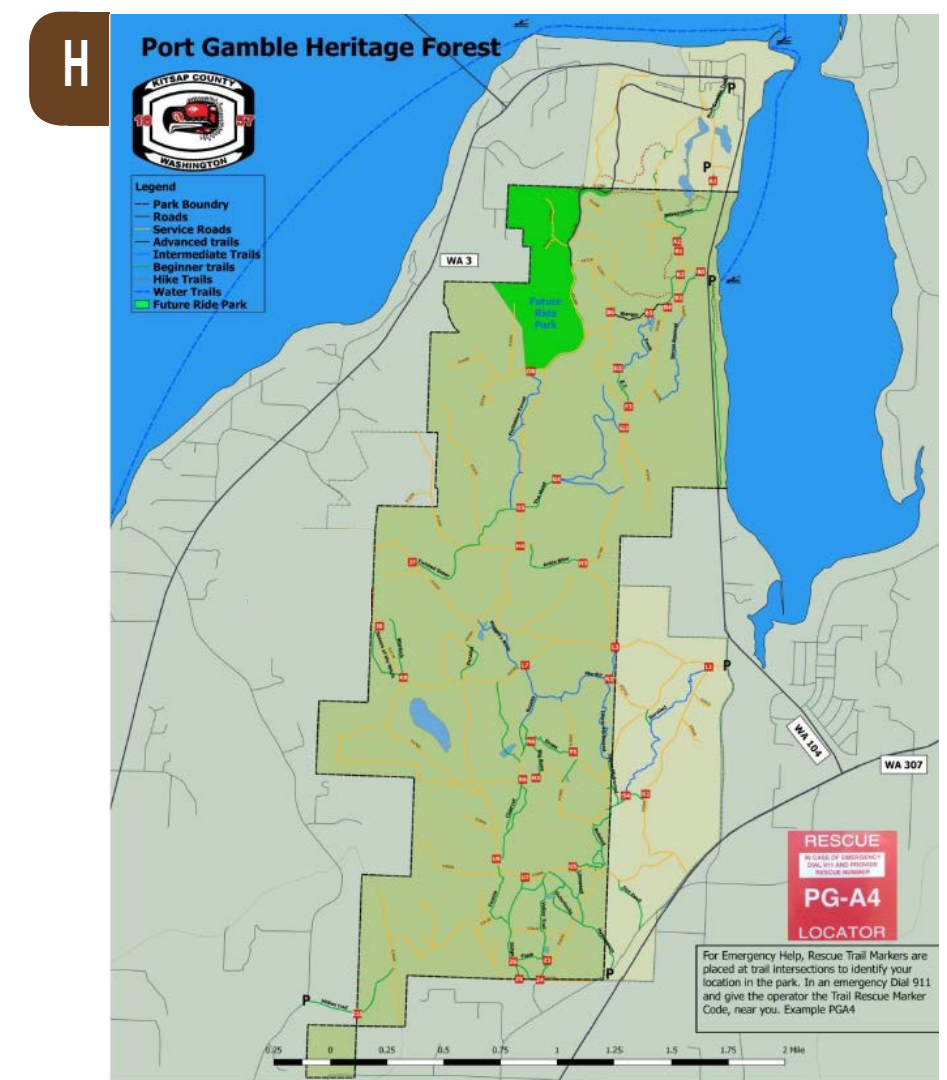


Figure 2H: County Park Land After 2017 Acquisition

time timber rights was the mechanism used to reduce the value of each acre). Once a section is logged it will be replanted by Pope Resources.

The Sound to Olympics Trail is consistent with Puget Sound Regional Council’s Vision 2040 goal of regional trail development as part of a larger strategy to develop regional green space and transportation alternatives. Vision 2040 is a regional strategy for accommodating the five million people expected to live in the region by 2040.

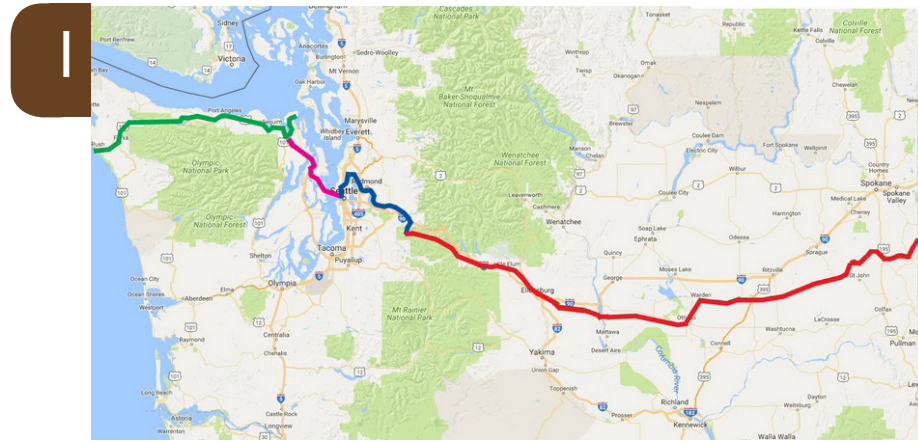


Figure 2I: Linking Cross-State Trail System (Olympic Discovery Trail-Green, Sound to Olympics Trail-Pink, King County Trails-Blue, John Wayne Pioneer Trail-Red)

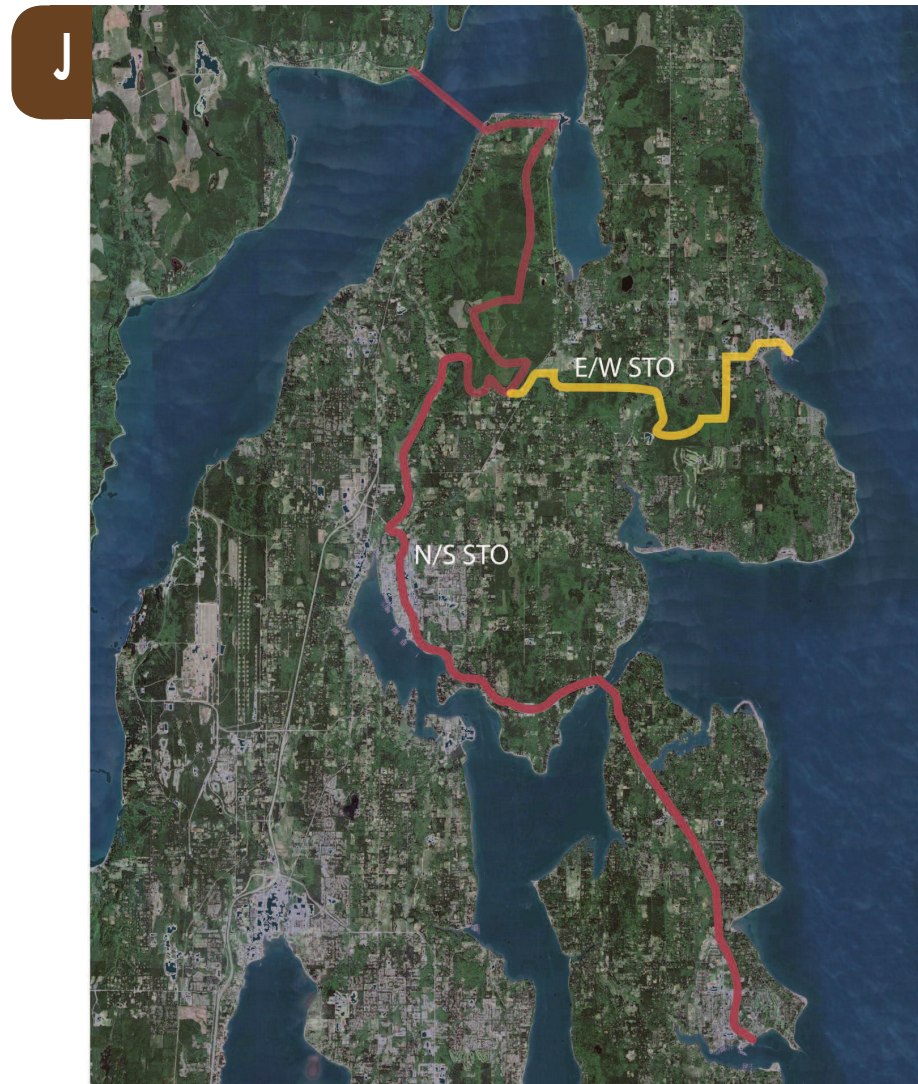


Figure 2J: Sound to Olympic Kitsap Alignments

Relevant Plans, Policies and Background Materials

A number of plans, policies and background documents were reviewed by the consultant team including:

- Kitsap County Non-Motorized Facility Plan (2013)
- WSDOT HB 1700
- North Kitsap String of Pearls Trail Plan (adopted by Kitsap County in 2011)
- Sound to Olympics Trail Master Plan
- AASHTO Guide for the Development of Bicycle Facilities, 2012, Fourth Addition
- Kitsap County Greenways Plan (1996)
- Kitsap County Bicycle Facilities Plan (2001)
- Transportation 2040 - Puget Sound Regional Council
- 2008 Washington State Bicycle Facilities and Pedestrian Walkway Plan
- AASHTO Guidelines for Geometric Design of Very Low-Volume Local Roads
- ADAAG, 1991
- OPG Haul Road Surveys
- Wildlife and Fish Conservancy Maps
- Kitsap County Critical Areas Ordinance
- FHWA, Publication No. FHWA-HEP-05-030 Acquiring Real Property for Federal and Federal-Aid Programs and Projects
- WISAARD the Washington Information System for Architecture and Archeological Records Database

Plans Specific to the Project Area

The Resource Stewardship and Public Access Plan was developed by the County with cooperation from a number of stakeholders when the initial block of land was purchased by the County from OPG. As you can see in Figure 2K, the Landscape Classification Map from the plan, it allows for passive recreation and trails through this block of land, although primarily where road corridors currently exist. This plan was not developed for the entire project area but will likely be updated now that the County has acquired a significant amount of additional land. The trail as planned is consistent with the classifications as shown and described in the plan.

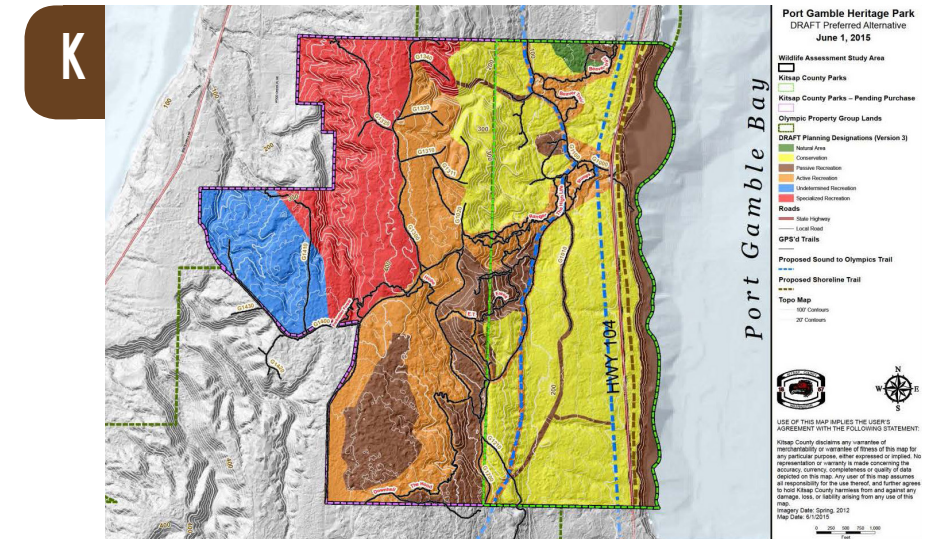


Figure 2K: Landscape Classification Map

2.6 Existing Conditions

Trail Location

More than six miles of potential multi-purpose shared-use path are proposed between Stottlemeyer Road to the south and the town of Port Gamble to the north. The trail would exist in a large undeveloped block of land owned by the County and Olympic Property Group (OPG) that totals more than 4,000 acres in size. As discussed, a recent conservation Initiative helped the County acquire thousands of acres of OPG land that will be managed forest and passive recreation. The trail would primarily be located on existing roads within this large forest.

Land Ownership

A majority of the land in the project area was recently owned by Olympic Property Group of Pope Resources (OPG). The remainder of the land is or will be owned by Kitsap County and managed by the Parks Department. A detailed description of recent land acquisitions was described previously in Section 2.4. None of the land that the trail is proposed on is owned by entities other than Pope Resources or the County.

Land Acquisition and Applicable Regulations

Federal funding requires a clear designation of trail ‘termini’ which are access points or destinations. If federal funds are used, the County needs to control the land; preferably through fee simple ownership or long-term easement. Land acquired for Federally Funded Transportation projects must be acquired in compliance with the Uniform Relocation Assistance and Real Property Act of 1970, amended in 1987. Revised Rules for the Uniform Act were published in the Federal Register on January 4, 2005.

Cultural Resources / Historical Use

Land owned by the OPG has historically been used for timber production. There are a number of existing and overgrown logging and haul roads. The town of Port Gamble is a National Historic Landmark District. A review of the Washington Information System for Architecture and Archeological Records Database (WISAARD) does not reveal any records of cultural resources on this land. The Tribes (S’Klallam and Suquamish) have been consulted about the proposed recreational use of the land.



Figure 2L: Existing Road with Olympic Mountains in the Distance (Photo courtesy of Don Willott)

Visual Resources

The forested corridor is scenic and comprised predominantly of foreground and understory views of trees, vegetation, drainages and creeks. From the top of the ridge there are territorial views to the Olympic Mountains to the west, primarily where recently timber harvesting has occurred. From the north end of the site near the proposed OPG development there are views of the Babcock farm to Mount Baker and the North Cascades beyond. The alignment is sensitive to preserving mature trees and minimizing the amount of clearing and earthwork required to build the shared-use pathway, hence the use of logging road corridors as a development strategy.

Accessibility

The alignment design seeks to balance accessibility requirements with protection of existing resources. The goal is to provide as much trail length as possible that is under 5% in longitudinal slope. Where the conditions do not allow for these gentle slopes, the next goal is to keep the slope under 8.33% (1:12). In these cases, the running length of the steeper slopes is kept to less than 200 linear feet. In some cases there are multiple segments up to 200 linear feet with less steep landings between them. In no cases are trail slopes proposed to be over 8.33% with the exception of segments that follow the grade of a road, as allowed per FHWA and AASHTO standards.

Current and Future Recreational Uses

OPG has made these forest available to outdoor recreation enthusiasts for many years. There are currently over 60 miles of trails within the forest that are used by hikers, mountain bikers, birders, mushroom hunters and equestrians. Several sponsored recreation events take place on forest trails including the Stottlemeyer 30/60 Bike Race in May each year and the Roots Rock Trail Running Series with events throughout the year.

The future Port Gamble Ride Park (referred to as Ride Park in this document) will provide 200 acres of riding loops and skill obstacle elements for mountain bikers. It is located at the north end of the project area at the top of the ridge on the west side of the 1300 Road. It spans from the OPG property line near Babcock Farm south to the approximate 1300/1000 Road junction. Kitsap County Parks received a WWRP Local Parks grant in 2017 to begin implementation of this project.

M



Figure 2M: Current Equestrian Use (Courtesy of Don Willott)

O



Figure 2O: Current Hiking Use (Photo Courtesy of Don Willott)

N



Figure 2N: Current Mountain Biking

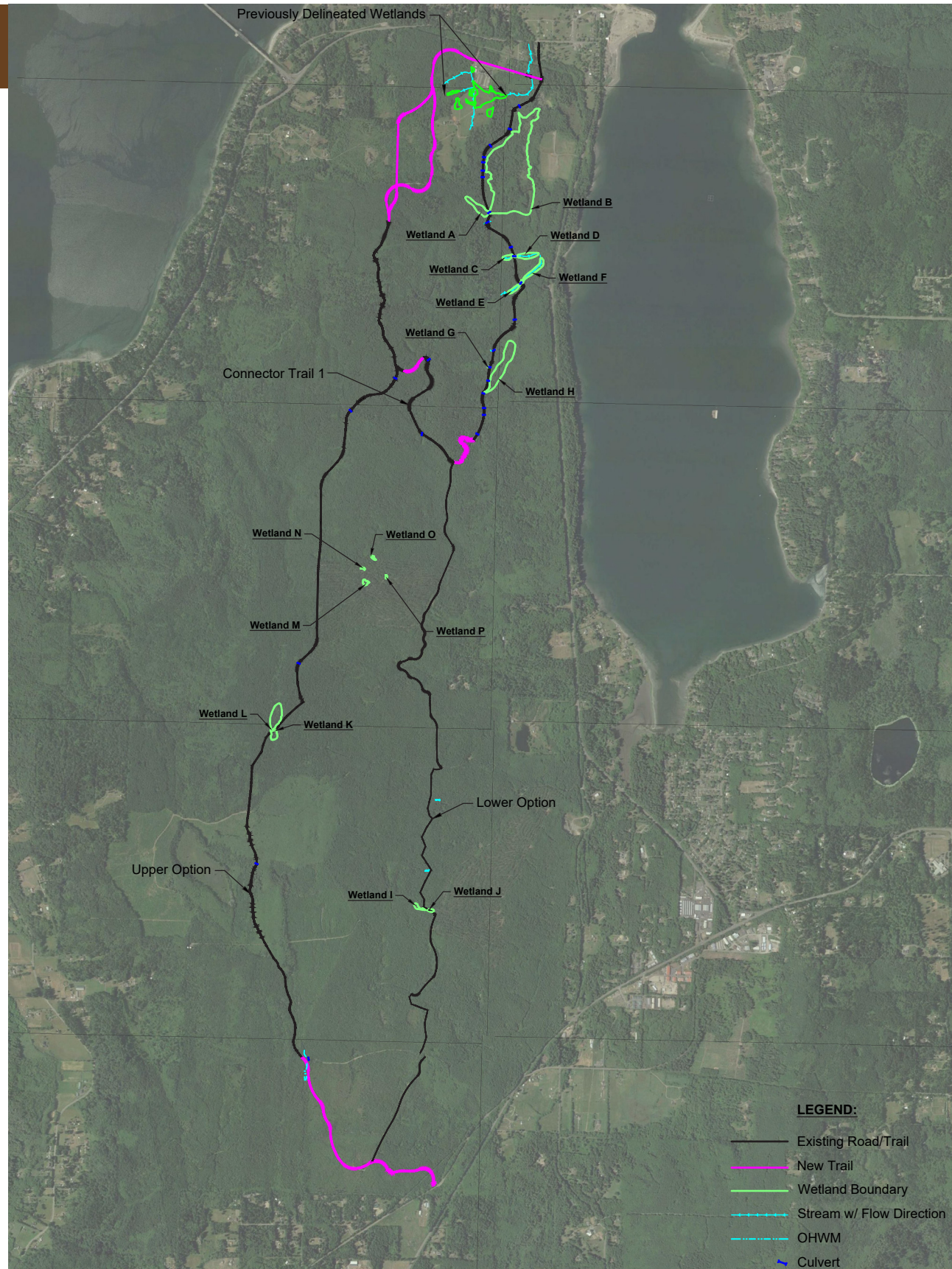


Figure 2P: Excerpt of Map from Wetland Feasibility Report

Ecological Resources - Wetlands

The following section describes ecological resources, primarily critical areas such as wetlands and plant communities. ELS provided field study and a report that summarizes findings of wetland delineations conducted in accordance with the Kitsap County Code, Chapter 19.200. The report can be found in Appendix B. The report defines, in detail and with maps, specific wetlands associated with the routes being considered.

The northern portion of the project area is composed of undulating terrain from the low north end to the high ridge at the south end. The top of the ridge is composed of a relatively level upland forest. Logging schedules have left most of the areas vegetated with mature stands of Douglas fir. Many culverts convey surface water beneath the logging roads and wetlands are mostly absent along most of the Upper route. There are several well-established beaver pond wetlands at the north end at lower elevations along the Combo route.

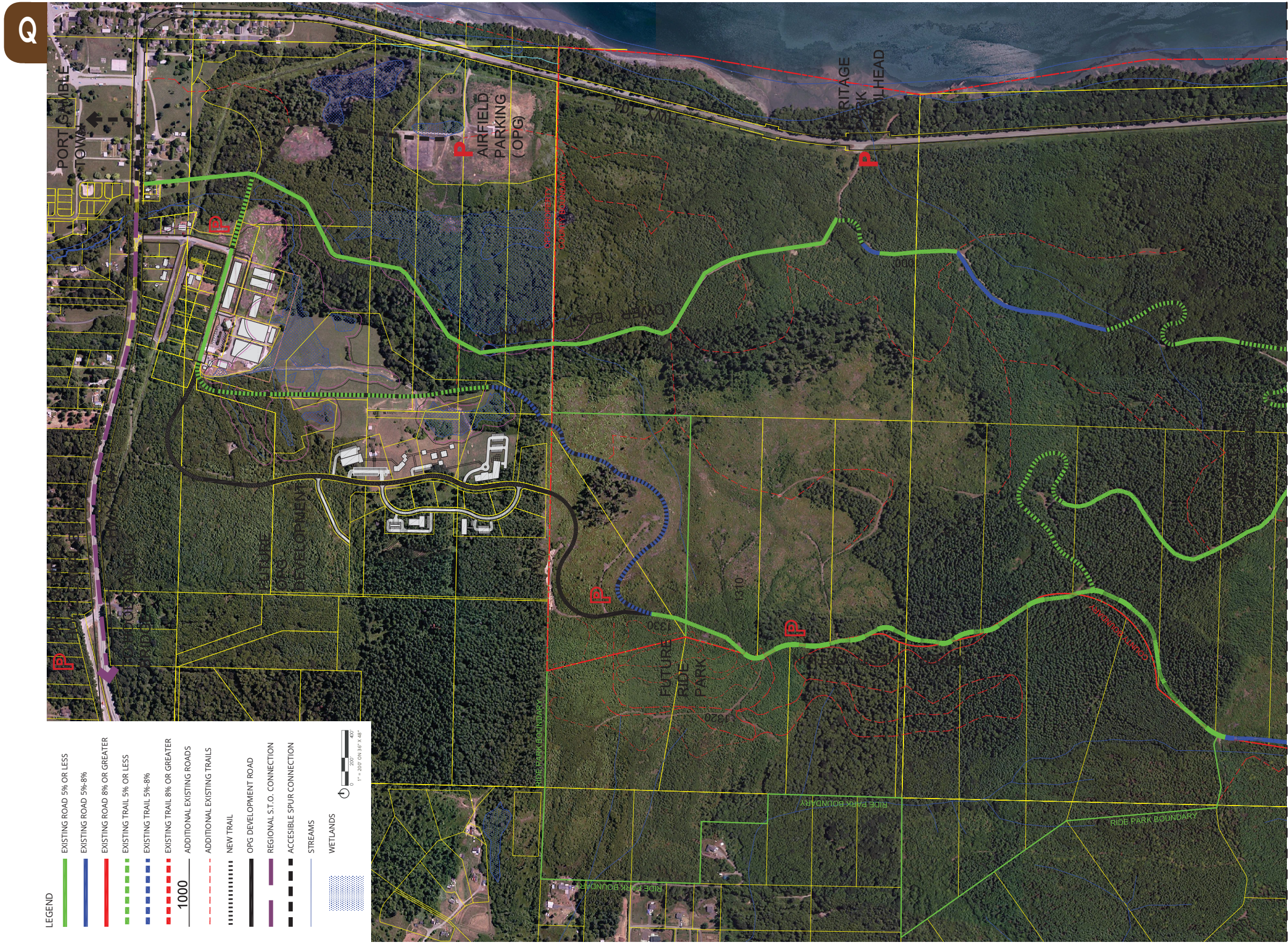
The central portion of the project area is characterized by very level terrain on top of the ridge where the alignment is proposed. There is highly variable topography along the Lower route on the east side of the ridge that was studied early in the process. Several ravines carve deep into the slope perpendicular to the road, creating topographical and critical areas challenges. Some areas of forest are very dense with tree cover and are staged for commercial thinning.

The south portion of the project contains several streams along the earlier studied Lower route. Wetlands are located adjacent to the trail in this segment as well. No wetlands were found on the south segment of the Upper route, and one stream was mapped in the area.

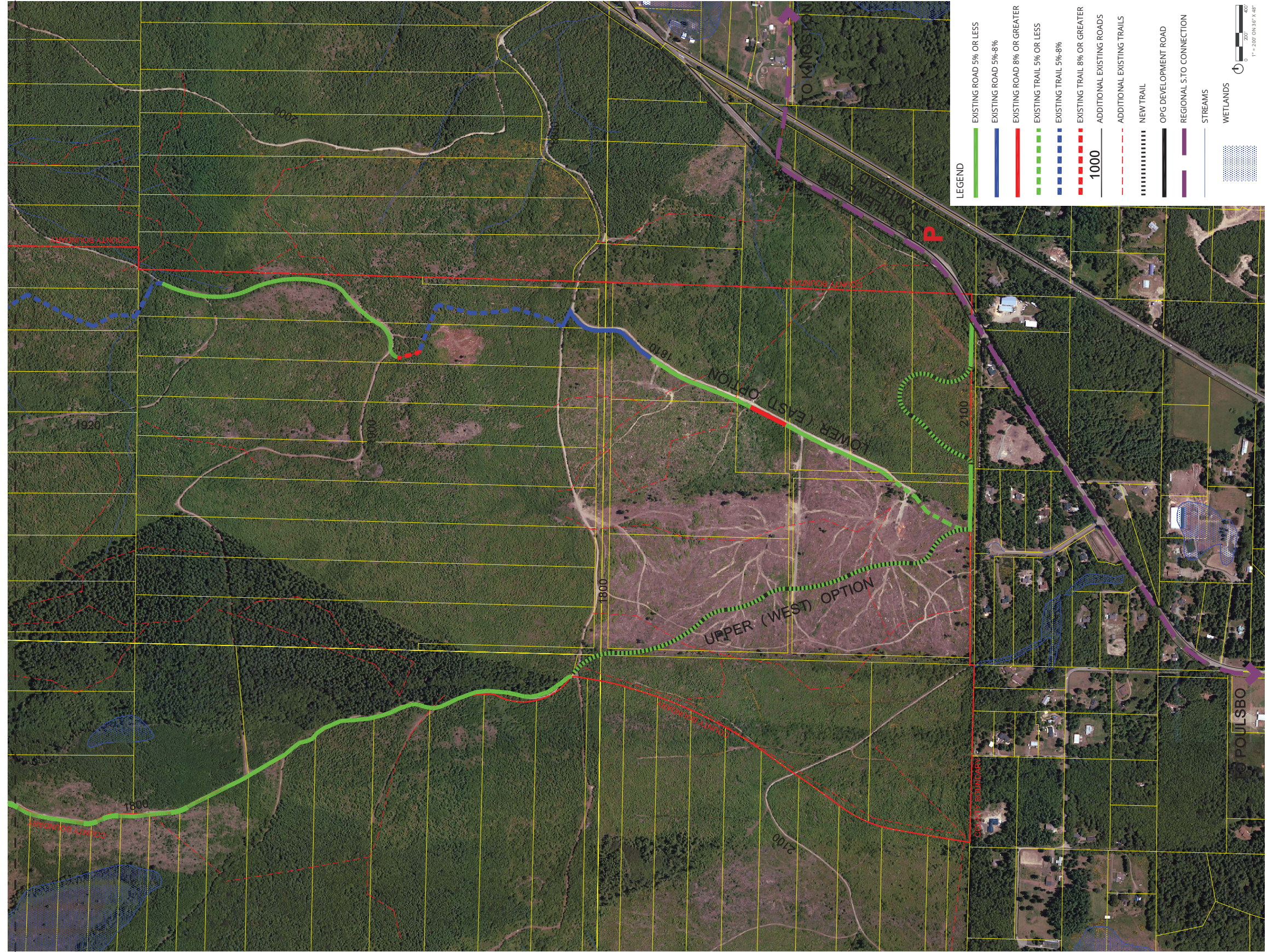
The areas of wetland identified along the trail alignment consisted of forested vegetation communities. The most common plant species in the wetlands include red alder, salmonberry, youth-on-age, lady fern, water parsley, stinging nettle, reed canarygrass, slough sedge and soft rush

The majority of the study area is maintained as timber land planted with Douglas fir and western red cedar, additional plant species include red alder, salmonberry, red elderberry, snowberry, English holly, salal, trailing blackberry, sword fern, youth-on-age, common horsetail, velvet grass and lady fern.

Existing Conditions (North)



Existing Conditions (South)



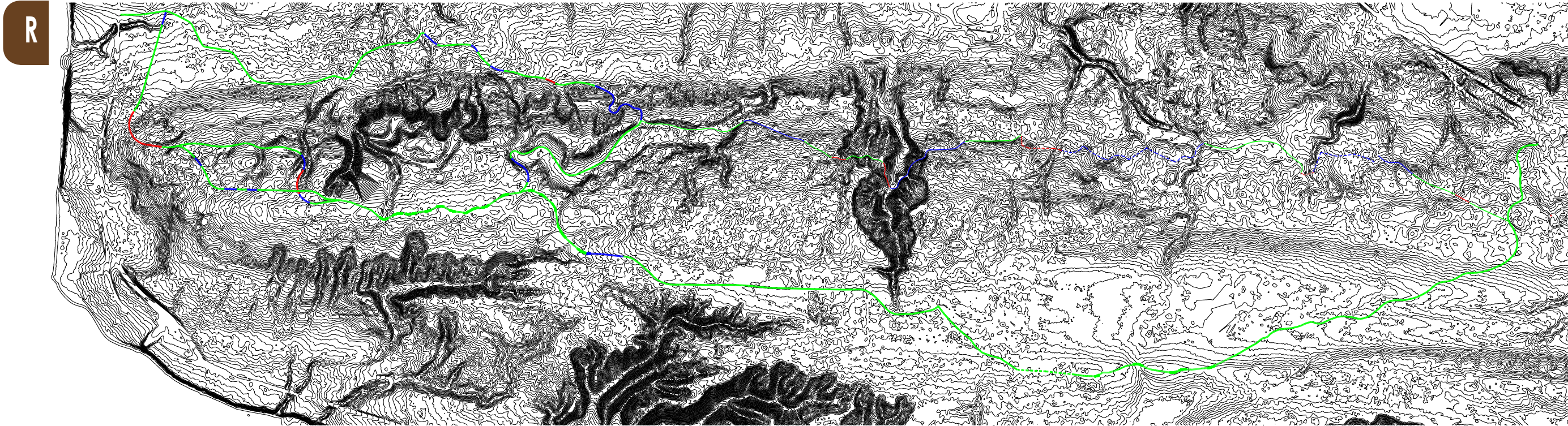


Figure 2R: Topo with Preliminary Trail Grades

Topography & Grades

Steep slopes, and the cost and environmental disturbance associated with building on them, are one of the major limitations for shared-use trails in this region. For the purpose of this feasibility study, there were two routes, previously identified by NKTA, that were the basis of investigation. As such, the scope for this study did not include significant investigation of alternate alignments that deviated from the general routes identified. However, there were a few areas near and between the two routes that were investigated with regard to topographic feasibility of connections.

One of the primary directives for the study was to analyze whether existing logging road corridors could be used for the shared-use trail, either beside the existing road or by sharing an improved roadbed. Analysis of existing road slopes was one of the first tasks performed in the planning process. LIDAR topographic data provided by the County was used to grossly calculate the slope along any given segment of the proposed alignment (Figure 2R). For planning purposes, existing slopes were identified in three categories:

- Less than 5% (considered accessible for a shared-use path per AASHTO standards). These segments are shown on the plan in Figure P as **green**.
- 5% to 8% (considered acceptable for a share-use path with mitigation). These segments are shown as **blue**.
- Greater than 8% (not recommended for a shared-use path). These segments are shown as **red**.

This planning analysis allowed us to understand, at a high level, where the significant problem areas were and to devise strategies for reducing slopes to below 8%.

The trail slopes as calculated during the planning-level analysis were:

Route:	Combo	Upper	Lower
• < 5% :	94%	86%	66%
• 5% to 8.33%:	5%	10%	27%
• > 8.33%:	1%	4%	6%

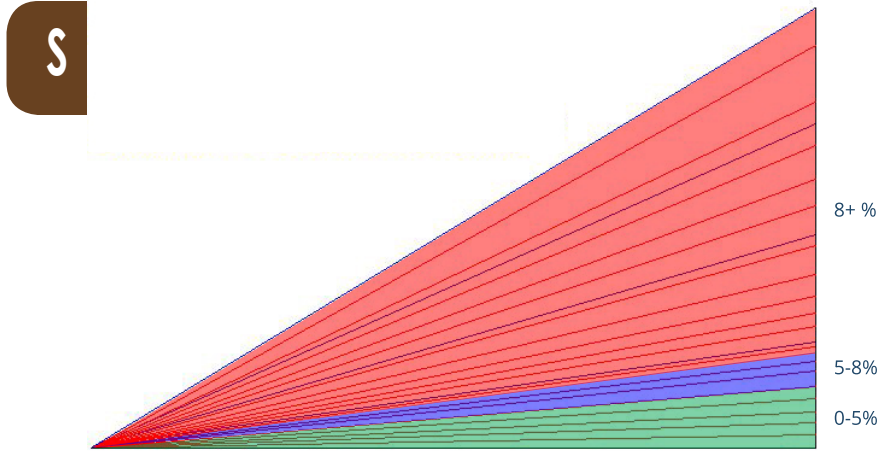


Figure 2S: Example of Trail Grade Thresholds

Slopes Per Preliminary Engineering

During the engineering phase, the engineer applied parameters to the design model to restrict the area of disturbance to a 40 foot wide corridor. The maximum side slopes will be 1.5:1 (horizontal distance: vertical distance) on cut slopes and 2:1 on fill slopes. After more detailed engineering of the alignment based on the LIDAR topography data, the slopes of the existing road were verified in several locations in the field (Figure 2T). Based on engineering and field verification, new vertical alignments for the path were developed.



Figure 2T: Slope Field Verification

In the end, the percentages of vertical slopes along two potential alignments were:

Engineering Analysis Route	Combo	Upper
• Less than 5% :	87%	86%
• 5% to 8.33%:	13%	8%
• Greater than 8.33%:	0%	6%

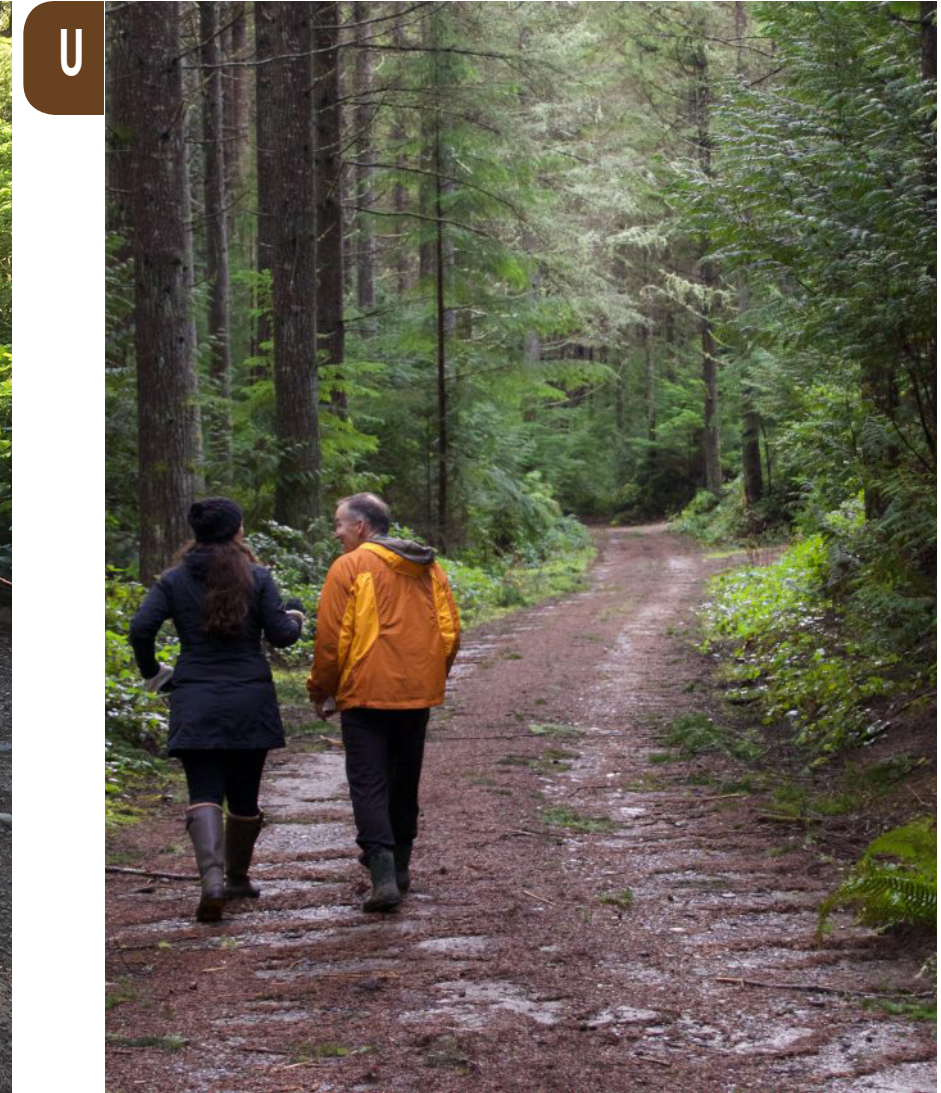


Figure 2U: Current Hiking Use (Photo Courtesy of Don Willott)



Figure 2V: Gated OPG Access

Timber Harvest Schedule & Impact

The proposed trail will pass through forestlands owned and/or managed by OPG and the County. OPG retains the rights to one more timber harvest on land recently sold to the County. To minimize implementation costs and reduce environmental impacts, the County adopted a strategy to use the logging road bed as the base for a new, paved shared-use path where feasible. Due to that fact, the potential inconvenience of infrequent trail closures is acceptable to the County. To accommodate logging activity traffic, the width of the shared use path was increased from 10' wide to 14' wide.

Based on infrequency of use for logging activities, the corridor should be designated as a trail (as opposed to a road) designed to accommodate maintenance vehicles and, in identified sections, to accommodate logging trucks. As such, portions of trail will need to be closed during logging operations, which would be infrequent based on discussions with OPG.



Figure 2W: Northwest Timber Harvest

Field investigation was done to determine the existing quality of various roads and their base courses to establish costs for changing those gravel roads to a wide, paved, shared-use path. Trail pavement sections (base course plus asphalt) for trail types were also developed by the engineer to inform costs for various trail segment development. These costs are reflected in Section 3 of this report.

During a Working Group meeting in April 2017, Adrian Miller (OPG Policy Resource Manager) provided a comprehensive summary of OPG's position and potential timber management strategies including:

- Tentative schedule for harvest blocks and years of harvest from 2017 through 2035.
- OPG supports sharing STO with the understanding that it will be closed periodically for harvesting.

- Trail should support logging trucks and will be designed as such (14' width).
- Hauling on weekends are less likely as mills don't operate and schedule typically starts early in the day and ends early in the day.
- Due to favorable site conditions winter logging is optimal.
- Majority of logs will "flow" off central blocks (recently acquired) with the topography to the east and use east/west roads, minimizing the need to use the Ridge road.
- Ridge road likely to be used more for hauling logs off the west OPG block, although closures would be for short segments for limited times.
- OPG will retain easements to use all current roads and future roads on land sold to the County.
- OPG has easements for interpretive/education signs- the STO trail will be a perfect location for these.
- We should plan for the "right" location of the trail based on all other criteria as harvest schedule and haul logistics are too uncertain at this point.
- OPG can do things to reduce user conflicts and provide access around closures using other trails.
- PUD will have easement for water line access.



Figure 2X: Wide Gravel Road Used by Logging Trucks

Summary of Existing Road & Trail Types

For the preferred Combo alignment, a majority (approximately 82%) of the proposed trail will be built upon existing logging and maintenance roads. Another 3% will be located adjacent to existing roads with a 5 foot wide buffer. The remaining 15% is proposed to be built where no current roadbed or trail exists. For the additional Upper segment, about half of the trail would be built upon an existing logging road (Road 1300). The other half will be newly constructed trail separated from a newly constructed road through the OPG development.

This strategy should minimize construction cost in addition to reducing disturbance to the landscape. As such, it is important to understand the current width and condition of sub-base for each existing road type. These factors will impact the cost to develop the trail on roadbeds of varying conditions.



Figure 2Y: Narrow Gravel Road Not Used by Logging Trucks

Type 1 - Wide Gravel + Used by Logging Trucks

A majority of the preferred Combo alignment will utilize existing logging roads that are wide, surfaced with compacted gravel and have a solid base. These include the 1000, 1300 and 1800 Roads. These roads have been used and maintained for decades. Little effort and cost will be required to prepare a subbase for pavement. Little to no grading will be required except in those short segments that are over 8% in longitudinal slope and need to be regraded to meet slope requirements.

Type 2 - Narrow Gravel + Not Used by Logging Trucks

A small portion of the preferred Combo alignment will utilize old logging roads that are more commonly used for maintenance activities. These are less wide and do not have the level of existing base course as the existing logging roads. This includes the 1100 Road between the parking area and town of Port Gamble. These roads have also been used for decades but not maintained to the same level. Additional effort and cost will be required to prepare a subbase for pavement. Some grading will



Figure 2Z: Dirt Recreation Path

be required in short segments that are over 8.3% in longitudinal slope to bring them in under 8.3% to meet slope requirements.

Type 3 - Dirt Recreation Path

There may be a few short segments that follow existing dirt recreation trails. These contain no discernible road base and are considered new construction for costing purposes. New construction segments (not occurring on existing road base but on virgin soil or recreation trail) occur at the south end of the project where a new path will connect the 1800 Road southeast to Stottlemeyer Road. It will also exist on the additional Upper segment from the Ride Park down through the OPG development to the town of Port Gamble. This segment will run adjacent to the new development proposed by OPG for this area.

2.7 Alignments Considered

Over the course of the planning and feasibility study the consultant team and Working Group looked at variations to the two preliminary north-south routes identified by NKTA in 2014. The following section summarizes each of these segment considerations and discusses the reasons for integrating them or discarding them as possible improvements to the preliminary alignments.

South End Connection - Context

It should also be noted that this study is not addressing the feasibility of connection south of the Stottlemeyer Road trailhead to Poulsbo. Utilizing Stottlemeyer south to the roundabout at Noll and Lincoln looks the most promising. Bond Road is too busy and provides challenges with safety and aesthetics. The County's Non-motorized Committee will be having ongoing discussions about this connection. Michael Bateman (Transportation Engineer) from Poulsbo Public Works

stated that there is no plan to put a traffic light at Big Valley Road and Bond as previously thought, which would be needed for a safe crossing of Bond Road for the STO route at that intersection. The Working Group agreed that a soft surface trail could still be implemented and maintained in the future through Millie's (if approved by the private landowner) as a recreation connection to the STO. Michael felt that a connection to Poulsbo utilizing Stottlemeyer would be preferable and most feasible.

South End Connection - West to Big Valley

The hand-drawn alignment and grading studies shown below in Figure AA was done early in the planning process to determine the best southern terminus for the trail feasibility study. It was determined by the Working Group that the study would not address the feasibility of a connection from the top of the ridge to the west, down what is known as the Millie's Trail connection to Big Valley Road. Instead, it was determined that the Stottlemeyer trailhead would be the southern terminus for this feasibility study. Three options were explored for the Millie's

connection, two of which would require agreement with private landowners. Due to steep slopes and limited land in which to work, much of the trail would need to have 8% longitudinal slopes. Millie's family has agreed in the past to lease the trail easement to NKTA for access to OPG land as a recreational footpath. Use of their land for a wide shared-use segment of the STO trail would need to be explored with them.

The Working Group did not determine a connection west to Big Valley Road was infeasible; however, the County has determined that the focus of the study should direct resources at studying the feasibility of an STO route which connects through the Stottlemeyer Trailhead.

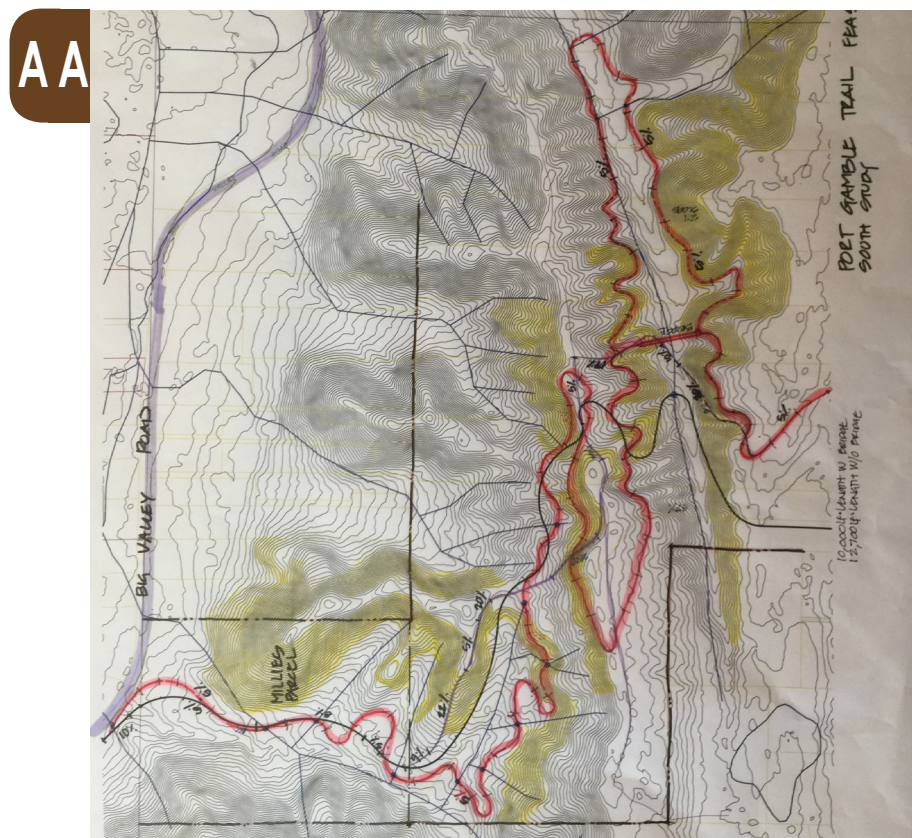


Figure 2AA: First Alignment of Millies Area (1/2017 Meeting)



Figure 2AB: Field Investigation of Routes (Photo Courtesy of Don Willott)

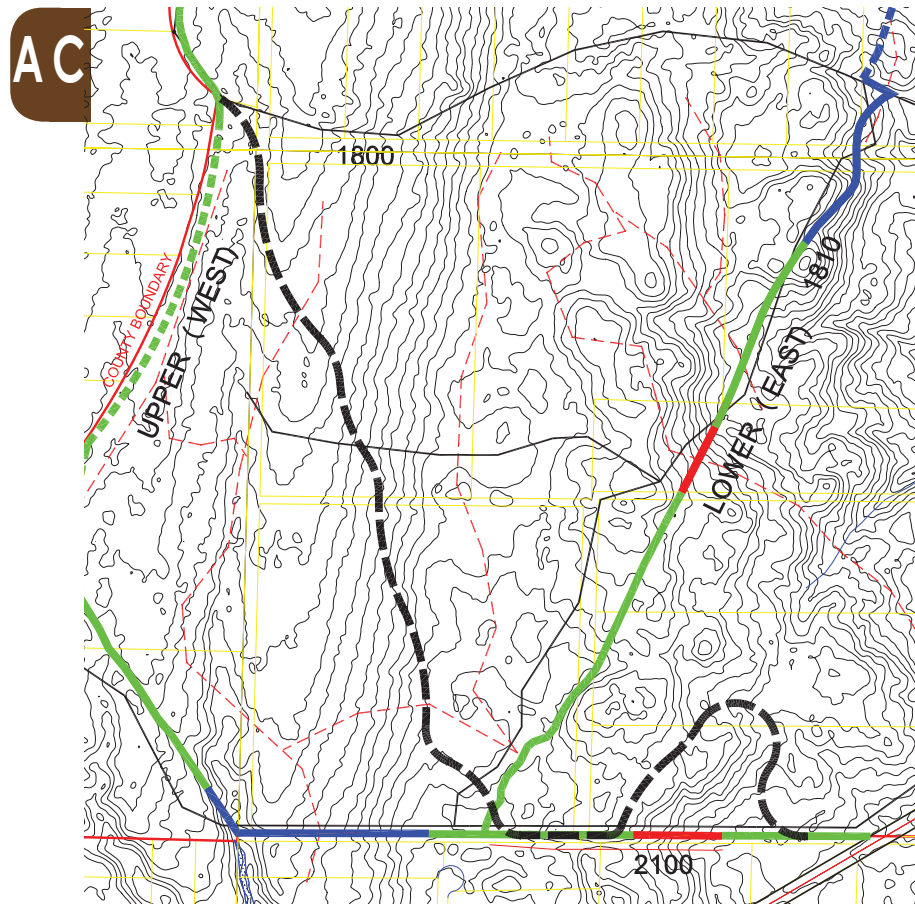


Figure 2AC: Route Identified from Ridge Road to Stottlemeyer

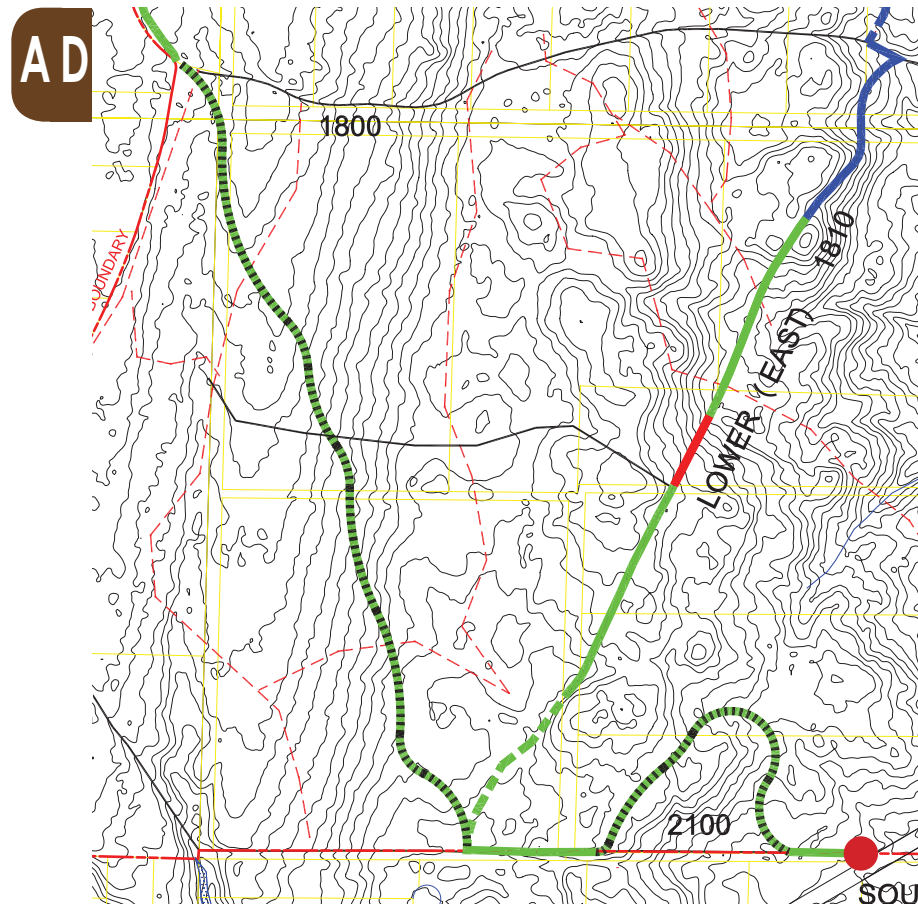


Figure 2AD: Evolution of Planning for the South Connection

South End Connection - East to Stottlemeyer

Early field assessment and desktop engineering indicated that the southern half of the Lower alignment, as identified by NKTA, would be problematic due to steep longitudinal slopes of existing logging roads and trails that were being considered for the new path corridor. As such, a new route, not utilizing existing roads, was identified as shown in Figures 2AC and 2AD. This route would be under 5% in grade until it intersected with the 2100 Road at the south end of the project area. There is a steep section (over 8.3%) on this road so a bypass loop of new trail was proposed, ending at Stottlemeyer Road.

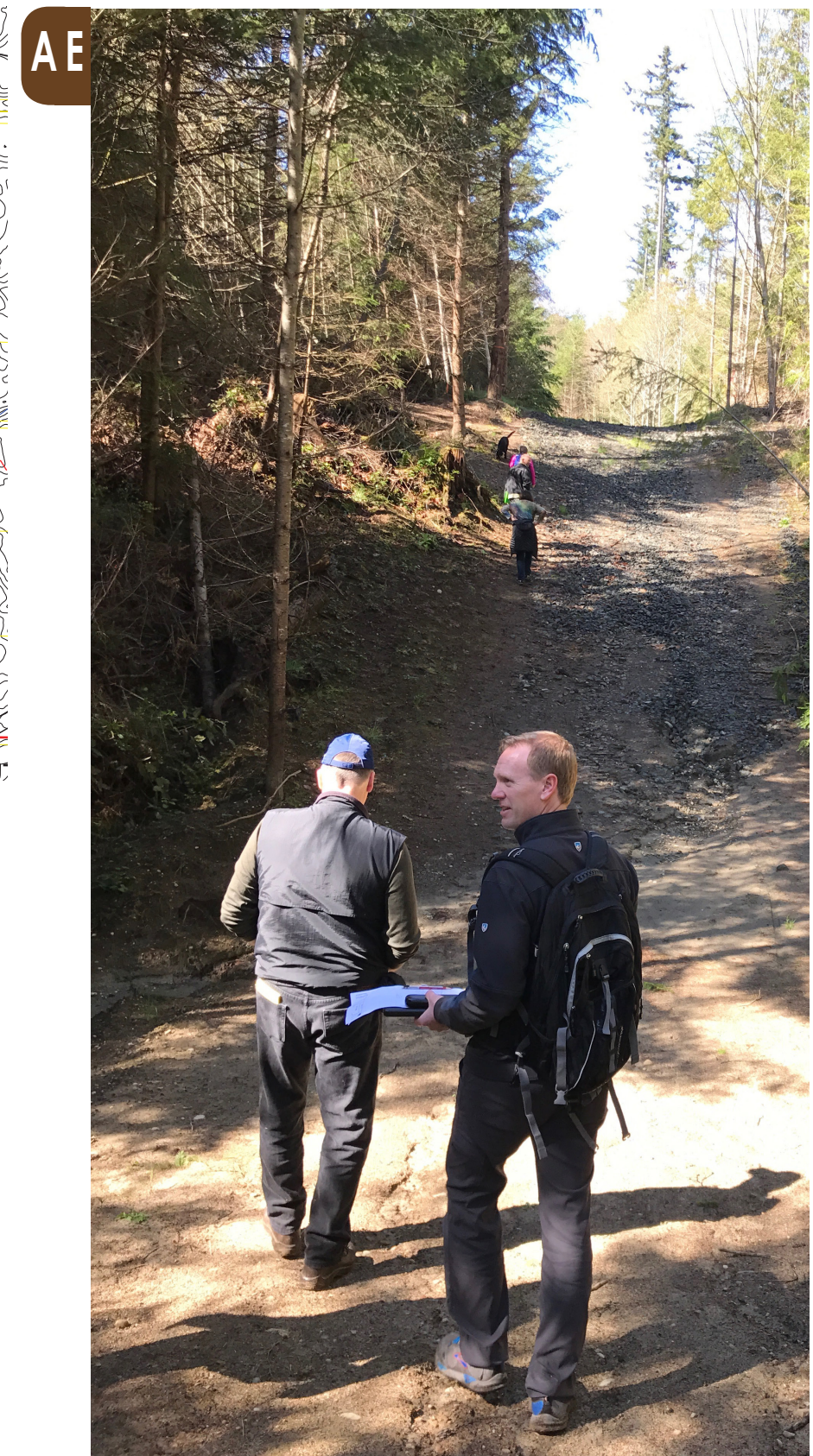


Figure 2AE: Field Investigation of Routes (Photo Courtesy of Don Willott)

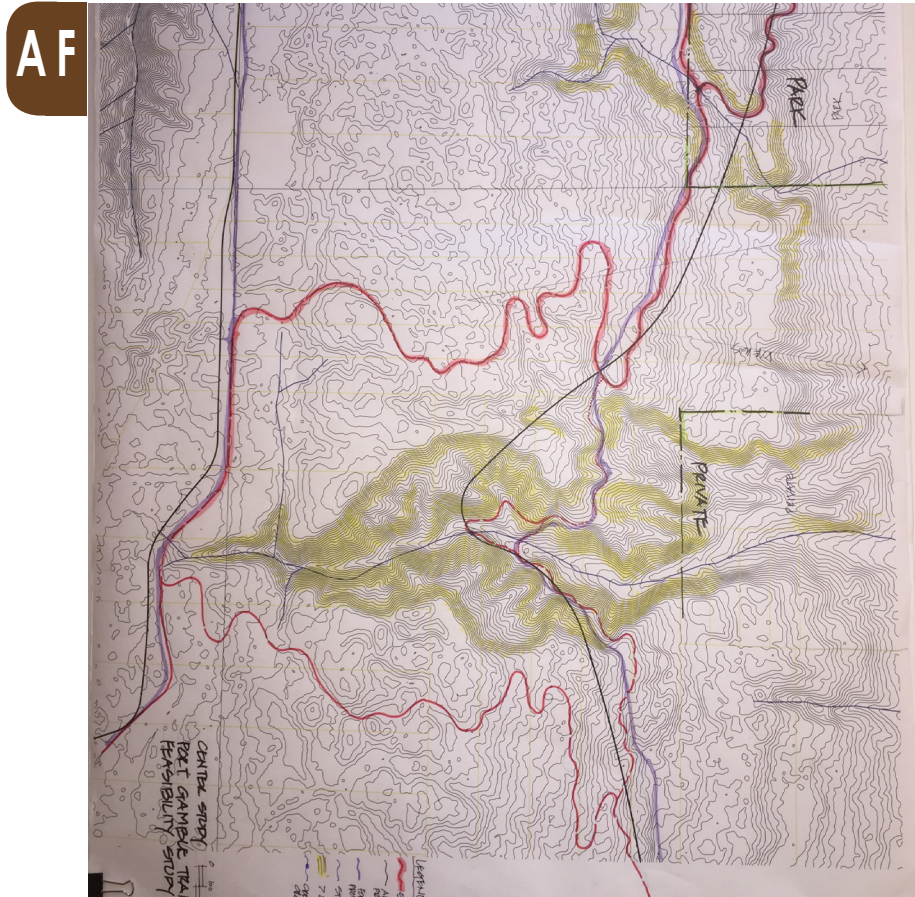


Figure 2AF: Study of Connection Between Upper and Lower (Jan.2017 Meeting)

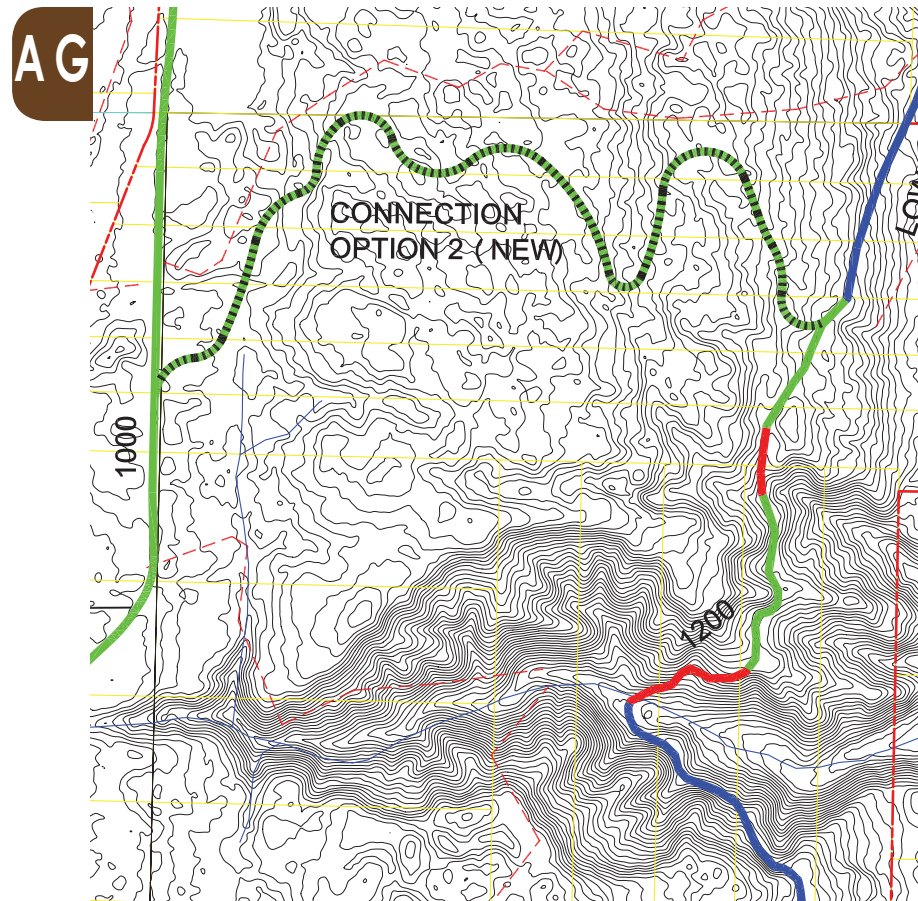


Figure 2AG: Study of Connection Between Upper and Lower (Feb .2017 Meeting)



Figure 2AH: Field Investigation of Road Slopes

Connection Between Upper and Lower Routes - Early Studies

Since the southern portion of the Lower option was determined to be infeasible due to steep grades, other options were explored. One was the 1000 Road up to the 1300 Road, which was the route that was eventually selected as the preferred Combo alignment (see next section). Prior to that, other connections were studied between the southern segment of the Upper alignment and the northern segment of the Lower alignment.

Another connection option originally considered was further south of the 1300 Road (Figures 2AF and 2AG). The Working Group was concerned that an additional new path would add

to habitat fragmentation and was not consistent with the County's Resource Stewardship & Access Plan. The connecting trail would be completely new trail to accommodate the grade requirements, and four wetlands were found in the vicinity of the proposed trail. As such, this alternate segment was not considered further and focus shifted to an existing corridor—the 1000 Road as a means to make a connection between the Upper and Lower routes.

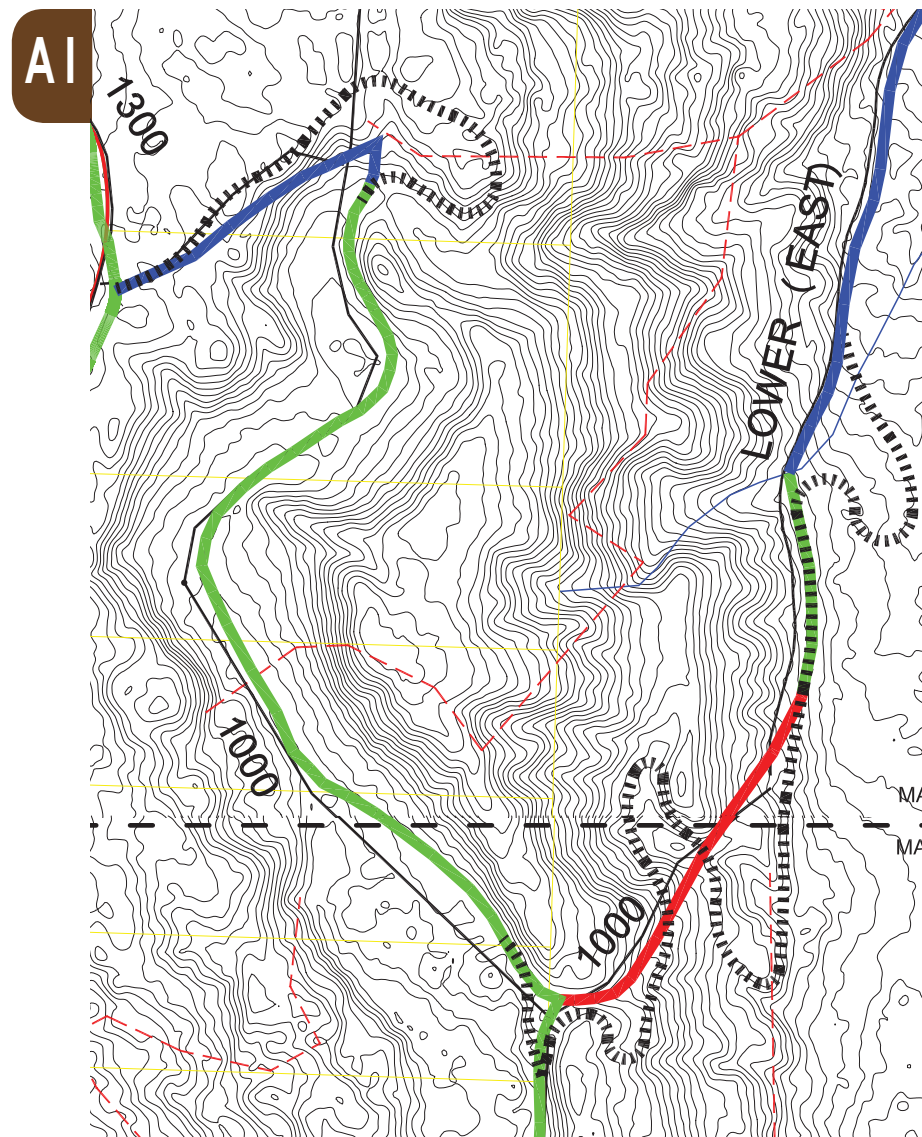


Figure 2AI: Existing Road Grades and Possible Alignments

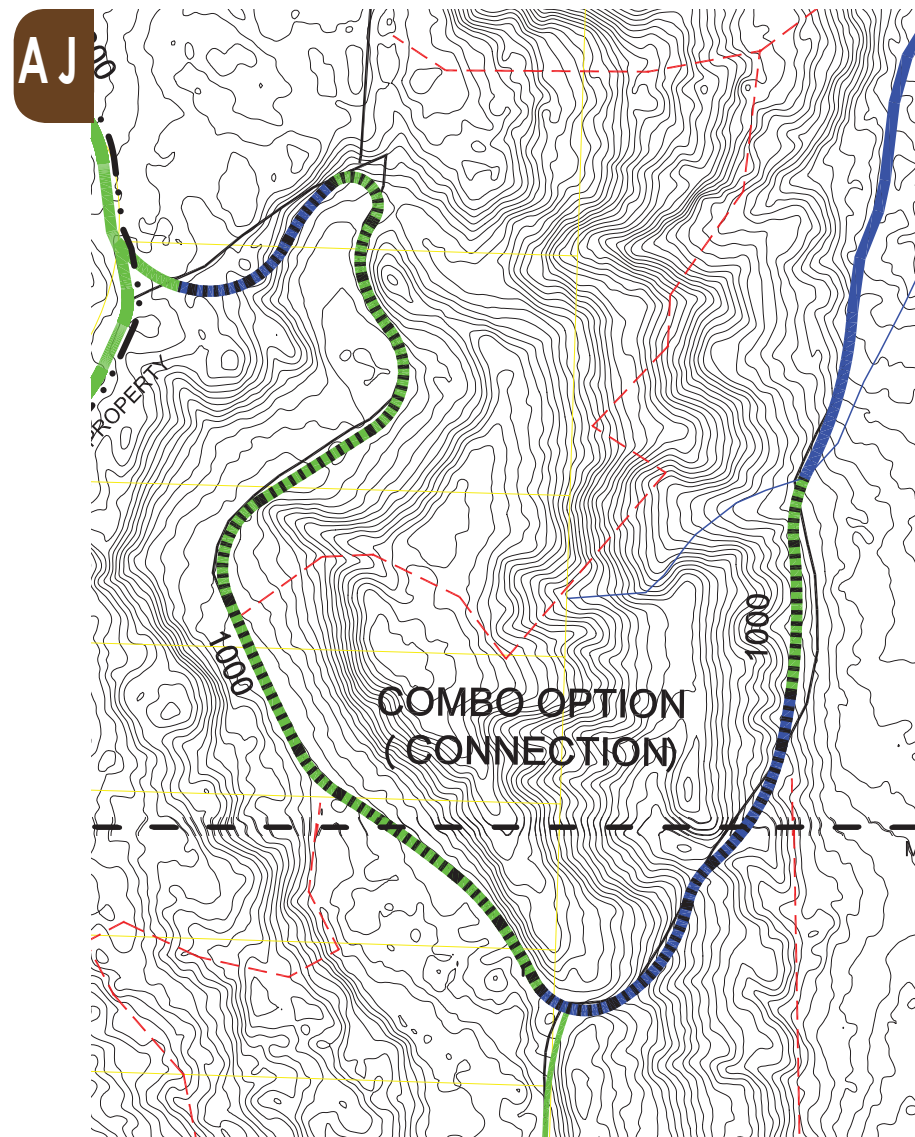


Figure 2AJ: Proposed Grades for Trail on 1000 Road

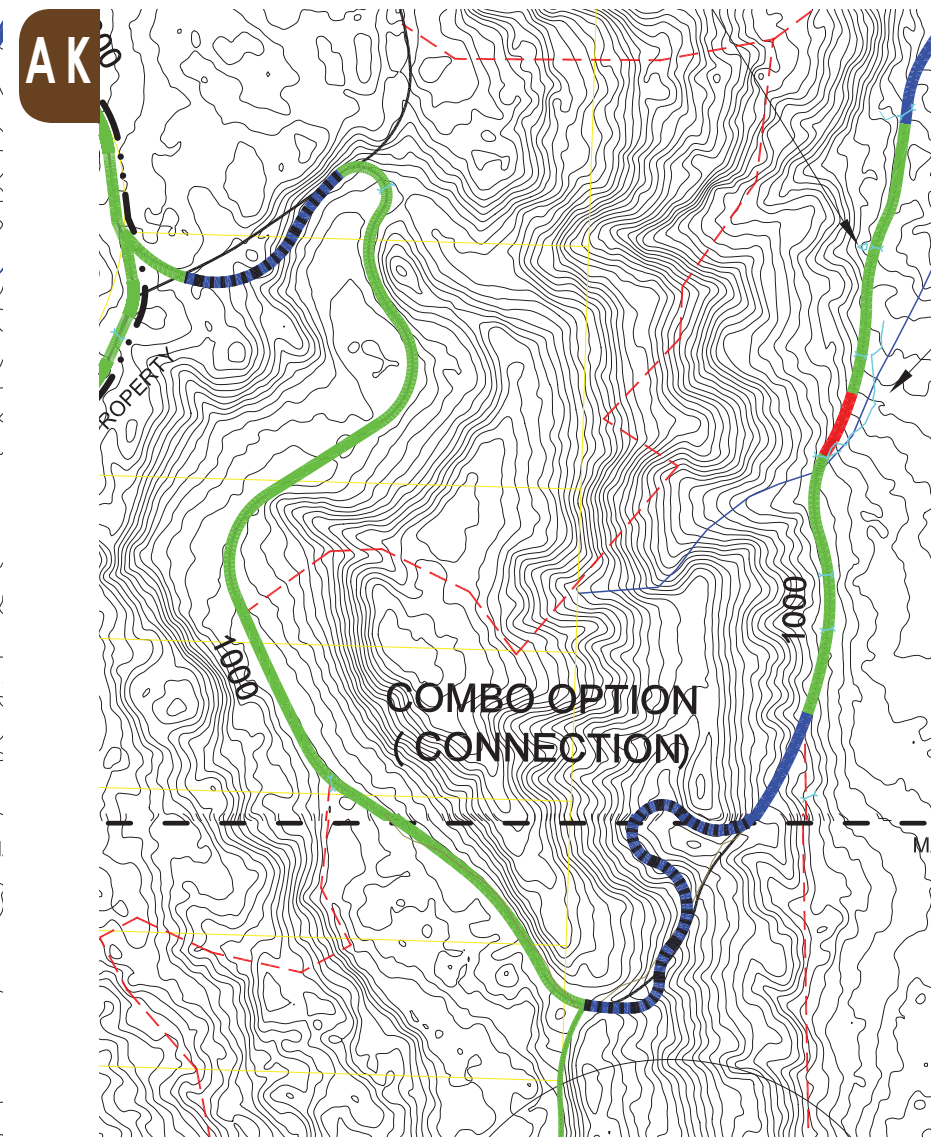


Figure 2AK: Refinement of Alignment Based on Field Study

Connection Between Upper and Lower Routes - The Evolution of the Combo Route

Through field work and desktop engineering, it was determined that the 1000 Road was the best opportunity to connect the Upper and Lower routes originally proposed by NKTA. However, this connection, a vital segment in the “Combo” alignment being proposed has significant slopes.

In Figure 2AI, an analysis map from one of the early Working Group meetings demonstrated that there were long segments of 5-8.3% slope (blue line) and 8.3% and greater slope (red

line). As such, a new alignment for this corridor was identified and is depicted as the dashed black line. This alignment shows what is necessary for a 5% or less slope. It was determined that this would result in too great a cost and result in too much habitat disturbance. As such, the alignment was designed to have long sections of steeper slope (closer to the 8.3% maximum for a shared use trail (Figure 2AJ). It was at this point that decided to field test the slope of the existing roads in this area to see how accurate the LIDAR topo data was and whether we could rely on gross engineering we had performed to date. It became evident that there were several areas where a new small alignment would be required to stay under 8.3% in slope (Figure 2AK). There were also a few

step segments of over 8.3% that were short enough that it was determined these could be “graded out” while staying on the existing road corridor meaning that the grade of the road would only need to move up or down in that short segment (such as depicted by the short red line in Figure 2AK.



Figure 2AL: First Alignment of North Problem Area (January 2017 Meeting)

Upper Route - Connection Between the Ride Park and Port Gamble Town

One of the most significant challenges in this feasibility study, and one of the reasons for two alternate alignments on the north portion of the project, was how to get the shared-use path down off the plateau and into the Town of Port Gamble. Early desktop engineering on LIDAR topo reveals significant switchbacks (Figure AL). At this early stage of planning, utilizing the right-of-way of the proposed OPG road was not yet a consideration. A

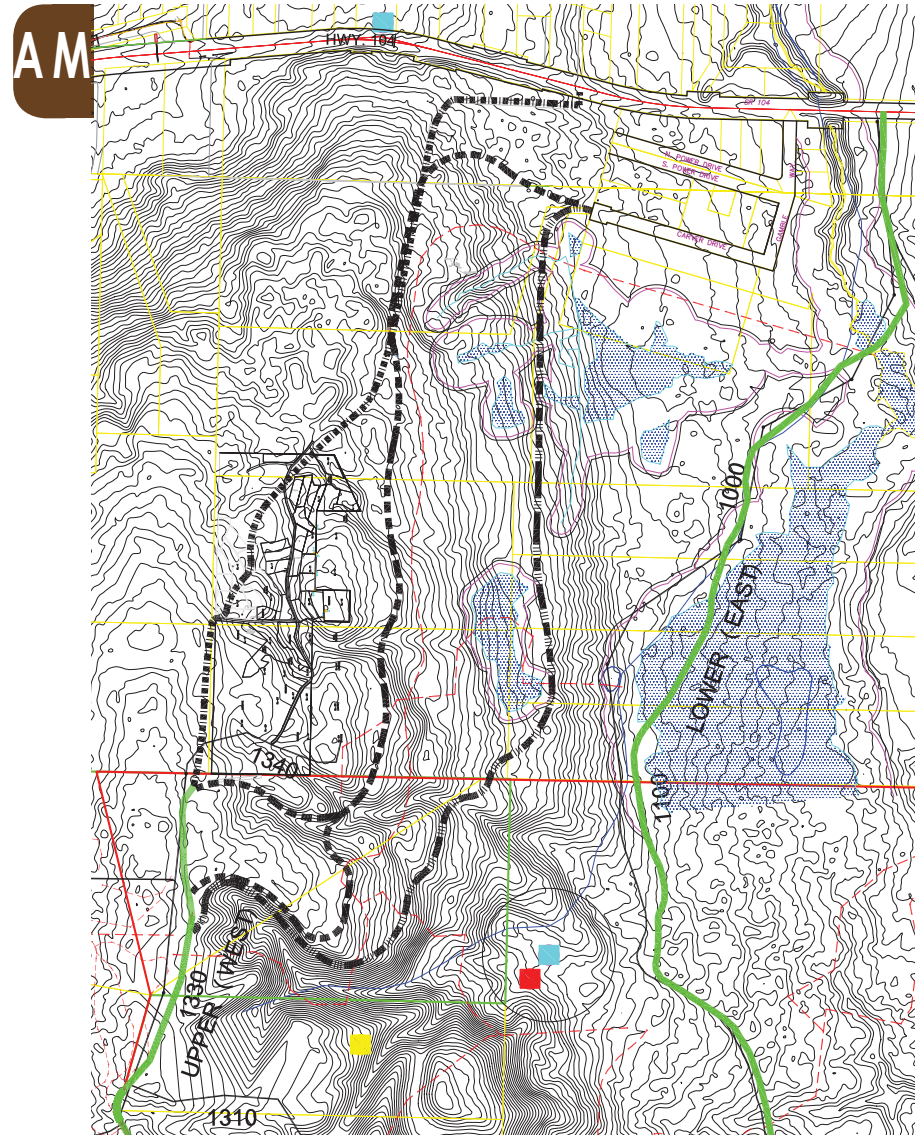


Figure 2AM: Initial Alignments Considered

After field investigation, a west route near the new OPG septic facility was identified. At the same time, OPG's development engineers suggested an east route through Babcock Farm (Figure 2AL and Figure 2AN). Discussions amongst the Working Group led to a consideration of a roadside path. While a roadside path is allowed to be over 8.3% if it meets the grade of the road, the group was concerned about user experience and OPG was concerned that development planning had not accommodated a wider ROW to this point.



Figure 2AN: Field Investigation of Connection Between Upper Areas and Town (Photo Courtesy of Don Willott)

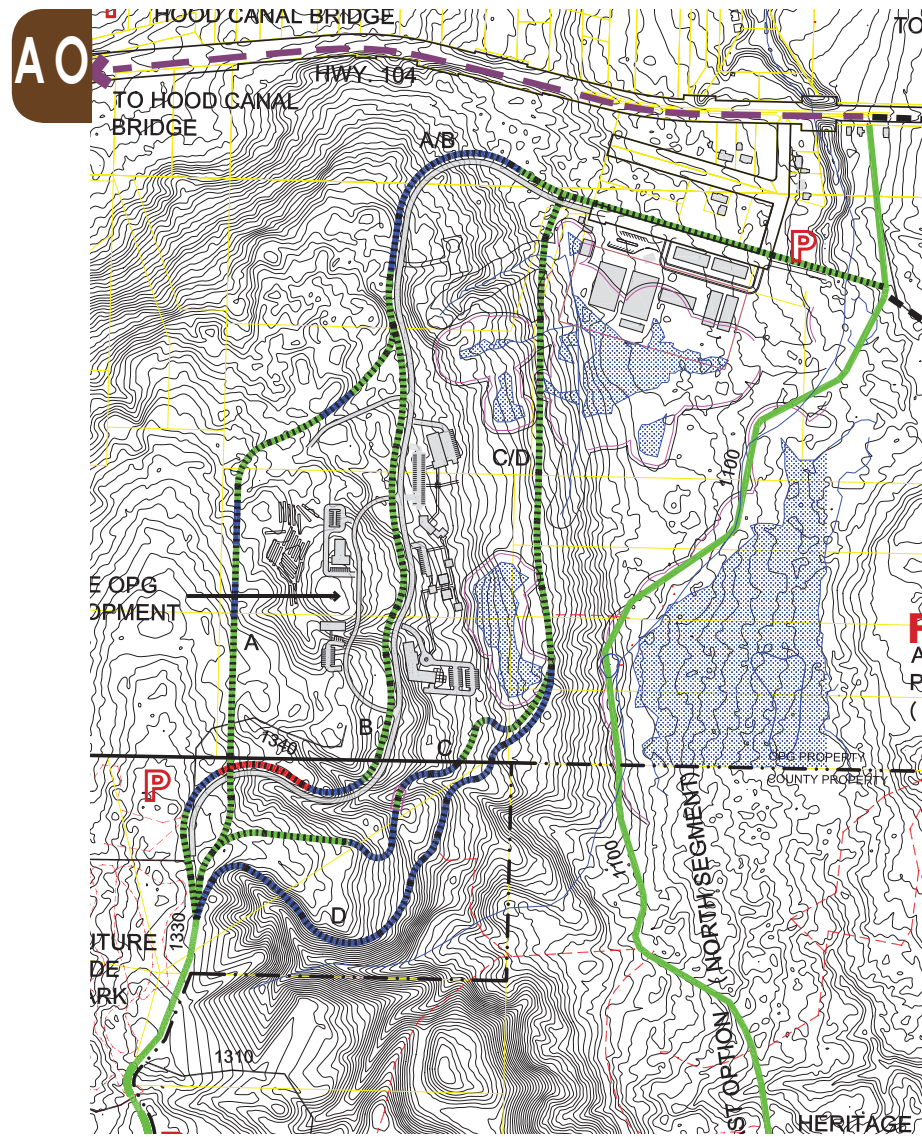


Figure 2AO: Four North End Routes Considered

Further field investigation helped to refine these four options, now labeled A through D (Figure 2AO). General grades of each were determined by desktop engineering and each was analyzed and metrics were presented at a Working Group meeting with regard to distances and slopes.

Additional field investigation by the consultant team and the Working Group identified significant challenges for options C and D including proximity to critical areas, what appeared to be sloughing slopes, terrain with extreme side slopes, the need for a bridge and disturbance of a mature forest. Due to these factors options C and D were not considered further. Two options emerged- A and B as shown in Figure 2AP.

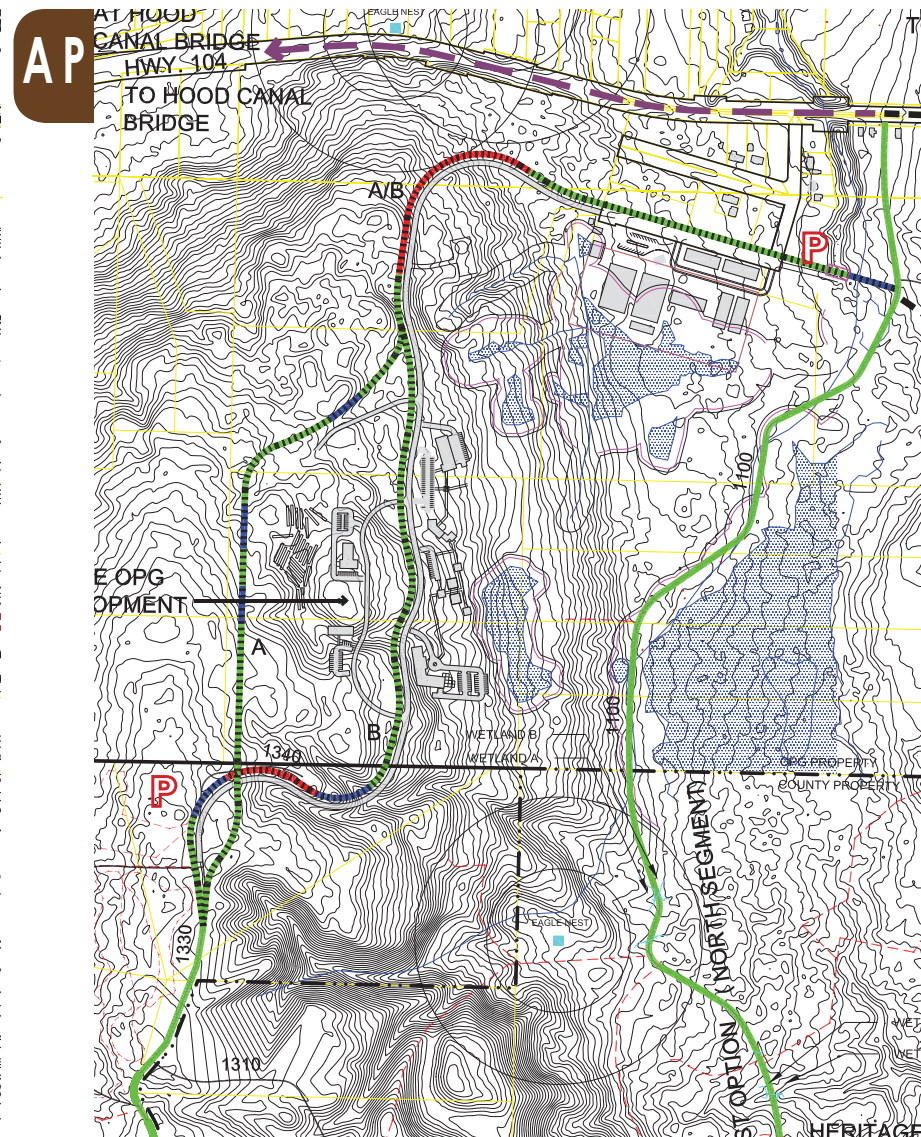


Figure 2AP: Evolution of the North End Routes

Since a majority of this segment is within OPG property and within their newly proposed development, finding a solution that OPG was agreeable to was important. Each successive proposal- whether it was based on field investigation or desktop engineering, was vetted internally by OPG to make sure it did not conflict with their program and goals for the area.

At this stage, OPG determined that the west route through the septic field area was not feasible for them and that they preferred a roadside trail through their proposed development. OPG then revised the ROW for their development plans to provide an additional 17 feet width for the 10 foot wide trail, two foot shoulders and five foot separation width from the edge of the road.



Figure 2AQ: Field Study of North End Routes - Babcock Farm (Photo Courtesy of Don Willott)

Option B is the route through OPG property that is included in the Preliminary Engineering plans and cost estimate for the feasibility study.

There is an opportunity to create a “loop” trail at the north end of the project using whichever alignment option is not eventually selected as the STO route. The 1000 road can connect the Upper (1300 Road) and Lower (1100 Road) routes at the south and the town can connect the routes at the north. This will be an amenity for the town. The loop segment that is not STO trail will likely require a different funding source than that used for the STO.

2.8 Analysis of Planning Alignments

For the first several months of field study, desktop engineering and Working Group meetings, three alternative alignments were being considered. Variations on each of the alignments were considered and the specific route of each of the alignments evolved over time, as is demonstrated by the options considered and discussed in the previous section. Per this analysis and discussion of the Working Group, the Lower option was removed from consideration for further study and more detailed engineering in March of 2017. Below are the statistics for each of the alignments at the time of this decision. If compared closely with the statistics for the Combo and Upper alignments as summarized in the following chapter, one will notice discrepancies. This is due to the alignments being continually refined during the planning process and more specific engineering design occurring during the preliminary engineering phase.

Comparison of Alternatives During the Planning Phase

	Combo	Upper	Lower
< than 5% :	95%	90%	66%
5% to 8.33%:	5%	10%	27%
> 8.33%:	0%	0%	6%
% Currently Trail:	2%	3%	15%
% Currently Road:	70%	66%	68%
% New Path:	28%	31%	17%
Distance:	7.4 Miles	6.1 Miles	6.3 Miles

Evaluation Criteria & Scoring Process

The evaluation of alternate routes was an iterative process, the pros and cons of each were discussed amongst Working Group members, each with a diverse expertise and interest related to the project. This is demonstrated by the various segments considered and discussed in the previous sections.

Early in the planning process and during the second Working Group meeting a list of evaluation criteria was presented to the group. The goal for developing these was to create a semi-quantitative means to track and score the alternate routes we were considering. The discussion resulted in additional criteria being added, categorization of the criteria, a potential value for each of the criteria (between 0 and 3), and a scoring of

each route with regards to that criteria value. At each of two subsequent meetings we revisited the evaluation criteria based on changes to the evolving alternative alignments. The table on the following page represents the last scoring exercised performed, at which point the Working Group decided to focus further planning and engineering efforts on the Combo and Upper alignments, dropping the Lower alignment from further consideration.



Figure 2AR: In-field Verification of Routes as Generated by Desktop Engineering (Photo Courtesy of Don Willott)

CONNECTIONS	very important		not important		Upper / West	Score	Lower/East	Score	Combined-East/North & West/South	Score	Comments on Criteria
	Notes and/or quantities				Notes and/or quantities				Notes and/or quantities		
1 Meets shared-use path AASHTO design stds.. (eligible for funding)	3				83% is 5% or less, 10% is 5-8%, 7% is >8%	2	66% is 5% or less, 27% is 5-8%, 6% is >8%	2	90% is 5% or less, 10% is 5-8%, 0% is >8%	3	See standards provided in table and trail sections
2 Provides regional connectivity-STO Trail	3				Highway 104 to Stottlemeyer	3	Highway 104 to Stottlemeyer	3	Highway 104 to Stottlemeyer	3	To STO trail north & south ends
3 Provides regional connectivity-Communities	3				Poulsbo, Kingston, Port Gamble	3	Poulsbo, Kingston, Port Gamble	3	Poulsbo, Kingston, Port Gamble	3	Poulsbo, Kingston, Port Gamble
4 Connects to developed/proposed recreation facilities		2			Connects to proposed Ride Park	2	Connects to Airfield and Heritage Park	2	Connects to Airfield, Proposed Ride Park	2	Ride Park, Airfield, Heritage Park
5 Connects to recreation trails - mtn. biking + hiking		2			Mtn. Biking & Hiking	2	Mtn. Biking & Hiking	2	Mtn. Biking & Hiking	2	Throughout the site
6 Proximity to parking		2			Bridge P&Ride, Ride Park (proposed)	1	Airfield, Bridge P& Ride, Heritage (full)	2	Airfield Bridge P&Ride, New Lot (proposed)	1.5	Existing Bridge P&Ride,104 and proposed at Ride Park
7 Avoids conflicts with planned recreational uses (races)		2				2		1.5		1.5	Annual mountain bike and foot races- they use 1000 Road
8 Convenient ADA Access		2			Best once Ride Park complete	1.5	Acceptable with new lot	1.5	Acceptable with new lot	1.5	
9 Connects to highways and streets			1		104, Stottlemeyer	0.5	104, Stottlemeyer, Mid Pt.	1	104, Stottlemeyer, Mid Pt.	0.75	SR 104
10 Connects to future attractions			1		Winery, Amphi, H. barns, Info Ctr., Town	1	Town	0.5	Town, Airfield, Wetland Trails	0.75	
11 Connects to logging roads				0		0		0		0	Not determined to be important
LAND OWNERSHIP & LAND USE											
1 Located on public land	3					2.5		2.5		2.5	N. Portions on OPG- All, Assume 6/2017 purchase will occur
2 Uses existing logging roads and/or trails	3				66% Roads, 3% Trail, 31% New Trail	2	68% Road, 15% Trail, 17% New Trail	2.5	70% Road, 2% Trail, 28% New Trail	2	
3 Located on private land where easement is feasible			1			1		1		1	
ECOLOGY & LANDSCAPE CHARACTER											
1 Minimize disturbance- wetlands / drainages	3					3		1.5		2	Per ELS wetland assessments
2 Minimize disturbance- near identified habitat (eagle, etc..)	3					3		1		2	
3 Minimize disturbance- forest in protected mature stands	3										Need more data - where are these?
4 Minimize disturbance- topography /steep side slopes	3				1800 LF	2	3200 LF	1.5	800 LF	3	
5 Diversity of views and landscape character		2			Water, Forest, Farm & Mountain Views	2	Water, Forest, Ravine Views	1.5	Forest, Wetlands, Water, Farm & Mountain Views	2	
6 Minimize disturbance- forest in timber management areas			1			1		1		1	Most forest being actively managed for timber
7 Interpretive opportunities			1		Views, Forest Mgmt.	1	Views, Farm, Forest Mgmt.	0.5	Eagle, Habitat, Views, Forest Mgmt.	1	
CAPITAL COSTS											
1 Minimizes structures (bridges and walls)	3				Bridge near town needed	2	Culverts	2		1.5	
2 Minimize cost	3				Shortest, Moderate Retaining Walls	3	Mod Length, Most Slopes w/ Retaining Walls	2	Longest with fewest slopes/ retaining walls	2.5	
3 Minimizes overall length		2			31,957LF, 6.1 Miles	2	33,160 LF, 6.3 Miles	1.75	39,120 LF, 7.4 Miles	1.5	
	33	14	5	0		42.5		37.3		41	Maximum Points =52

Table 2AS: Evaluation Criteria & Scoring from Working Group Exercise



Figure AT: Wetland Complex at Project Site (Photo Courtesy of Jeff Peterson)

2.9 Preliminary Engineering/Site Optimization Software

The feasibility of routing approximately six miles of trail through hilly terrain was made efficient through the use of various software. The alignments were engineered using both AutoCAD Civil 3D and SiteOps. AutoCAD was used to develop horizontal and vertical profiles for trail segments proposed on existing roadbeds. In the case of SiteOps, the alignment was draped over a terrain model (Figure 2AU), and minimum/maximum longitudinal centerline profile slopes were inputted, together with the proposed cross-section template and pavement section depths. SiteOPS analyzed the minimum/maximum elevations- every point can be based on the design thresholds inputted. The design thresholds were based on AASHTO standards summarized in Table 2D and shown graphically with trail cross sections in Section 3 of the report. The final step yields a finished grading plan and a quantity of materials for that alignment. This information was then imported into AutoCAD Civil 3D software to produce the feasibility plan and profile sheets found in Appendix A. A plan and profile sheet is shown an example on the opposite facing page in Figure 2AF.

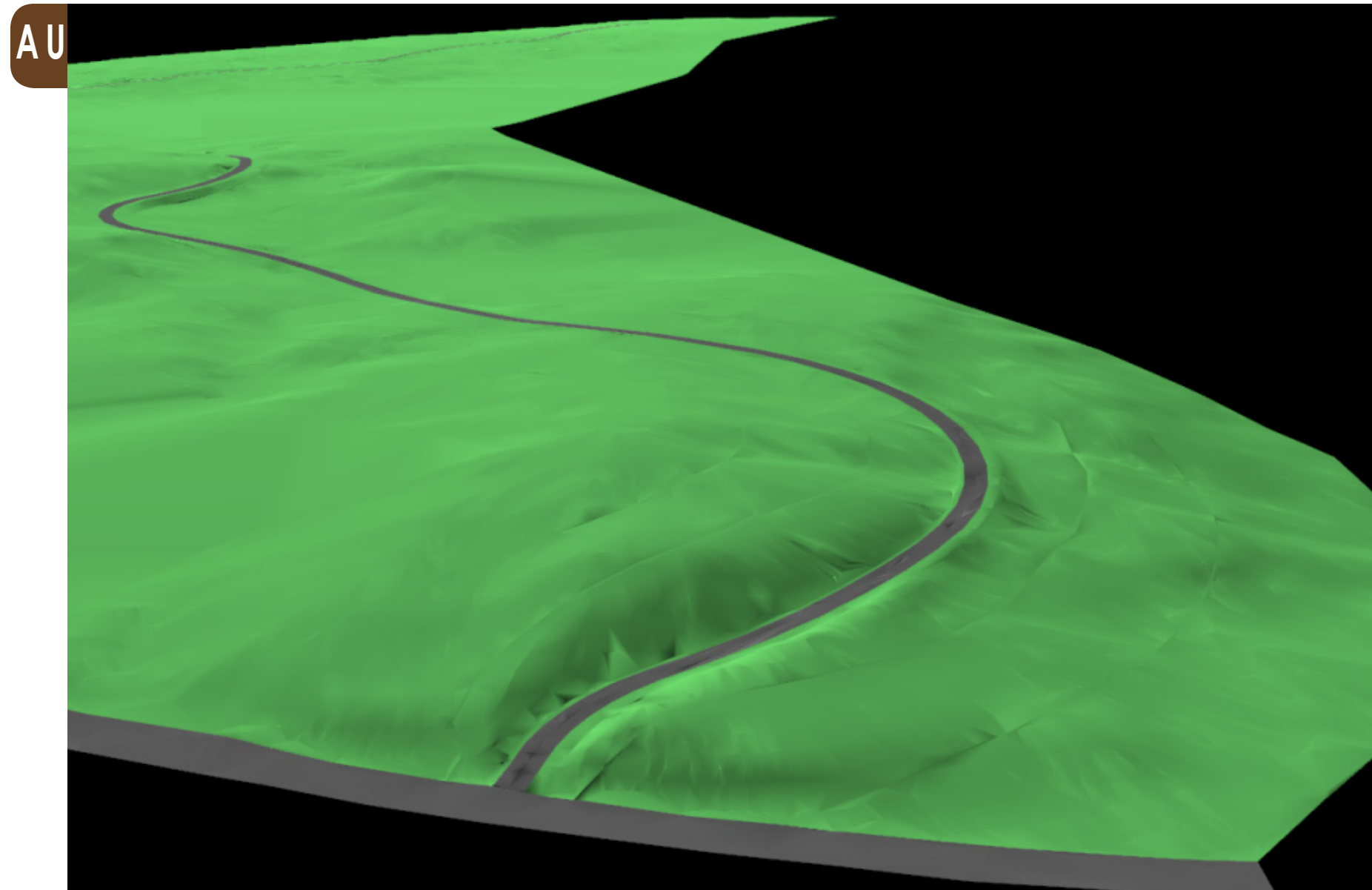
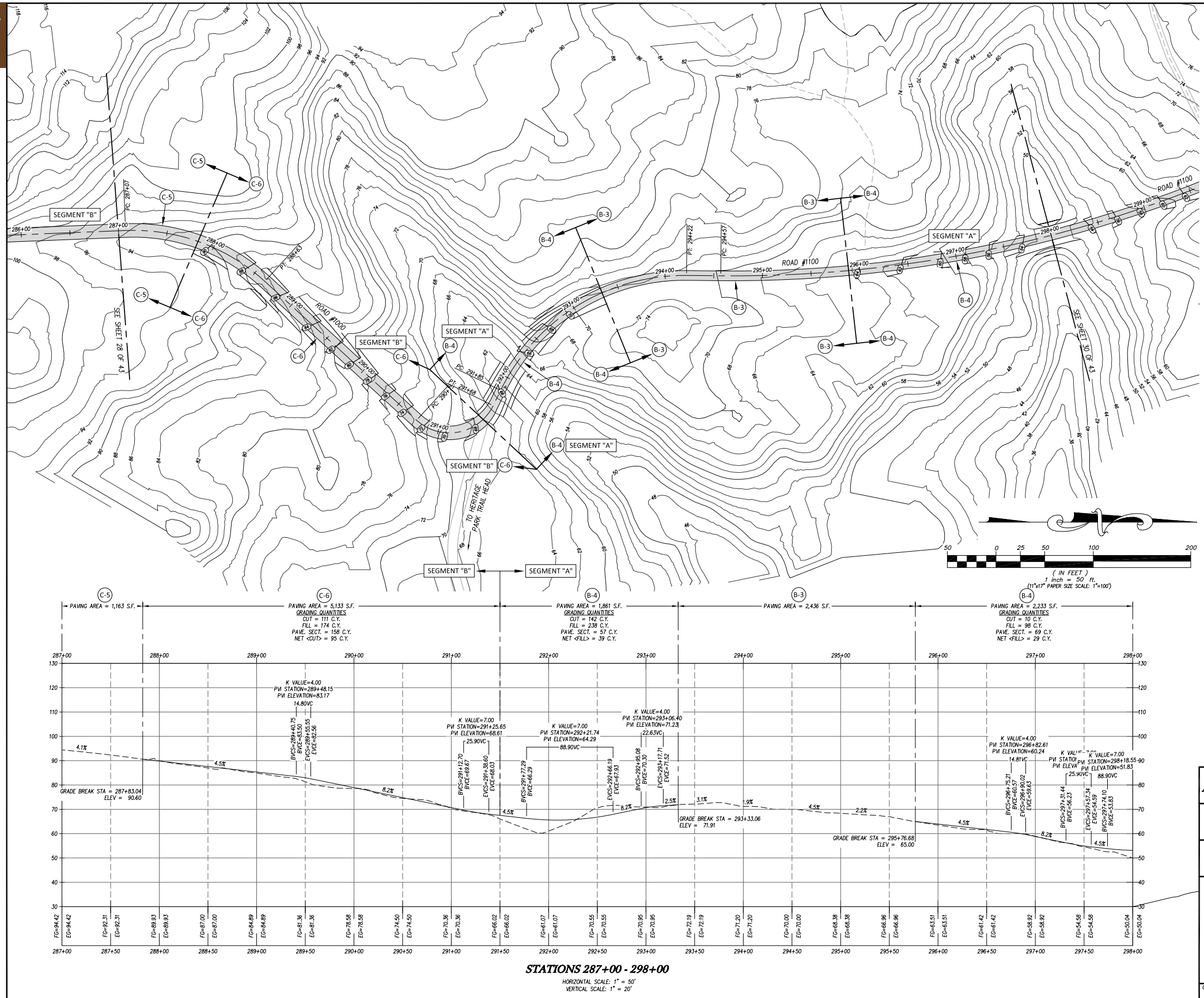


Figure 2AU: Graphic Output of Site Ops for Trail Segment off of Stottlemeyer Road (Image Courtesy of MAP)



- PROPOSED TRAIL TYPES/SECTIONS**
- A - 10' WIDTH: SEPARATED FROM ROAD
 - B - 10' WIDTH: SHARED (NO LOGGING)
 - C - 14' WIDTH: SHARED (LOGGING TRUCKS)
- ROAD CATEGORIES**
- 1 - 10' PAVEMENT WIDTH FOLLOWING EXISTING GRADE
 - 2 - 10' PAVEMENT WIDTH AT NEW GRADE
 - 3 - 10' PAVEMENT WIDTH ON EXISTING ROAD FOLLOWING EXISTING GRADE
 - 4 - 10' PAVEMENT WIDTH ON EXISTING ROAD AT NEW GRADE
 - 5 - 14' PAVEMENT WIDTH FOLLOWING EXISTING GRADE
 - 6 - 14' PAVEMENT WIDTH AT NEW GRADE
 - 7 - 14' PAVEMENT WIDTH ON EXISTING ROAD FOLLOWING EXISTING GRADE
 - 8 - 14' PAVEMENT WIDTH ON EXISTING ROAD AT NEW GRADE

LEGEND

--- PROPOSED PORT GAMBLE TRAIL
 - - - - - N.K.T.A. EX. ROADS



NO.	DATE	DESCRIPTION	BY
4	12-15-17	REVISED PER COMMENTS	KFF/QJD
3	11-22-17	REVISED PER COMMENTS	KFF/QJD
2	11-1-17	REVISED PER COMMENTS	KFF/QJD
1	9-28-17	REVISED PER COMMENTS	KFF/QJD

PORT GAMBLE TRAIL FEASIBILITY STUDY

STATION 287+00 - 298+00

FOR FISCHER BOUMA PARTNERSHIP
 310 MADISON AVE SOUTH, SUITE A
 BAINBRIDGE ISLAND, WA 98110

CONTACT
 JEFF BOUMA
 (206) 716-0799



P.O. Box 110 • 1309 Clear Creek Road NE
 Silverdale, Washington 98133
 Silverdale 602-8525 • Seattle (206) 680-5574
 Fax (360) 698-0546

CALCULATED	DESIGN	DRAWN	CHECKED	DATE	SCALE	JOB NO.	SHEET
		QJD	KFF	7-17-17	1" = 50'	6696	29 OF 43

Figure 2AV: Engineering Plan and Profile Example



FINDINGS & RECOMMENDATIONS

A



Figure 3A: Existing Gravel Road

CHAPTER 3: FINDINGS AND RECOMMENDATIONS

Chapter 3 summarizes the preferred trail alignment and highlights the opportunities and constraints associated with the alignment. Conceptual construction methods and materials are introduced including a discussion of the standard trail cross sections. A summary of the probable project costs, including construction costs and soft costs, such as environmental, permitting, design and engineering, are included at the end of the chapter.

3.1 Alternative Alignments

The following section summarizes the preferred Combo alignment and the additional Upper route segment and highlights some of the opportunities and constraints of each. Refer to Figure 3B for a graphic of the alignments.

Combo Alignment (Preferred) Data

Type A Trail (10' width, separated):	1,130 LF	0.2 Mi.
Type B Trail (14' width):	24,333 LF	4.6 Mi.
Type C Trail (10' width):	9,852 LF	1.9 Mi.
Total Trail Length:	35,315 LF	6.7 Mi.

Eighty-seven percent (87%) of the trail will be under 5% in grade. Thirteen (13%) of the 6.67 mile trail will be between 5% and 8.3% in grade. None of the trail will be over 8.33%.

Upper Segment (Additional) Data

Type A Trail (10' width, separated):	6,286 LF	1.2 Mi.
Type B Trail (14' width):	3,923 LF	0.7 Mi.
Type C Trail (10' width):	0 LF	0 Mi.
Total Segment Length:	10,209 LF	1.9 Mi.

Seventy-five percent (75%) of this segment will be under 5% in grade. Six (6%) of the 1.9 mile segment will be between 5% and 8.3% in grade. Nineteen (19%) of the segment will be over 8.33% along the proposed OPG development road.

Segment Descriptions

The following section describes each of the distinct segments of trail from south to north. The segment descriptions in this section are similar to, but do not exactly correspond, to segments for costing in the following section. The preferred Combo route segments are summarized first, followed by the additional Upper route segments.

Preferred Combo Alignment Segments:

1 - Stottlemeyer Road NW to 1800 Road

Starting from the existing parking/trailhead at Stottlemeyer, the trail will enter NW into the forest and begin climbing the slope up to the top of the plateau. There is a significant length (approximately 900 LF) of slopes between 5 and 8.33% at the beginning of the trail. This trail segment will be a Type C trail which is 10' wide. It will not be placed on an existing roadbed; instead the trail will be new construction. This segment is approximately 4,750 linear feet (0.9 miles). There will not be a need for periodic closures during logging as this will only accommodate maintenance vehicles. The first 360 LF of trail off of Stottlemeyer will be on OPG property and will require an easement. The trail then crosses into County Park land. Refer to the detailed maps in the report for this area.

2 - 1800 Road North to 1000/1300 Road Junction

Once this trail climbs to the top of the ridge, it will intersect with the 1800 Road. The trail then turns north and runs approximately 15,800 LF (3.0 miles) until it intersects with the 1000/1300 Road junction. The trail will primarily be built on top of the existing logging road and will be Type B, which is 14' in width. This is the longest and flattest segment- there is only 700 linear feet of slopes between 5 and 8.33% along this 3.0 mile segment. There will be a need for periodic closures during logging activities as this is the main spine road on top of the plateau.

3C - 1000/1300 Road Junction to 1100 Road Junction

This Combo alignment segment turns to the east from this junction and begins the descent off of the plateau down into the lowlands. It utilizes the existing 1000 Road; however, due to steep slopes the trail will be realigned in a few locations to

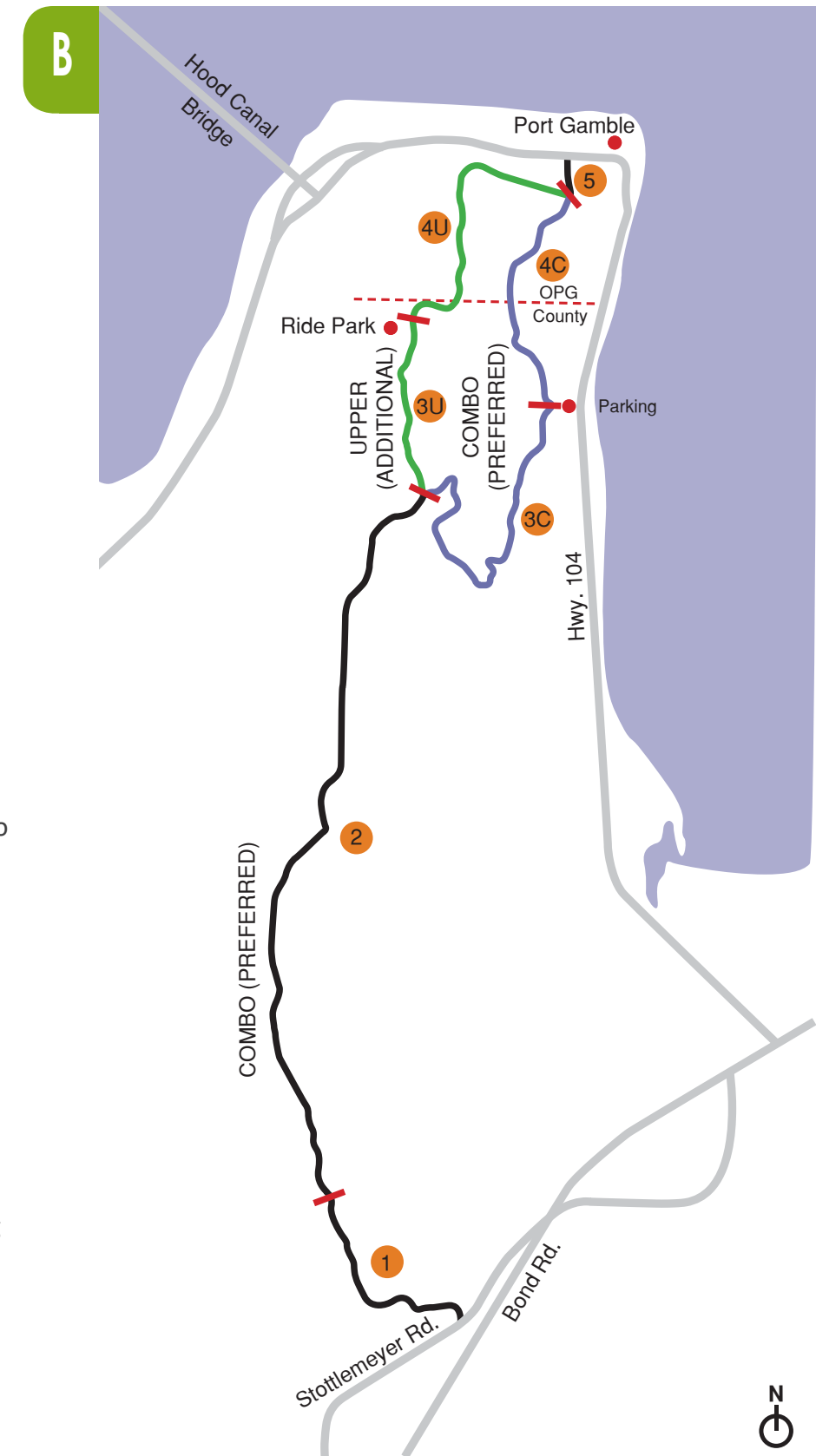


Figure 3B: Alignment Segments

provide the horizontal length required to achieve a grade of under 8.33%. The distance from the junction down to the 1100 Road junction near the Hwy 104 parking area is approximately 8,300 LF (1.6 miles) in length. The trail will be built primarily on top of the existing logging road and will be Type B which is 14' in width. This segment has several stretches totalling approximately 2,000 linear feet that are between 5% and 8.33% slope but nothing greater than 8.33%. There will be a need for periodic closures during logging activities as this is the main access road to the top of the plateau.

4C - 1100 Road Junction to Carver Drive/OPG Road

This Combo alignment segment runs from the 1000/1100 Road junction near the Hwy 104 parking area north through forest and adjacent to large lowland wetland complexes. It utilizes the existing 1100 Road. Approximately 150 LF of boardwalk will be required where the beaver pond frequently overflows the existing road as shown between stations 339+00 and 340+50 on the engineering plans. The boardwalk would be wide enough to accommodate the 10' wide trail and built directly on top of the existing road. Refer to page 51 of this report for an example of the PermaTrak system suggested, which utilizes concrete, not timber, planks. This trail segment ends at Carver Drive as designed by OPG in their most recent development plans. The distance is approximately 5,200 LF (1.0 mile) in length. The trail will be built primarily on top of the existing logging road and will be Type C which is 10' in width. This segment has a few stretches totalling approximately 600 linear feet that are between 5% and 8.33% slope but nothing greater than 8.33%. There will not be a need for periodic closures during logging activities as this segment will only be used by maintenance or emergency vehicles, not logging trucks.

5 - Carver Drive to Proposed Hwy. 104 Roundabout

At Carver Drive the trail would cross the street on a crosswalk and become separated from the road. It would be a Type A trail which is 10 feet wide. OPG has designed the development and roads in a way to allow for the 10' path, 2' shoulders on each side and a 5' separation from the road edge. The distance of this small segment is approximately 1,100 LF (0.2 miles) in length. The trail will be new construction next to the new road. This segment has a two stretches totalling approximately 400 linear feet that are between 5% and 8.33% slope but nothing greater than 8.33%. No vehicles will need to use this path as it will site adjacent to a road.

Additional Upper Route Segments:

3U - 1000/1300 Road Junction to Ride Park Road

This Upper alignment segment continues north from this junction on the plateau and continues to the proposed Ride Park and proposed OPG development. It utilizes the existing 1300 Road. It is relatively flat and primarily has slopes less than 5%. The distance from the junction to the Ride Park is approximately 3,800 LF (0.7 miles) in length. The trail will be built primarily on top of the existing logging road and will be Type B which is 14' in width. It is at the Ride park that the trail will transition from Type B to Type A and become a separated path adjacent to a new road accessing the Ride Park. There will be a need for periodic closures during logging activities as this is the main spine road on top of the plateau.

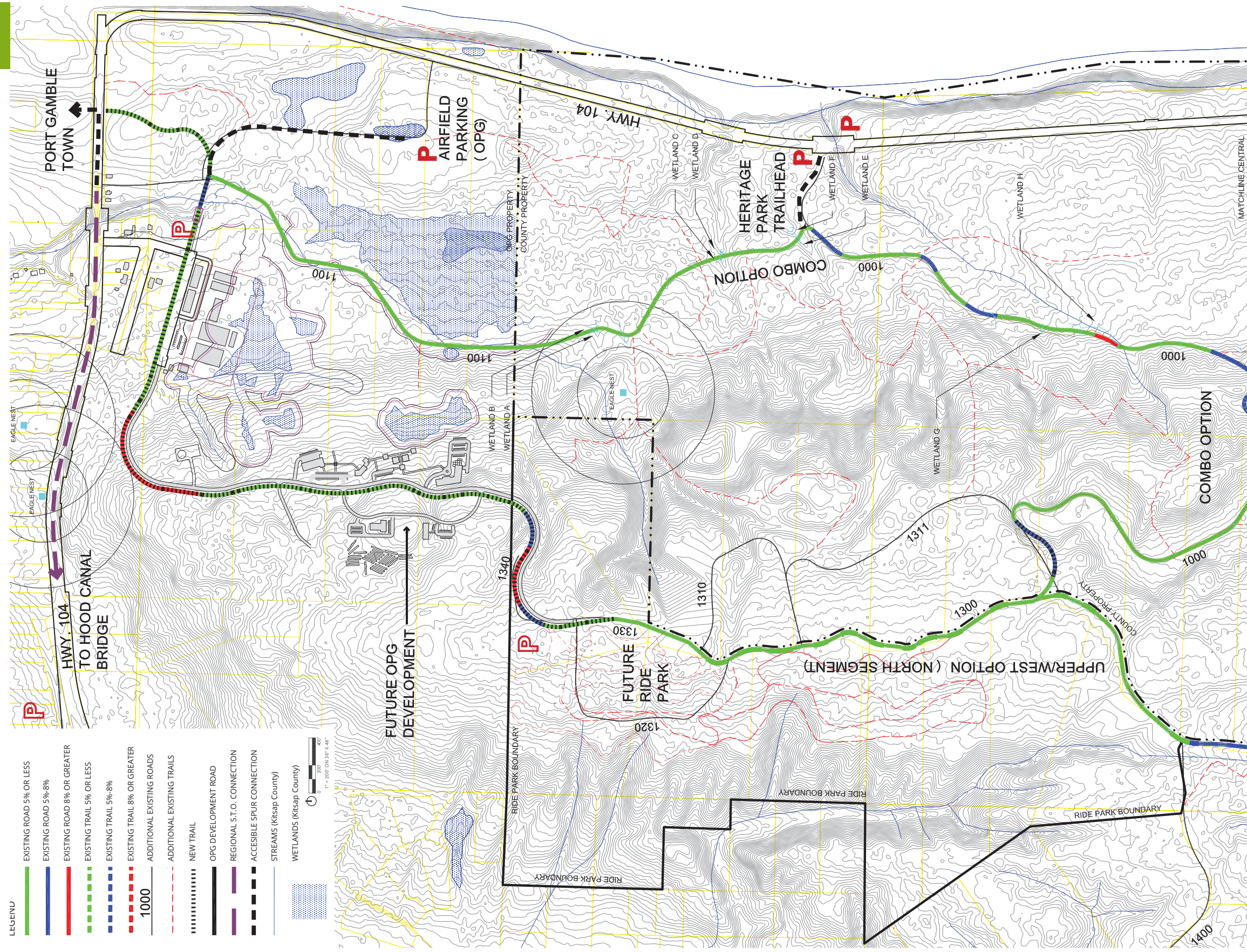
4U - Ride Park Road to Carver Drive

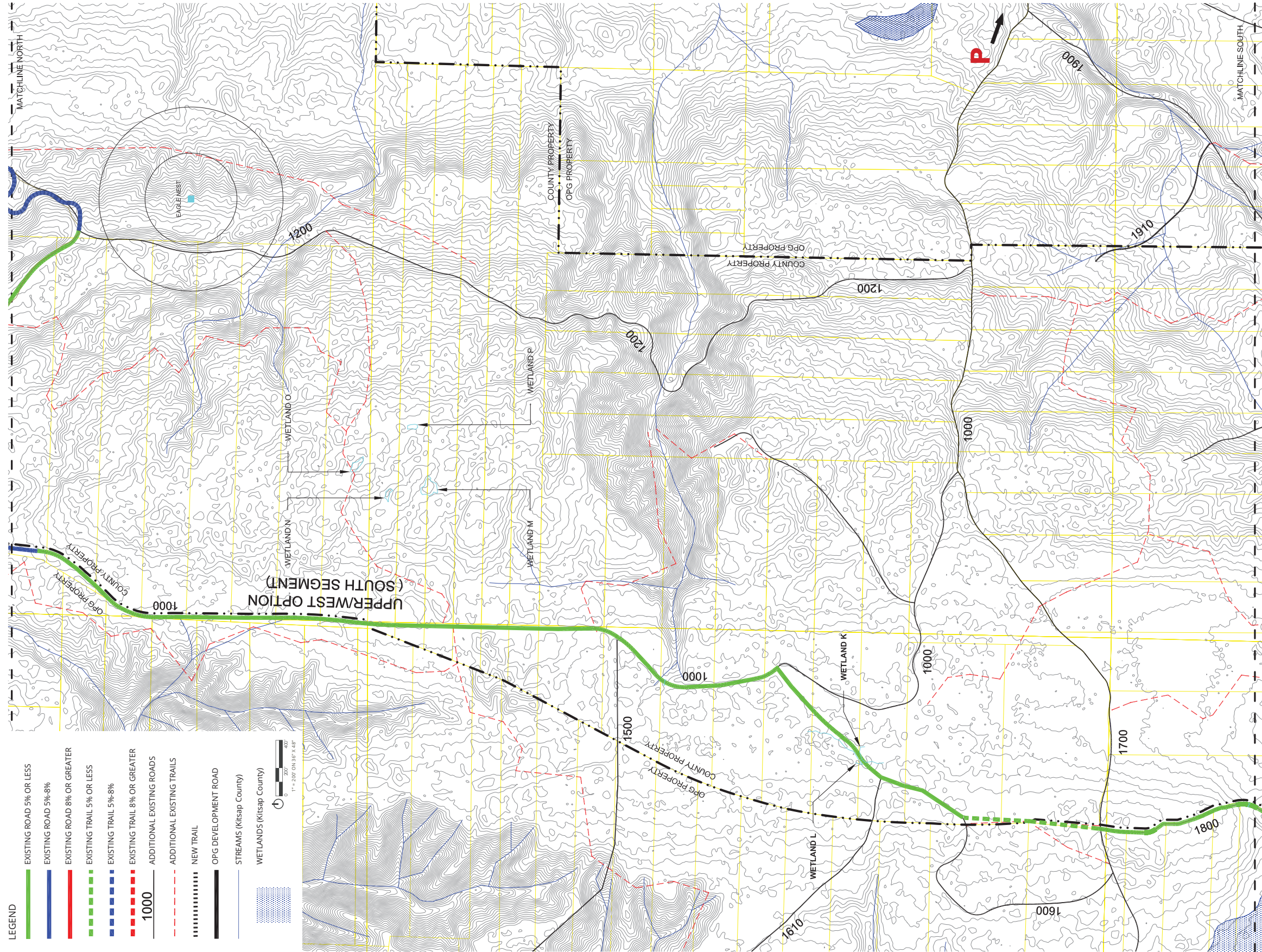
This Upper alignment segment runs from the proposed Ride Park for a few hundred feet to the County/OPG boundary line. It then runs through the proposed OPG development (currently in the area of Babcock Farm) along a proposed road named Carver Drive. It is descending steeply for a majority of this segment. For 600 linear feet between the Ride Park and the County/OPG property line, the grade of the road and adjacent trail would be 9%. It then turns east, continuing to follow Carver Drive until it reaches a point where the Combo route alignment intersects. At this bend where it turns east it becomes steep again- there are 800 linear feet with a grade of 9%. The distance of this segment is approximately 6,400 LF (1.2 miles) in length. It would be a Type A trail which is 10' wide and separated from the road. OPG has designed the development and roads in a way to allow for the 10' path, 2' shoulders on each side and a 5' separation from the road edge. In all, OPG has planned for an additional 17' of ROW for a trail along the road in their development. The trail will be Type A which is 10' in width. The trail will be new construction next to the new road. No vehicles will need to use this path as it will site adjacent to a road.

Comparing the Combo and Upper Northern Segments

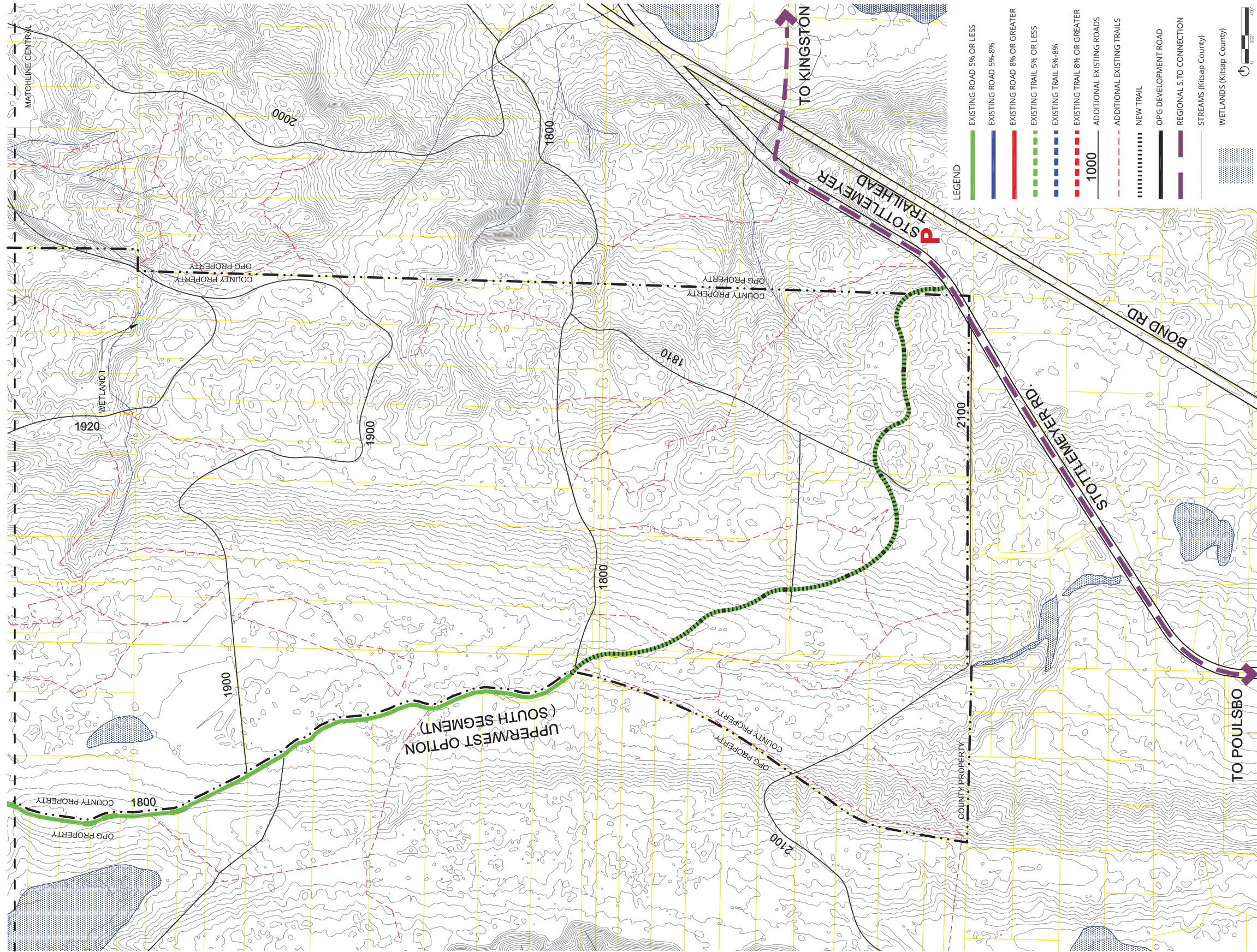
Alignment:	COMBO (3C & 4C)	UPPER (3U & 4U)
Length (linear feet):	13,485 LF	10,209 LF
Length (miles):	2.6 Mi.	1.9 Mi.
Type A Trail (10' width):	0 LF	6,286 LF
Type B Trail (14' width):	8,385 LF	3,923 LF
Type C Trail (10' width):	5,100 LF	0 LF
On Existing Road:	9,346 LF	6,434 LF
New Construction:	4,089 LF	3,775 LF
<5% Grade	10,715 LF	7,669 LF
5-8.33% Grade	2,770 LF	655 LF
>8.33% Grade	0 LF	1,885 LF

Alignments (North)





Alignments (Central)



Alignment (South)

3.2 Elevation Profiles

The following diagrams show the elevation profiles for both the preferred Combo alignment (Figure D) and the additional Upper route segment at the north end of the project (Figure E). As is evident, a significant portion of the middle of the alignment is relatively flat- under the 5% grades as recommended in the guidelines. It is at both the southern and northern ends of the proposed alignment that challenges arise in getting down off the ridge. Figure D shows the entire length of the proposed trail while Figure E shows the additional segment from the 1300/1000 Road junction north, through the OPG development and down to the town of Port Gamble. The vertical scale has been exaggerated five times the horizontal scale for emphasis.

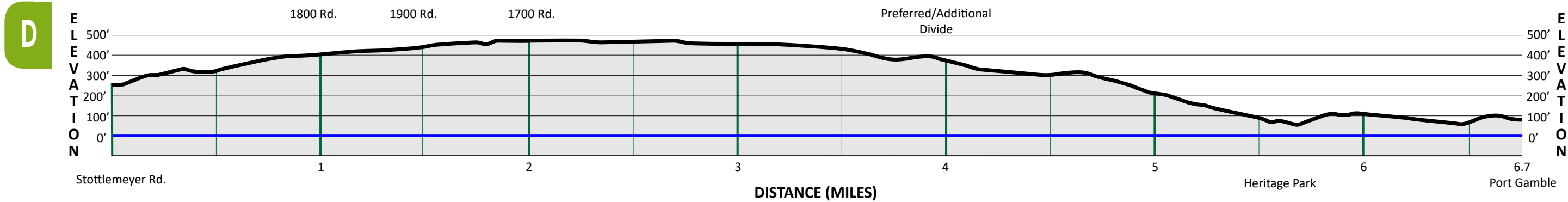


Figure 3D: Elevation Profile for the Preferred "Combo" Alignment

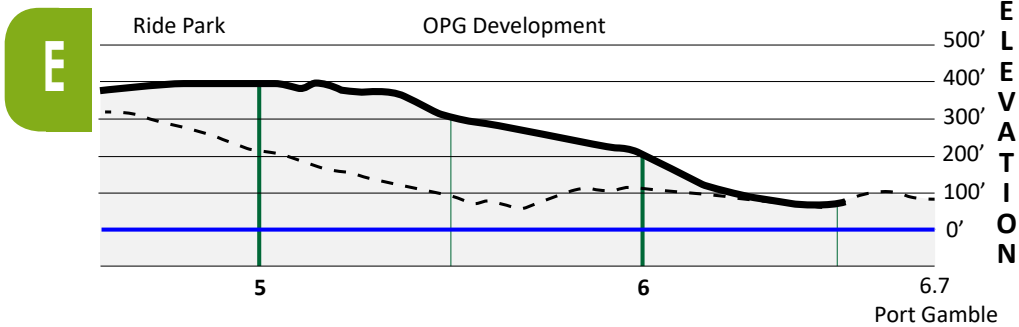


Figure 3E: Elevation Profile for the Additional "Upper" Segment

3.3 Comparison of Preferred and Additional Alignment Segments

The primary challenge from the beginning of the planning process was to find the best route from the Town of Port Gamble up to the top of the ridge. Two options, each with different issues, became evident during the early planning process. This study concluded that the Combo route was the preferred alignment for this northern section but that the Upper route provides an additional trail opportunity as a recreational loop trail. The Upper route could be considered viable as a feasible STO alternative should project conditions change with regard to the timing of the development of the OPG road up to the Ride Park.

Length and Grades

The north segment of the Upper segment, at 1.9 miles, is 0.7 miles shorter than the Combo segment. However, this segment has almost 1,900 linear feet that is over 8.3% in grade (between 9% and 10%). This segment does have approximately 2,100 less linear feet between 5% and 8.3% grade though. From a user experience standpoint, each route poses some challenges regarding difficult grades. Starting from Port Gamble town, one must begin ascending right away on the Upper route to get up to the ridge near the proposed Ride Park. For the Combo option, one has over a mile of flat terrain until the trail ascends the 1000 Road starting near the Stumps parking area. The Upper segment may require a bridge over a ravine along Carver Drive, depending on the road and bridge designed for this area by OPG.

Context & Views

The Upper segment will be able to take advantage of a recreation amenity already being planned for the area- the Ride Park. This will be a recreational amenity along the trail that has uses complimentary to the STO and facilities, such as parking, that would benefit the trail. There are also amazing views north of Mount Baker and the North Cascade Mountains from the Upper segment. However, this segment of the trail would be running adjacent to a proposed road in the OPG development

at Babcock Farm. This presents completely different experience than riding on the north segment of the Combo segment which will wind through forest and between large wetlands.

Land Use and Development Complexity

There is uncertainty regarding the schedule for construction of the OPG road, which would provide the ROW width for the separated trail. The proposed development along this road is currently scheduled for a later phase of the OPG project. In the interim, the County and OPG will be coordinating to figure out the best way to provide access up to the Ride Park, which may or may not follow the proposed OPG development road. Both the Upper and Combo segments have a significant length within OPG lands which will require that the County obtain easements for the trail.

The pros and cons for each of the northern routes considered are summarized below.

Preferred Combo Segment PROS

- Utilizes existing logging roads
- Grade of the trail is all under 8.3%
- Proximity to the parking areas along Highway 104

Preferred Combo Segment CONS

- Longer than the Upper segment and a less direct route
- More of the trail will need to be shared with logging operations/uses
- Contains approximately 2,000 LF more of 5 to 8.3% grade
- Cost of construction is more
- More impact to wetlands and wetland buffers
- Section of boardwalk will be required over the beaver pond

Additional Upper Segment PROS

- Shorter and more direct route into Town of Port Gamble
- Less trail will need to be shared with logging uses
- It is relatively flat (<5%) along the top of the ridge
- Cost of construction is less
- Adjacent to the future Ride Park and parking area

Additional Upper Segment CONS

- Relies on OPG road to be developed
- OPG timing and funding of the road uncertain- schedule is not defined by OPG but could be as many as 10 years out or more
- New County road segment required to close the gap between OPG development road and Ride Park area (approximately 1,230 LF)
- Trail can not be built to standards without the construction of Carver Road
- More steep (between 8.3% and 10%), although still meeting standards when following a road
- User experience, due to steep grades and adjacency to a developed road, may be compromised
- An expensive pedestrian bridge along Carver Drive over a ravine may be required

3.4 Trail Types/Sections

Three trail types (represented as sections) are practical for the proposed trail within the study area. These sections were used in the preliminary engineering of the trail and development of the cost estimate. For a majority of the trail, these sections will be integrated with the existing roadbed. The cost estimate was generated based not only on the type/section being proposed but the condition of the existing roadbed upon which it would be built.

Type A - Sidepath Along Road

For roads where public use occurs or where the volume of traffic is frequent, the shared-use path will be located adjacent to the road with a 5 foot buffer as required by AASHTO standards. If this buffer is less than 5 feet then a physical barrier must be provided between the road and trail. The trail will be 10 feet wide in this case and have 2 foot minimum shoulders. This trail will not be open for use to any vehicles, including maintenance or emergency vehicles as they will be able to access areas of the trail from the adjacent road. The area of disturbance outside of the trail would be between 17 and 21 feet depending on the width of the shoulders. Figure 3F provides an image similar to this condition and Figure 3I provides a section of this condition.

Type B - Shared Path (14' Width)

The Working Group determined that the existing road corridor should be used for the shared-use path as well whenever possible. These roads are not open to the public and are used infrequently. The shared use path would be constructed on top of the existing roadbed. Use of the shared-use path will be restricted during periodic logging operations. As such, the increased width (4 feet wider than the AASHTO minimum standard) is meant to accommodate the largest anticipated vehicle which is a logging truck. The wider path will minimize damage to the edges of the path. The area of disturbance outside of the trail would be between 18 and 26 feet depending on the width of the shoulders. Figure 3J provides a section of this condition.

Type C - Shared Path (10' Width)

This is the same cross-section as Type B except that it is 10 feet wide instead of 14 feet wide. This trail section will be able to accommodate maintenance and the periodic emergency vehicles but not large logging trucks. The area of disturbance outside of the trail would be between 14 and 22 feet depending on the width of the shoulders. Figure 3G on this page provides an image similar to this condition and Figure 3K on the following page provides a section of this condition.



Figure 3F: Type A Trail Example



Figure 3G: Type C Trail Example

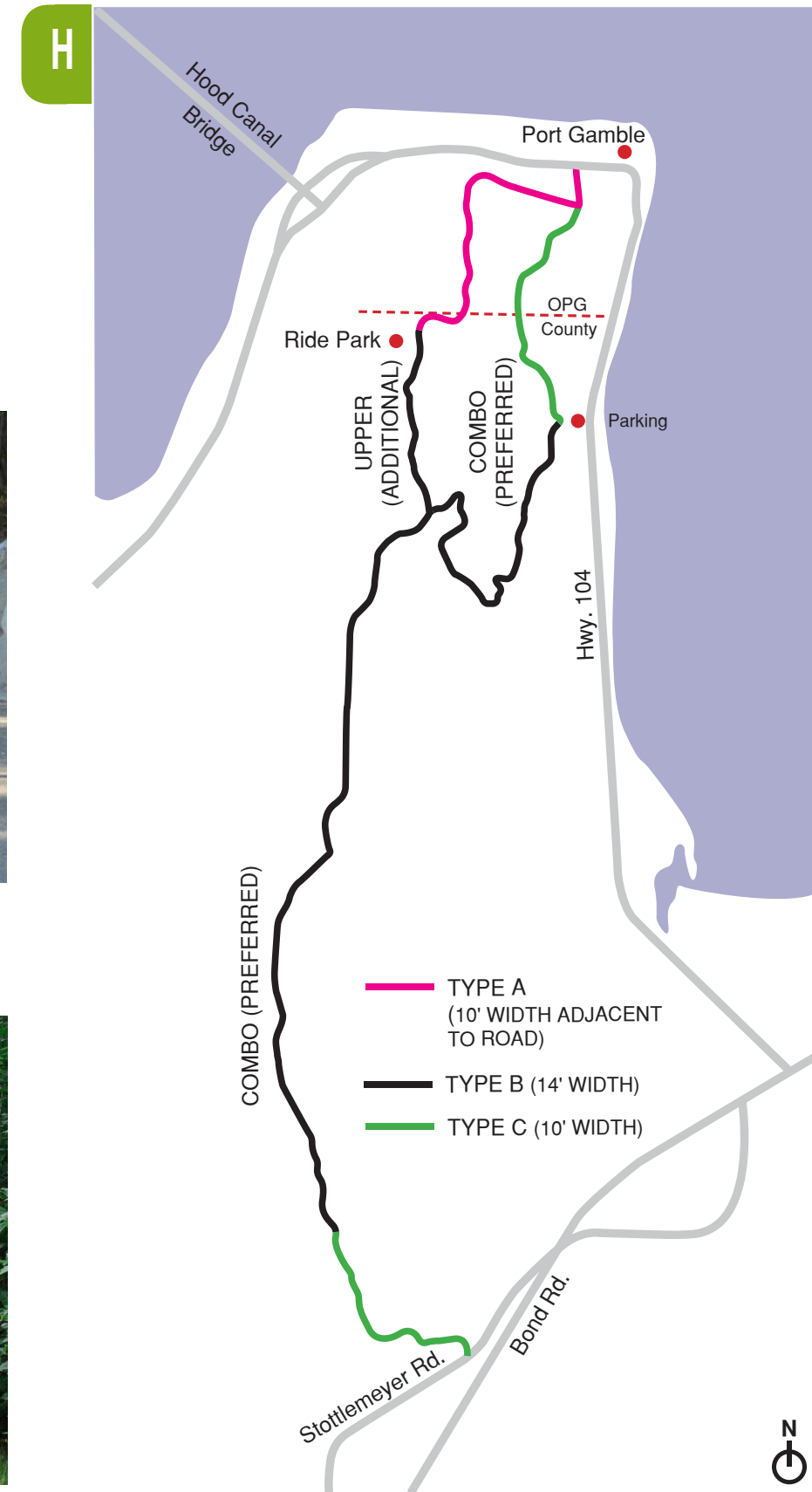


Figure 3H: Trail Type Location Diagram

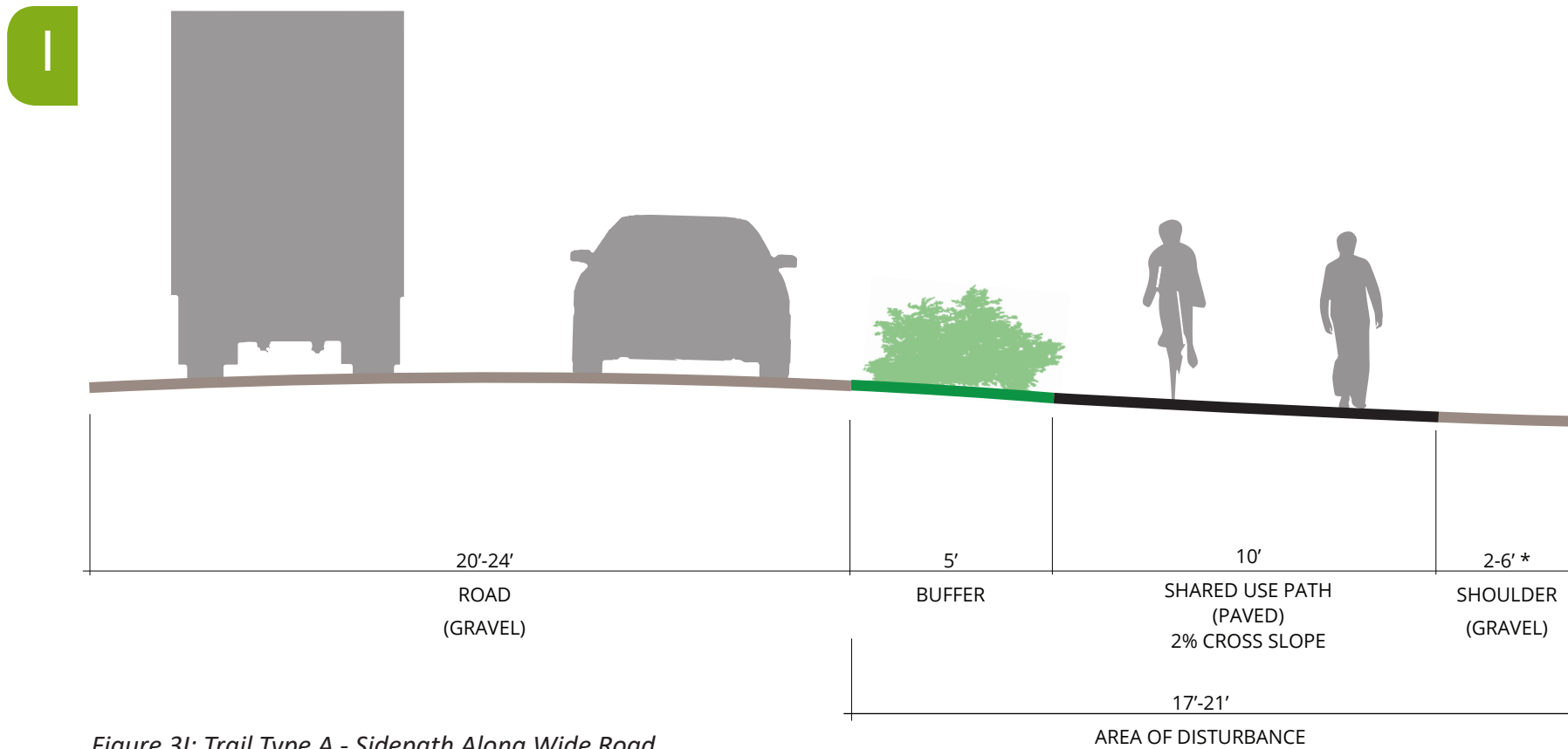


Figure 3I: Trail Type A - Sidepath Along Wide Road

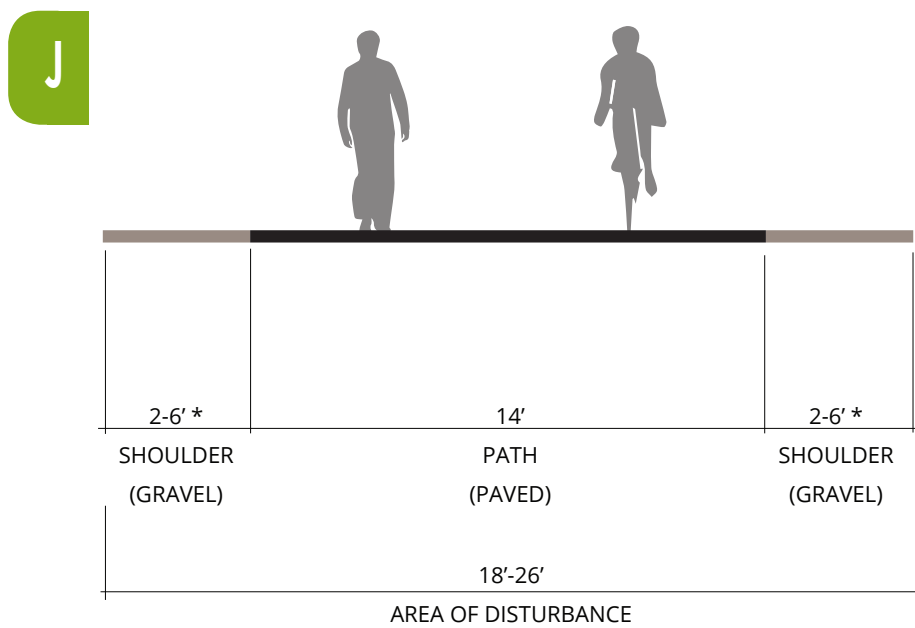


Figure 3J: Trail Type B - Shared Path (Closed When Used for Logging Activities)

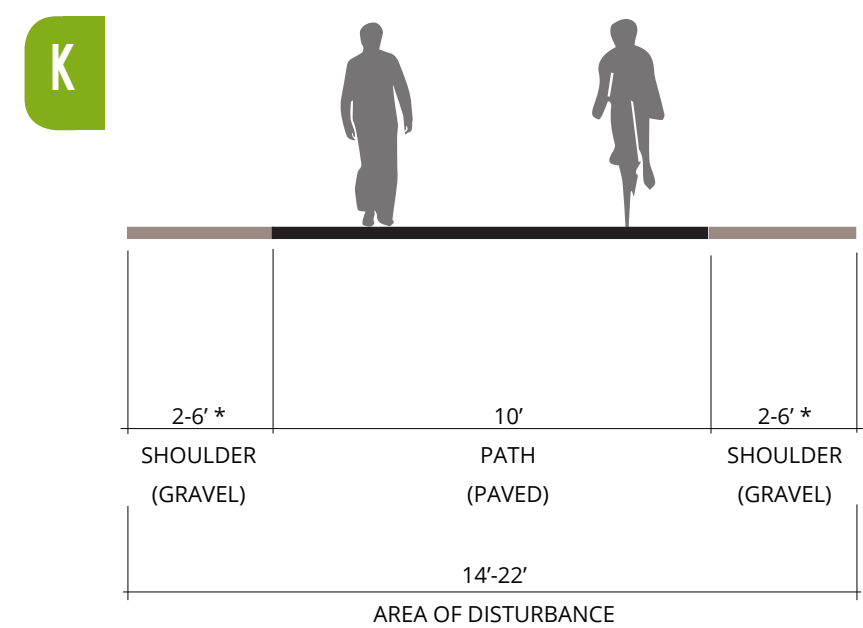


Figure 3K: Trail Type C - Shared Path (With Maintenance Vehicles Only)

3.5 Conceptual Construction Methods and Materials

Introduction

While the previous section described the alignment and site specific features along the preferred route, the following section describes in more detail construction methods, materials and other features that will be required to implement the trail and provide the whole user experience. A summary is provided for the element, method or material assumed to be best suited for the context of this particular project, which is reflected in the cost estimate. Additional methods or materials may also be discussed as a consideration by the County or design team during final engineering and implementation.

Typical Cross Sections

Standard Trail Cross Section

Figure 3M shows a typical shared-use path cross section where there is little cross slope. The dimensions are based on AASHTO standards and decisions by the County and consultant team during the design process. A summary narrative and table of the applicable AASHTO design standards was provided in Section 2.3 of the report. In this cross section, the paved trail is 10 foot wide with a 2% cross slope in the direction of the downhill side of the path. Gravel shoulders will be 2 feet wide on each side, except where the downhill slope exceeds 6:1 in which case the gravel shoulder on that side will be 5 feet wide. This cross section results in a disturbed width of 14 feet to 17 feet.

Cross Section on Steep Slope Without Retaining Walls

Figure 3M shows a shared-use path cross section where there is a significant cross slope without retaining walls. This cross section results in a disturbed width of 25 feet to 30 feet based on having to accommodate the steep cross slopes and providing a 1V:2H slope on the uphill (cut) side of the trail. In addition, a rail may be required on the downhill side of the trail if the shoulder is less than 5 feet width and the side slope is 1V:3H or steeper with a drop of 6 feet, 1V:2H or steeper with a drop of 4 feet, or 1V:1H or steeper with a drop of 1 foot (AASHTO Section 5.2.1).

Trail Cross Section on Steep Slope With Retaining Walls

Figure 3O shows a shared-use path cross section where there is significant cross slope using retaining walls to minimize site disturbance on either side of the trail. This cross section results in a disturbed width of only 20 feet compared to 25 feet to 30 feet when retaining walls are not used. A rail is required on the downhill side of the trail.

Use of Walls for This Study

There is usually a trade-off between cost savings (no wall) and impact to habitat that is considered when determining where to use each one of these two sections. In this project area it was determined walls would not be included to reduce costs, even if there would be more of an impact to adjacent habitat. Since most of the areas that will require additional grading will be logged in the future, preserving adjacent forest was determined as less critical.

Use of Existing Gravel Roads

Standard Trail Cross Section

Figure 3L shows where the trail will be built on an existing road and where it will be completely new construction. There are cost implications that are figured into the cost estimate for the trail in each of these scenarios. Obviously it will be less expensive to build a trail when a solid gravel road base already exists. For the preferred Combo alignment 82% of the trail would be built on existing road while 18% would be new construction.

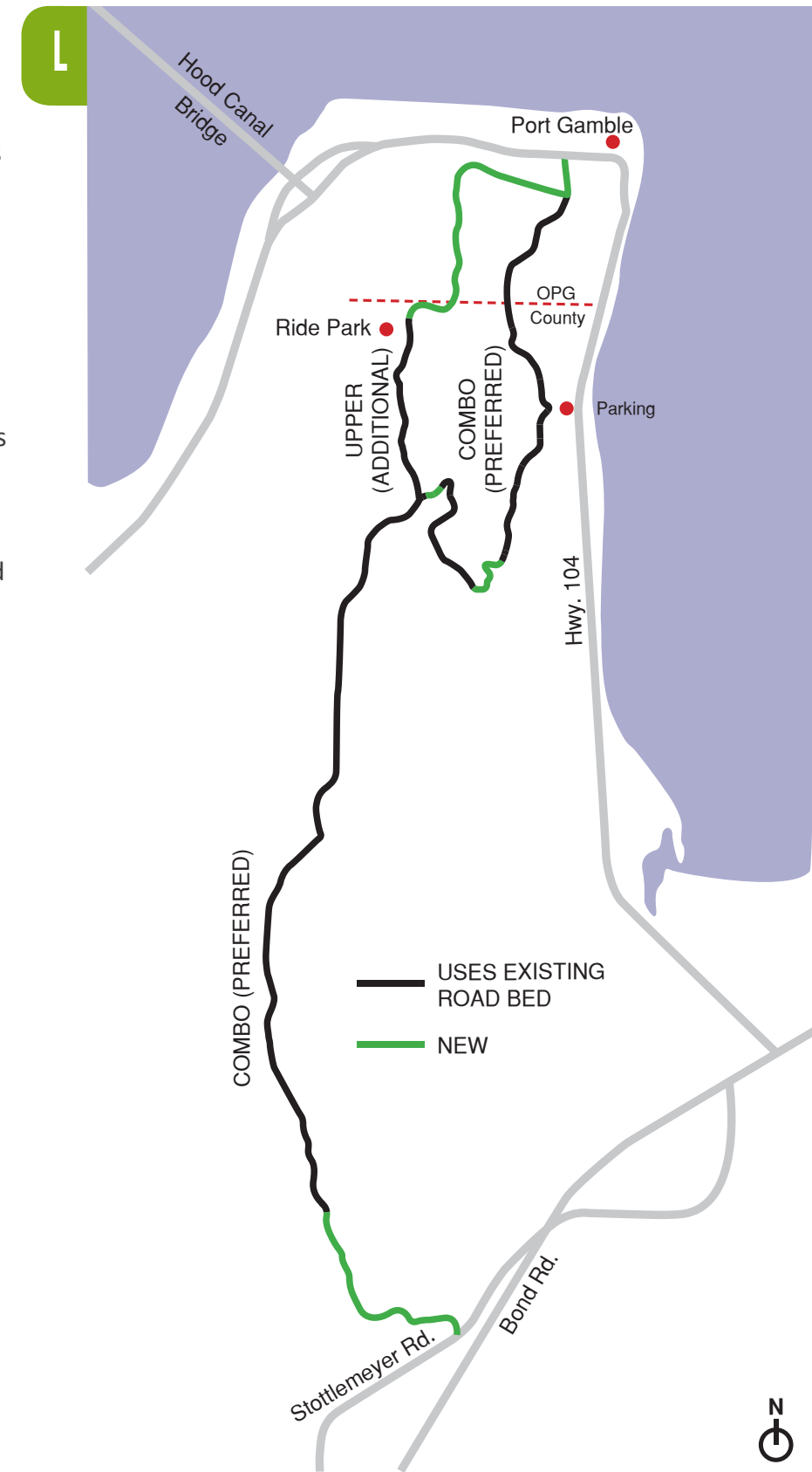


Figure 3L: Trail Proposed on Existing Road Versus New Trail

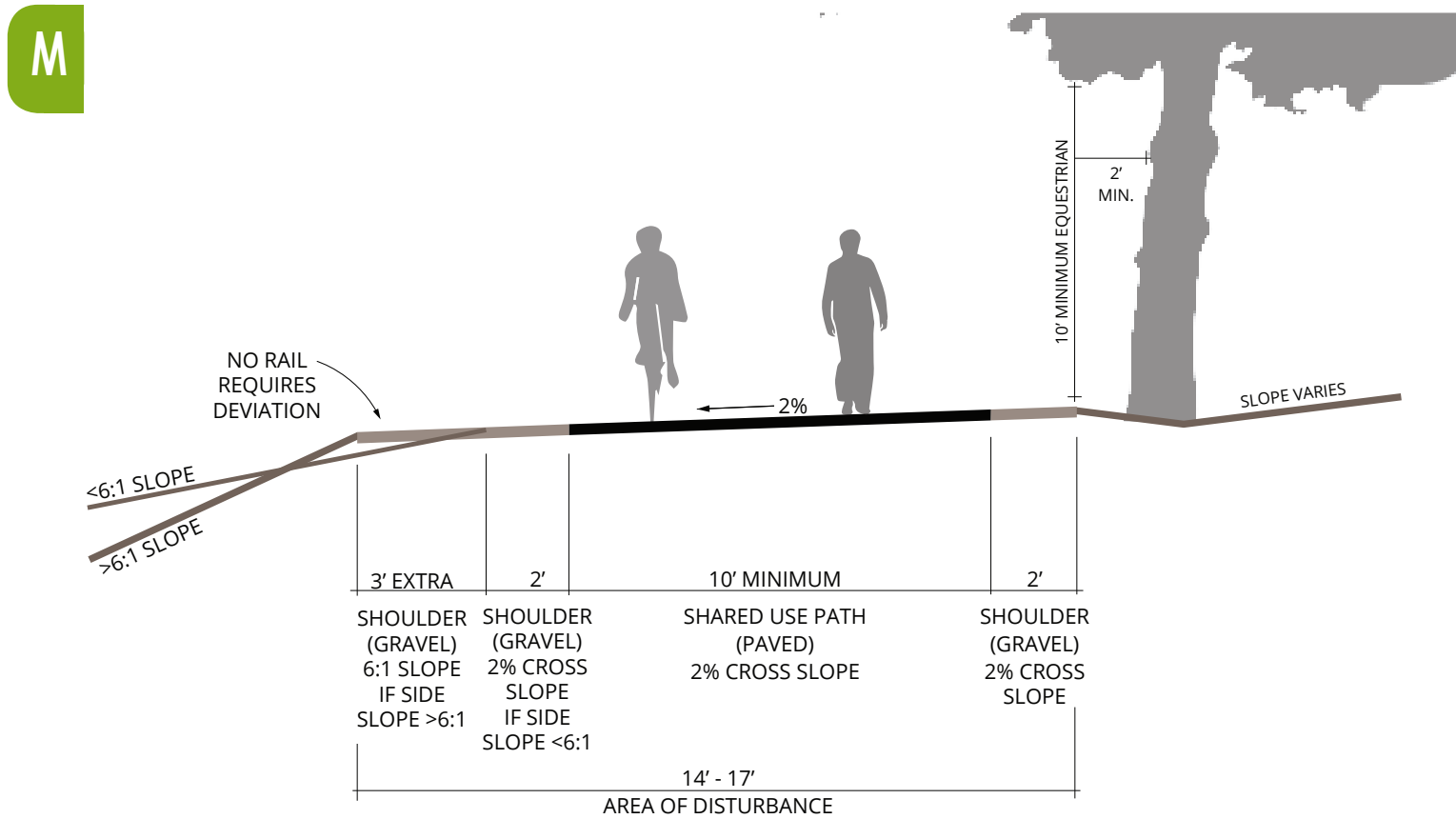


Figure 3M: Typical Trail Section on Minimal Cross-Slope

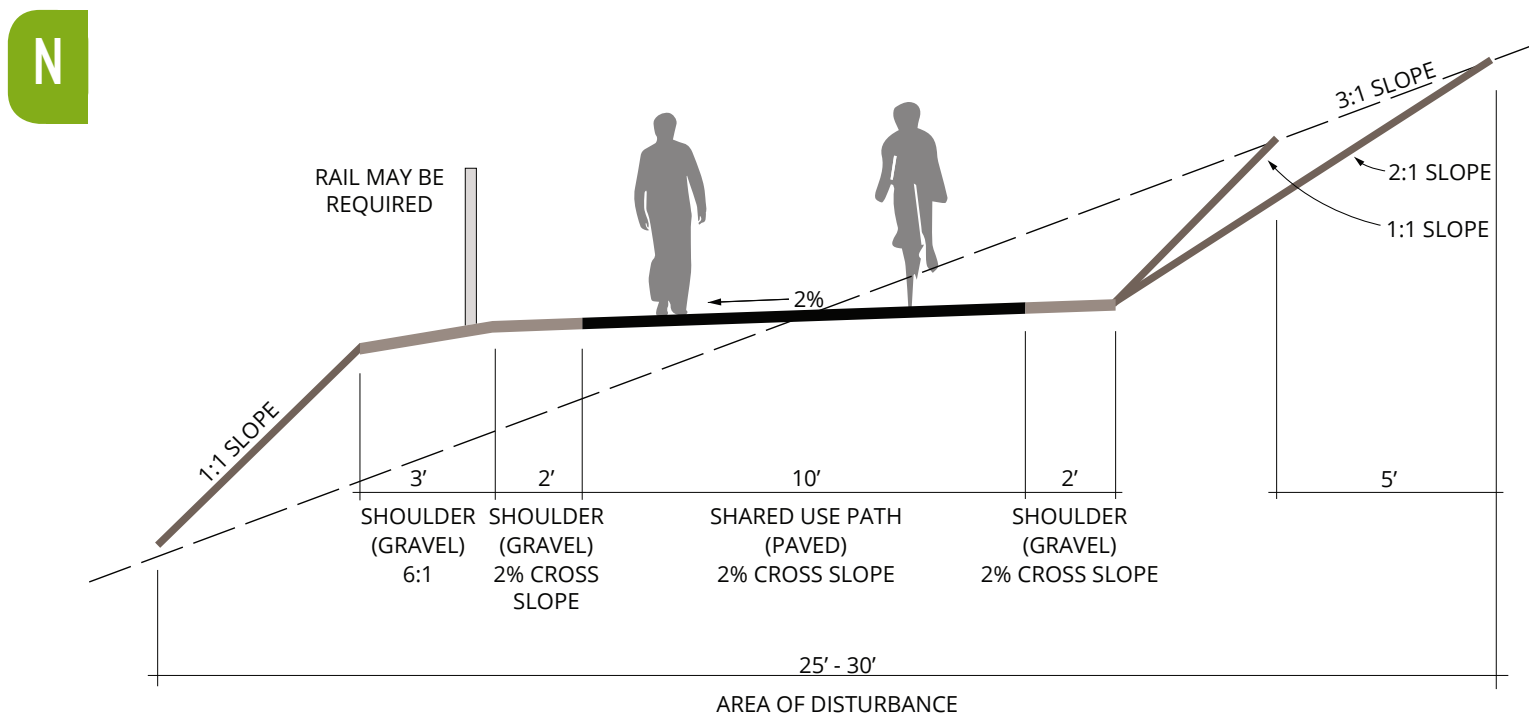


Figure 3N: Typical Trail Section on 3:1 Cross-Slope With No Walls

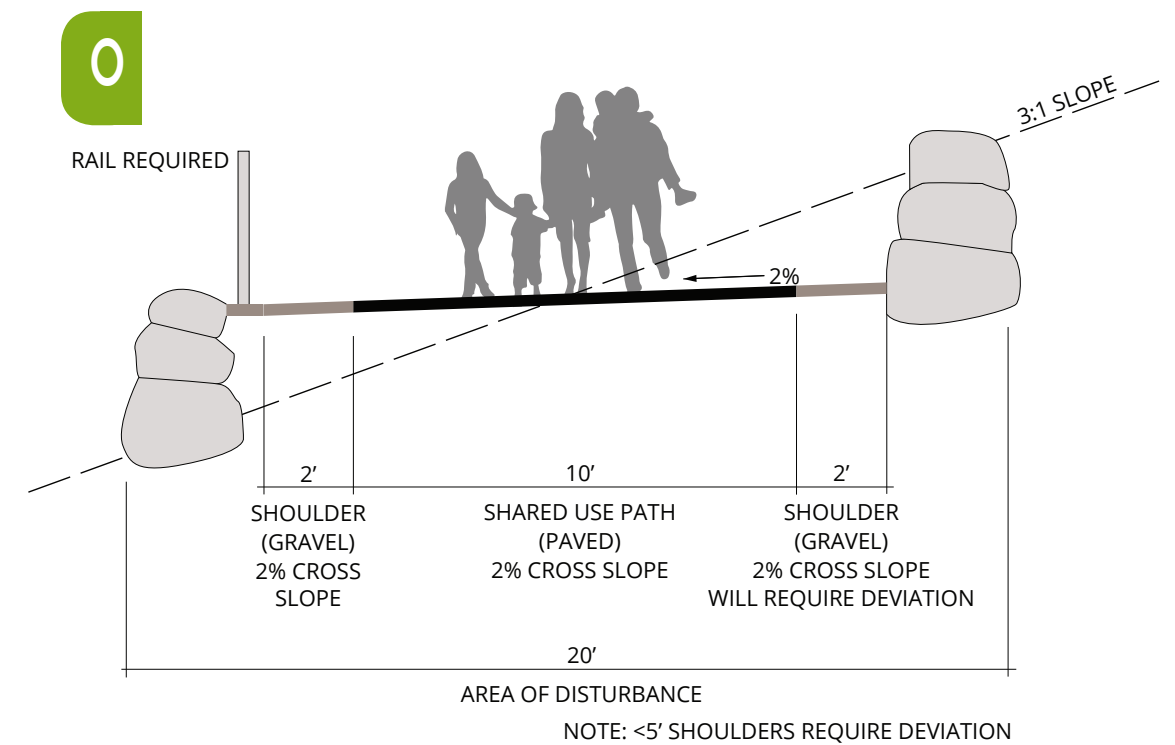


Figure 3O: Typical Trail Section on 3:1 Cross-Slope With Walls



Figure 3P: Typical Asphalt Pavement Surfacing

Trail Surfacing

For the purpose of this feasibility study, we have assumed that asphalt would be used as the pavement surface. Asphalt is easier to install and less expensive. However, asphalt is less durable than concrete with a life expectancy of 15-20 years. Asphalt requires more interim maintenance than concrete. The location of this path in a forest may make the asphalt path susceptible to heave from root growth beneath. Concrete has a higher installation cost but has a longer service life and reduced susceptibility to cracking and heaving from roots. For purpose of developing the cost estimate, the asphalt depth is assume to be 2 inch with a base course aggregate of 6 inch depth. Gravel shoulders would be 4" depth over compacted subgrade. This is the assumed pavement section for all trail/road types- whether used by logging trucks or not.



Figure 3Q: Sketch of Trail Pullout

In-trail Landings

Several segments of the trail will have a grade over 5% but under the maximum 8.3% (1:12). There are no segments of trail over 8.3%. As such, FHWA standards require that a landing be provided every 200 linear feet along these steeper segments. These landings need to be level (2% cross slope) and under 5% in running slope. There are no pull-outs proposed along the trail as mitigation for steep slopes as there are no trail segments between 5% and 8.3% greater than 199 feet in length. There are instances where segments of steep slope (between 5% and 8.3%) occur back to back with a short segment of gentle (<5%) slope between them. For user enjoyment and convenience, future engineering may want to consider pull-outs or viewpoints in some locations.



Figure 3R: Example of Trail Crossing

Road Crossings

Trail crossings occur primarily on the additional Upper segment across proposed roads in the OPG development between the Ride Park and Town of Port Gamble. These roads will be low use on Port Gamble property.

For the purpose of this study and cost estimate, standard paint striping and signage are assumed to be the minimum that would be installed for safety. Guidance on the need for a signal and other traffic control devices is provided in the MUTCD and FHWA sources. Specific design of the crossing will occur in the engineering phase of the project.



Figure 3S: Typical Steel Bridge

Bridges & Culverts

One 75-foot minimum span bridge over a ravine may be necessary in the additional Upper segment option. Carver Drive, a proposed OPG road, is shown in engineering plans as spanning this ravine. It is unclear at this time if it will need to be a road bridge. If so, it could be designed with additional width to accommodate the trail. For the purpose of this study we are assuming a separate pedestrian bridge as a cost analysis between the two options was not part of this study. Decking on the bridge would be paved similar to the adjacent trail. A pedestrian bridge, including abutments, will require design and engineering.

The preliminary engineering plans identify the need for new culverts. These occur where the existing road is being significantly regraded or where new roads have been proposed. Several other culverts already exist under existing roads and are not included in the estimate for replacement.

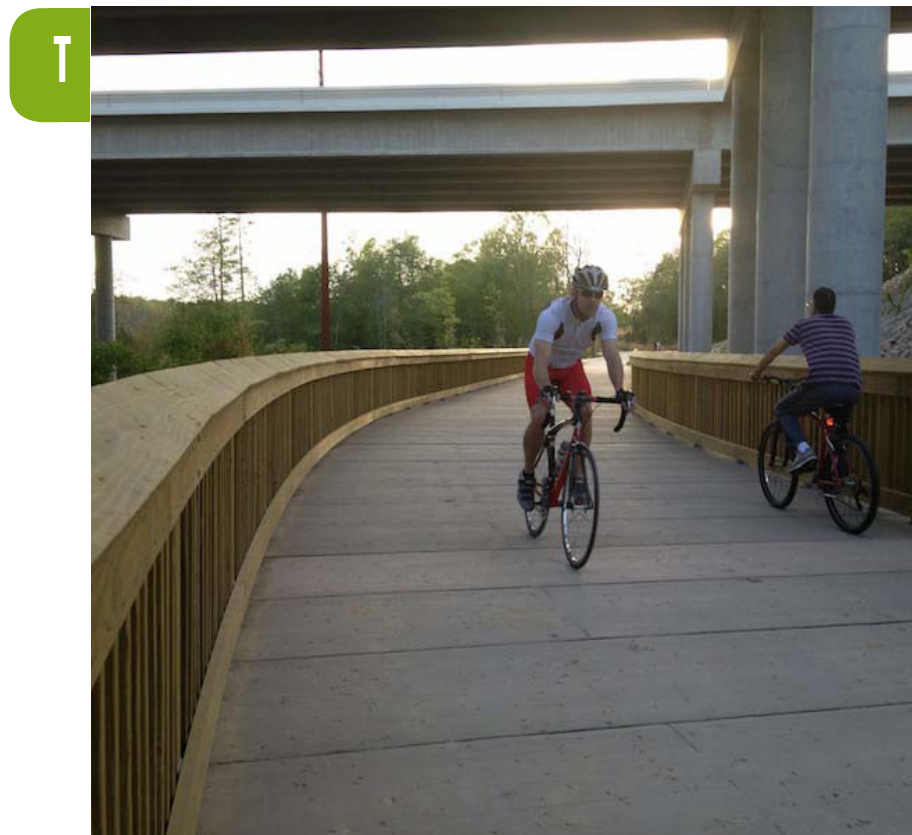


Figure 3T: Concrete Boardwalk (Image Courtesy of PermaTrak)

Boardwalk

Approximately 150 LF of boardwalk will be required in Segment A of the preferred Combo alignment. The existing road is within the wetland buffer and in one particular location- at the northern outlet, is constantly flooding in winter.

The live load should be designed to accommodate weights up to a small maintenance vehicle such as a Gator, as well as for wind, seismic, snow and equestrian use. The governing code for design of the boardwalk will be AASHTO LRFD Guide Specifications for Design of Pedestrian Bridges. For the purpose of the feasibility study and cost estimate, a concrete PermaTrak (<http://www.permatrak.com/>) boardwalk was estimated for cost. PermaTrak is an environmentally friendly precast concrete boardwalk system engineered for ease of flexibility. It requires little maintenance compared to timber. Timber can become slick in a wet environment such as the



Figure 3U: Pin Pile Footings (Image Courtesy of Diamond Pier)

Pacific Northwest. Structural members of the PermaTrak system are also reinforced concrete. Timber may be considered as a lower cost alternative (approximately 25%-30% less) in the short-term but will incur higher maintenance and replacement costs over time. For the footing system, whether a PermaTrak boardwalk system or timber, a helical pile system is recommended due to the deep layer of bog soil that exists and the less impact this system has on critical areas. PermaTrak claims that its system can be constructed “top-down” which refers to the ability to install the boardwalk treads and beams from equipment operating on top of previously installed treads and beams. As such, sensitive areas can be protected during the construction phase.



Figure 3V: Example of Trailhead Kiosk



Figure 3W: Example of Wayfinding Sign Along Trail



Figure 3X: Typical Interpretive Sign Along Trail

Signage

Signs play an important role in the safety and enjoyment of a shared-use path. In a beautiful natural setting such as this, care should be taken not to install too many signs that could detract from the rural feel of the place. Three types of signs, described below, are required or would be appropriate for this section of path. They include regulatory signs, wayfinding signs and interpretation and education signs. Guidance is provided in AASHTO's Guide for the Development of Bicycle Facilities (2012, Fourth Edition).

Regulatory and Warning Signage

Regulatory and warning signs will be according to the MUTCD Part 9 which regulates the design and use of all traffic control devices. Regulatory signs, such as speed limit, yield, stop and others should be retroreflective and conform to the color, legend, and shaped requirements described in the MUTCD. Signs along the path may be reduced in size per Table 9B-1 of the MUTCD. Use of signs for shared-use paths are summarized

in AASHTO Section 5.4.2. Regulatory signs have been included in the cost estimate.

Wayfinding Signage

Wayfinding is the process of navigating through a built or natural landscape whether familiar or unfamiliar, using information as provided. People navigate the environment based on a variety of queues; signage is only a portion of the information the user relies on to navigate the world. By thoughtfully designing and strategically locating wayfinding elements, confusion can be eliminated, thereby enhancing the use experience. Wayfinding signs should be:

- Simple and unobtrusive, not distracting from the user's experience
- Easy to find and comprehend
- Located primarily at intersections or decision points along pathways

Interpretation & Education (I & E) Signage

Interpretation provides an explanation or perspective to an experience. Interpretive signs should make visible and available any information that is not obvious while also emphasizing connections and patterns. The natural environment of the site and the timber production that occurs there provides several opportunities to educate the public and interpret the world around them. It is recommended that several interpretive signs be placed along this trail segment. A recreation signage plan for the trail system within Kitsap County is recommended to provide a consistent messaging and similar environmental graphics such as materials, colors, fonts, icons among all wayfinding and interpretive signs. This latter recommendation is not reflected in the cost estimate, although the design, fabrication and installation of interpretive signs for this segment of trail is included.



Figure 3Y: Example of a Trail Overlook

Overlooks

There are several opportunities for overlooks along the trail. During the course of the study new views became evident as logging operations opened up views that were not previously evident. Spectacular views are available on the north end of the project, particularly on the Upper route that will descend down through the OPG development at what is now the Babcock Farm area. Views from here include Mount Baker to the north and the northern Cascade mountains. There are also views west to the Olympic mountains from various locations along the central portion of the proposed route that utilize what is now the 1000 Road. Specific costs for overlooks have not been included in the cost for this study. Locations for these amenities should be specifically identified by County Parks in the coming years since much of the timber will be removed by OPG as part of the land acquisition agreement, revealing opportunities for optimal locations.



Figure 3Z: Example of Trailhead Parking

Trailheads and Parking

There are several existing parking lots and trailheads that will service the trail, although they also service a number of different recreation activities in Heritage Park and OPG timber lands. Expansion or upgrade to these parking areas will be necessary over time as both the County park and the town of Port Gamble continue to grow and become more popular as places to recreate. Costs associated with new or upgraded parking areas are not included in this study as these will also service other activities. However, amenities associated with trailheads, such as kiosks, are included. These may be located at parking areas or strategic nodes along the trail that connect to parking areas.

Additional parking locations in proximity to the trail have been identified during this study. These include a parking area that will serve the new Ride Park but will undoubtedly receive use for those that will be looking for access to the new trail. Another potential parking area was identified by OPG during the planning process on land off of Carver Drive on the north

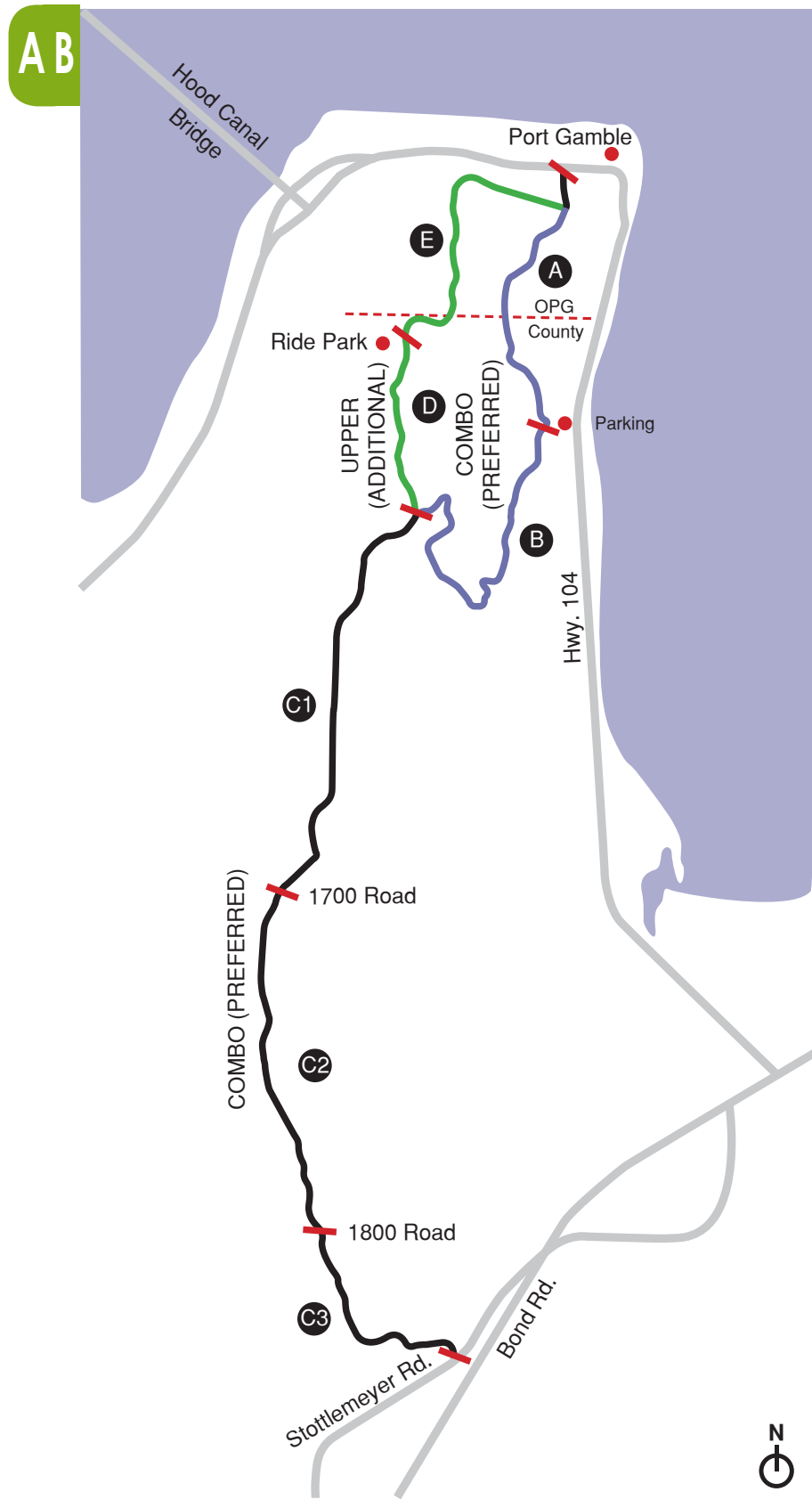


Figure 3AA: Example of Equestrian Trail Use(Photo Courtesy of Don Willott)

end of the project. Also, the Park & Ride lot being proposed at the Hood Canal Bridge should be considered the official regional trailhead parking location on the north of the peninsula as Port Gamble town does not have the capacity to accommodate a large amount of parking.

Equestrian Use

Although accommodation for equestrians is desired by the community, the referenced standards all require separated pathways. This would require additional land and would have significant impact on the landform and land cover if the equestrian path were to follow the shared-use path alignment. The 4 foot wide gravel shoulder can informally accommodate equestrian users. Trail management policy will not preclude use of the trail by equestrians; however, the trail will not be promoted as part of the equestrian trail system. Eventually a separate, independently aligned trail may be studied and implemented if found feasible.



3.6 Summary of Estimates of Probable Costs

Project costs are estimated in 2018 dollars and consist of both soft costs, such as environmental, permitting, design, engineering and construction management and hard costs, which are the construction costs.

For the preferred Combo alignment, the overall project cost for a 6.7 mile shared-use path meeting federal and state standards is estimated at \$5,517,389. This includes \$4,194,125 in construction costs and \$1,323,263 in soft costs (32% of construction cost). The cost is approximately \$156 per linear foot for the length of the 35,315 foot long trail.

For the additional Upper alternative segment, the cost for this 1.9 mile shared-use path meeting federal and state standards is estimated at \$1,858,866. This includes \$1,430,959 in construction costs and \$427,907 in soft costs (30% of construction cost). The cost is approximately \$182 per linear foot for the length of the 10,209 foot long trail. The cost is higher per linear foot because it includes the cost of a 1,230 LF paved road from the OPG property line to the Ride Park.

Not included are any costs associated with land acquisition. It is assumed that necessary land acquisitions would be completed prior to moving into final design of the trail. Quantities of several items were generated within the SiteOps engineering modeling program and costs were based on inputted unit costs from MAP. Other costs were generated based on comparable construction costs.

Costs in the report have been broken down by segment as shown in Figure 3AB. The preferred Combo route is comprised of segments A, B, C1, C2 and C3. The additional Upper route is comprised of segments D and E. Costs are provided by segment to give decision makers the information needed to acquire funding if phasing is necessary due to the large scope of the entire trail project. OPG development schedule, the County Ride Park project and STO funding opportunities (both transportation and recreation related) may impact what segments are built when.

Soft Costs

Soft costs are non-construction related costs and for this estimate are 1/3 of the construction cost and 1/4 of the total project cost for each of the alignments. Soft costs include:

- Engineer and Consultant Design Fees
- Owner Consultants – Survey, Geotechnical, Other
- Washington State Sales Tax
- Testing and Inspection
- Easements
- Permits
- Construction Administration Management
- Construction Contingency

Hard Costs

Hard costs are construction costs. Construction costs account for 3/4 of the total project cost for each alignment. For this shared-use path, the following costs are the most significant:

- Site Clearing
- Grading- Cut and Fill
- Asphalt Paving including Gravel Base Course
- Revegetation
- Erosion Control
- Bridge and Boardwalk
- Crosswalks
- Drainage & Culverts
- Kiosks and Signs

Figure 3AB: Trail Segments for Costing

3.7 Cost Breakdown Per Segment

Combo Alignment (Preferred) Segments

SEGMENT	LINEAR FEET	TOTAL COST	COST PER FOOT
A	6,290	\$978,065	\$156
B	8,325	\$1,683,122	\$202
C1	10,350	\$1,219,389	\$118
C2	5,475	\$659,338	\$120
C3	4,875	\$977,475	\$201
TOTAL	35,315	\$5,517,389	\$156

Upper Route (Additional) Segments

SEGMENT		TOTAL COST	COST PER FOOT
D	3,312	\$451,695	\$136
E	6,897	\$1,407,171	\$204
TOTAL	10,209	\$1,858,866	\$182

Assumptions

For the additional Upper route, the cost of developing the road that the trail will follow will be incurred by OPG as it is on their land. OPG has set aside, in recent planning documents, a 17' width within the right-of-way for a shared-use trail. OPG's cost would include all rough grading, which is extensive, and development of the road. The County would pay for final trail grading, some stormwater, erosion control, trail base course trail paving and seeding. The development road would not be built by OPG all the way to the Ride Park, only to the property line. The County will need to extend the road another 1,230 feet, in addition to the trail.

Not included in the costs are parking area improvements associated with existing or potential trailheads, rest area pullouts adjacent to the steeper sections of the trail as the are all under the maximum 8.3% grade (mitigation not required), site lighting, fencing or restrooms. The focus of this feasibility study is on the feasibility and costs of this as a transportation corridor, although it will be used recreationally as well. County Parks should consider the cost of additional recreation amenities associated with the trail in budgeting and grant applications.

Also not included in the costs is 600 LF of spur trail that would connect the Heritage Park Parking Lot on Highway 104 to the STO route. Assuming the average cost of the trail is \$156/LF, this additional item should be budgeted at about \$93,600.

Detailed costs for each of the segments are provided on the following pages.



Figure 3AC: Trail Photo

CONSTRUCTION COSTS (Hard Costs)

ON-SITE PREPARATION						
Work Activity	QUANTITY	UNIT	UNIT COST	SUBTOTAL	TOTAL	NOTES
Site Clearing						
Clearing	1.10	AC	\$10,250.00	\$11,275		
Topsoil Strip/Cut	1,769	CY	\$3.10	\$5,484		12" STRIPPING DEPTH ASSUMED
Topsoil Fill	715	CY	\$5.15	\$3,682		ASSUME FILL SLOPES AMENDED WITH 12" TOPSOIL FROM ON-SITE
Topsoil Export	1,054	CY	\$25.60	\$26,982		
Total Site Clearing				\$47,424	\$47,424	Quantities and costs per MAP
Grading Cut						
Earth Cut	662	CY	\$15.40	\$10,195		
Total Grading Cut				\$10,195	\$10,195	Quantities and costs per MAP
Grading Fill						
Earth Fill	1,209	CY	\$20.00	\$24,180		
Total Grading Fill				\$24,180	\$24,180	Quantities and costs per MAP
Grading Import						
Earth Import	547	CY	\$28.75	\$15,726		
Total Grading Import				\$15,726	\$15,726	Quantities and costs per MAP
Retaining Wall	0	SF	\$39.43		\$0	Quantities and costs per MAP
Other Preparation						
Fine Grading Sub-Grade Prep	10,626	SY	\$4.10	\$43,567		
Erosion Control	1.10	AC	\$4,100.00	\$4,510		
Seeding/Slope Stabilization	0.55	AC	\$20,500.00	\$11,275		
Total Other Preparation				\$59,352	\$59,352	Quantities and costs per MAP
TOTAL ON-SITE PREPARATION					\$156,876	

Table 3AD: Cost Estimate - SEGMENT A of the Preferred Alignment



ON-SITE IMPROVEMENTS

Work Activity	QUANTITY	UNIT	UNIT COST	SUBTOTAL	TOTAL	NOTES
Paving - Trail Section						
Asphalt Paving - Trail on existing road	3,922	SY	\$21.98	\$86,206		2" HMA OVER 2" CSTC
Asphalt Paving - New Trail/Trail along ex road	3,418	SY	\$23.21	\$79,332		2" HMA OVER 2" CSTC OVER 6" GRAVEL BASE
CSTC Gravel Shoulders	998	Ton	\$41.00	\$40,918		4" COMPACTED DEPTH, 7-ft along trail, 4-ft along roads
Total Paving - Asphalt				\$206,455	\$206,455	Quantities and costs per MAP
Boardwalk						
Boardwalk Segment at Beaver Pond	150	LF	\$950.00	\$142,500		\$70/SF for 12' width, assumes PermaTrak concrete system, including pile foundations, design
Railings	150	LF	\$50.00	\$7,500		Assumes timber rail. Steel rail would be closer to \$75-\$100/LF
Total Boardwalk				\$150,000	\$150,000	
Other On-Site Improvements						
Trail Signage						
Regulatory Allowance	1	LS	\$3,000.00	\$3,000		Allowance
Wayfinding Allowance	1	LS	\$3,000.00	\$3,000		Allowance
Interpretive Allowance	1	LS	\$5,000.00	\$5,000		Allowance
Trailhead Kiosks	4	1	\$7,500.00	\$30,000		Allowance
Overlook	1	EA	\$7,500.00	\$7,500		Allowance
Crosswalk- at Carver Road	1	LS	\$600.00	\$600		
Crosswalk- at Talbot Street	1	LS	\$600.00	\$600		
Storm Drainage	5,100	LF	\$12.38	\$63,138		Concentrated and Sheetflow Dispersion Through Native Vegetation per BMP's T5.11 and T5.12
New Culverts	7	EA	\$1,000.00	\$7,000		Quantities and costs per MAP
Storm Drainage participation with OPG	1	LS	\$50,000.00	\$50,000		1,130 LF of trail
Wetland Mitigation- per ELS report	1	LS	\$64,970.00	\$64,970		Cost per wetland mitigation report by ELS, worst case scenario for wetland and buffers
Total - Other On-Site Improvements				\$234,808	\$234,808	
TOTAL ON-SITE IMPROVEMENTS				TOTAL	\$591,263	

Contractor Mobilization @ 5% 1 LS \$37,406.98 \$37,407 Industry standard percentage

TOTAL CONSTRUCTION TOTAL \$785,547

Design and Construction Management (Soft Costs)						
Engineering/Design Consultants 20%	1	LS	\$88,252.67	\$88,253		Excludes 20% of Boardwalk Estimate- Design & Engineering are included in cost
Construction Management 12%	1	LS	\$94,265.58	\$94,266		
Conditional Use, SEPA, SDAP Permitting Fees	1	LS	\$10,000.00	\$10,000		
TOTAL Design Soft Costs and Construction Management				TOTAL	\$192,518	

Total Project Costs (Construction and Soft Cost Estimate) \$978,065

Not Included in Costs:
 Parking area improvements associated with existing or potential trailheads, rest area pullouts adjacent to steep trail sections (all are under 8.3%), site lighting, fencing, restrooms

Table 3AE: Cost Estimate - SEGMENT A of the Preferred Alignment Continued



ESTIMATE OF PROBABLE PROJECT COSTS FOR THE PORT GAMBLE TRAIL FEASIBILITY STUDY
SEGMENT B
 2018 Dollars

CONSTRUCTION COSTS (Hard Costs)

ON-SITE PREPARATION						
Work Activity	QUANTITY	UNIT	UNIT COST	SUBTOTAL	TOTAL	NOTES
Site Clearing						
Clearing	4.50	AC	\$10,250.00	\$46,125		
Topsoil Strip/Cut	7,258	CY	\$3.10	\$22,500		12" STRIPPING DEPTH ASSUMED
Topsoil Fill	2,388	CY	\$5.15	\$12,298		ASSUME FILL SLOPES AMENDED WITH 12" TOPSOIL FROM ON-SITE
Topsoil Export	4,870	CY	\$25.60	\$124,672		
Total Site Clearing				\$205,595	\$205,595	Quantities and costs per MAP
Grading Cut						
Earth Cut	9,416	CY	\$15.40	\$145,006		
Total Grading Cut				\$145,006	\$145,006	Quantities and costs per MAP
Grading Fill						
Earth Fill	4,923	CY	\$20.00	\$98,460		
Total Grading Fill				\$98,460	\$98,460	Quantities and costs per MAP
Grading Export						
Earth Export	1,499	CY	\$25.60	\$38,374		
Total Grading Export				\$38,374	\$38,374	Quantities and costs per MAP
Retaining Wall	0	SF	\$39.43		\$0	Quantities and costs per MAP
Other Preparation						
Fine Grading Sub-Grade Prep	17,622	SY	\$4.10	\$72,250		
Erosion Control	4.50	AC	\$4,100.00	\$18,450		
Seeding/Slope Stabilization	2.24	AC	\$20,500.00	\$45,920		
Total Other Preparation				\$136,620	\$136,620	Quantities and costs per MAP
TOTAL ON-SITE PREPARATION					\$624,056	

Table 3AF: Cost Estimate - SEGMENT B of the Preferred Alignment

ON-SITE IMPROVEMENTS						
Work Activity	QUANTITY	UNIT	UNIT COST	SUBTOTAL	TOTAL	NOTES
Paving - Trail Section						
Asphalt Paving - Trail on existing road	4,856	SY	\$21.98	\$106,735		2" HMA OVER 2" CSTC
Asphalt Paving - New Trail/Trail along ex road	8,134	SY	\$23.21	\$188,790		2" HMA OVER 2" CSTC OVER 6" GRAVEL BASE
CSTC Gravel Shoulders	1,465	Ton	\$41.00	\$60,065		4" COMPACTED DEPTH, 7-ft along trail, 4-ft along roads
Total Paving - Asphalt				\$355,590	\$355,590	Quantities and costs per MAP
Other On-Site Improvements						
Trail Signage						
Regulatory Allowance	1	LS	\$3,000.00	\$3,000		Allowance
Wayfinding Allowance	1	LS	\$3,000.00	\$3,000		Allowance
Interpretive Allowance	1	LS	\$5,000.00	\$5,000		Allowance
Trailhead Kiosks	1	EA	\$7,500.00	\$7,500		Allowance
Overlook	1	EA	\$7,500.00	\$7,500		Allowance
Storm Drainage	8,350	LF	\$12.38	\$103,373		Concentrated and Sheetflow Dispersion Through Native Vegetation per BMP's T5.11 and T5.12
New Culverts	12	EA	\$1,000.00	\$12,000		Quantities and costs per MAP
Wetland Mitigation- per ELS report	1	LS	\$86,140.00	\$86,140		Cost per wetland mitigation report by ELS, worst case scenario for wetland and buffers
Total - Other On-Site Improvements				\$227,513	\$227,513	
TOTAL ON-SITE IMPROVEMENTS				TOTAL	\$583,103	
Contractor Mobilization @ 5%	1	LS	\$60,357.95	\$60,358		Industry standard percentage
TOTAL CONSTRUCTION				TOTAL	\$1,267,517	
Design and Construction Management (Soft Costs)						
Engineering/Design Consultants 20%	1	LS	\$253,503.39	\$253,503		
Construction Management 12%	1	LS	\$152,102.04	\$152,102		
Conditional Use, SEPA, SDAP Permitting Fees	1	LS	\$10,000.00	\$10,000		
TOTAL Design Soft Costs and Construction Management				TOTAL	\$415,605	
Total Project Costs (Construction and Soft Cost Estimate)					\$1,683,122	

Not Included in Costs:

Parking area improvements associated with existing or potential trailheads, rest area pullouts adjacent to steep trail sections (all are under 8.3%), site lighting, fencing, restrooms

Table 3AG: Cost Estimate - SEGMENT B of the Preferred Alignment Continued



ESTIMATE OF PROBABLE PROJECT COSTS FOR THE PORT GAMBLE TRAIL FEASIBILITY STUDY
SEGMENT C-1
 2018 Dollars

CONSTRUCTION COSTS (Hard Costs)

ON-SITE PREPARATION						
Work Activity	QUANTITY	UNIT	UNIT COST	SUBTOTAL	TOTAL	NOTES
Site Clearing						
Clearing	1.19	AC	\$10,250.00	\$12,198		
Topsoil Strip/Cut	1,916	CY	\$3.10	\$5,940		12" STRIPPING DEPTH ASSUMED
Topsoil Fill	436	CY	\$5.15	\$2,245		ASSUME FILL SLOPES AMENDED WITH 12" TOPSOIL FROM ON-SITE
Topsoil Export	1,480	CY	\$25.60	\$37,888		
Total Site Clearing				\$58,271	\$58,271	Quantities and costs per MAP
Grading Cut						
Earth Cut	781	CY	\$15.40	\$12,027		
Total Grading Cut				\$12,027	\$12,027	Quantities and costs per MAP
Grading Fill						
Earth Fill	8	CY	\$20.00	\$160		
Total Grading Fill				\$160	\$160	Quantities and costs per MAP
Grading Export						
Earth Export	773	CY	\$25.60	\$19,789		
Total Grading Export				\$19,789	\$19,789	Quantities and costs per MAP
Retaining Wall						
	0	SF	\$39.43		\$0	Quantities and costs per MAP
Other Preparation						
Fine Grading Sub-Grade Prep	21,852	SY	\$4.10	\$89,593		
Erosion Control	1.19	AC	\$4,100.00	\$4,879		
Seeding/Slope Stabilization	0.44	AC	\$20,500.00	\$9,020		
Total Other Preparation				\$103,492	\$103,492	Quantities and costs per MAP
TOTAL ON-SITE PREPARATION					\$193,739	

Table 3AH: Cost Estimate - SEGMENT C-1 of the Preferred Alignment

ON-SITE IMPROVEMENTS						
Work Activity	QUANTITY	UNIT	UNIT COST	SUBTOTAL	TOTAL	NOTES
Paving - Trail Section						
Asphalt Paving - Trail on existing road	13,432	SY	\$21.98	\$295,235		2" HMA OVER 2" CSTC
Asphalt Paving - New Trail/Trail along ex road	2,351	SY	\$23.21	\$54,567		2" HMA OVER 2" CSTC OVER 6" GRAVEL BASE
CSTC Gravel Shoulders	1,816	Ton	\$41.00	\$74,456		4" COMPACTED DEPTH, 7-ft along trail, 4-ft along roads
Total Paving - Asphalt				\$424,258	\$424,258	Quantities and costs per MAP
Other On-Site Improvements						
Trail Signage						
Regulatory Allowance	1	LS	\$3,000.00	\$3,000		Allowance
Wayfinding Allowance	1	LS	\$3,000.00	\$3,000		Allowance
Interpretive Allowance	1	LS	\$5,000.00	\$5,000		Allowance
Trailhead Kiosks	0	EA	\$7,500.00	\$0		Allowance
Overlook	1	EA	\$7,500.00	\$7,500		Allowance
Storm Drainage	10,350	LF	\$12.38	\$128,133		Concentrated and Sheetflow Dispersion Through Native Vegetation per BMP's T5.11 and T5.12
New Culverts	1	EA	\$1,000.00	\$1,000		Quantities and costs per MAP
Wetland Mitigation- per ELS report	1	LS	\$106,945.00	\$106,945		Cost per wetland mitigation report by ELS, worst case scenario for wetland and buffers
Total - Other On-Site Improvements				\$254,578	\$254,578	
TOTAL ON-SITE IMPROVEMENTS				TOTAL	\$678,836	
Contractor Mobilization @ 5%	1	LS	\$43,628.75	\$43,629		Industry standard percentage
TOTAL CONSTRUCTION				TOTAL	\$916,204	
Design and Construction Management (Soft Costs)						
Engineering/Design Consultants 20%	1	LS	\$183,240.74	\$183,241		
Construction Management 12%	1	LS	\$109,944.45	\$109,944		
Conditional Use, SEPA, SDAP Permitting Fees	1	LS	\$10,000.00	\$10,000		
TOTAL Design Soft Costs and Construction Management				TOTAL	\$303,185	
Total Project Costs (Construction and Soft Cost Estimate)					\$1,219,389	

Not Included in Costs:

Parking area improvements associated with existing or potential trailheads, rest area pullouts adjacent to steep trail sections (all are under 8.3%), site lighting, fencing, restrooms

Table 3A1: Cost Estimate - SEGMENT C-1 of the Preferred Alignment Continued

CONSTRUCTION COSTS (Hard Costs)

ON-SITE PREPARATION						
Work Activity	QUANTITY	UNIT	UNIT COST	SUBTOTAL	TOTAL	NOTES
Site Clearing						
Clearing	0.33	AC	\$10,250.00	\$3,383		
Topsoil Strip/Cut	531	CY	\$3.10	\$1,646		12" STRIPPING DEPTH ASSUMED
Topsoil Fill	64	CY	\$5.15	\$330		ASSUME FILL SLOPES AMENDED WITH 12" TOPSOIL FROM ON-SITE
Topsoil Export	467	CY	\$25.60	\$11,955		
Total Site Clearing				\$17,313	\$17,313	Quantities and costs per MAP
Grading Cut						
Earth Cut	375	CY	\$15.40	\$5,775		
Total Grading Cut				\$5,775	\$5,775	Quantities and costs per MAP
Grading Fill						
Earth Fill	186	CY	\$20.00	\$3,720		
Total Grading Fill				\$3,720	\$3,720	Quantities and costs per MAP
Grading Export						
Earth Export	189	CY	\$25.60	\$4,838		
Total Grading Export				\$4,838	\$4,838	Quantities and costs per MAP
Retaining Wall	0	SF	\$39.43		\$0	Quantities and costs per MAP
Other Preparation						
Fine Grading Sub-Grade Prep	11,550	SY	\$4.10	\$47,355		
Erosion Control	0.33	AC	\$4,100.00	\$1,353		
Seeding/Slope Stabilization	0.12	AC	\$20,500.00	\$2,460		
Total Other Preparation				\$51,168	\$51,168	Quantities and costs per MAP
TOTAL ON-SITE PREPARATION					\$82,815	

Table 3AJ: Cost Estimate - SEGMENT C-2 of the Preferred Alignment

AK

ON-SITE IMPROVEMENTS						
Work Activity	QUANTITY	UNIT	UNIT COST	SUBTOTAL	TOTAL	NOTES
Paving - Trail Section						
Asphalt Paving - Trail on existing road	8,088	SY	\$21.98	\$177,774		2" HMA OVER 2" CSTC
Asphalt Paving - New Trail/Trail along ex road	739	SY	\$23.21	\$17,152		2" HMA OVER 2" CSTC OVER 6" GRAVEL BASE
CSTC Gravel Shoulders	961	Ton	\$41.00	\$39,401		4" COMPACTED DEPTH, 7-ft along trail, 4-ft along roads
Total Paving - Asphalt				\$234,327	\$234,327	Quantities and costs per MAP
Other On-Site Improvements						
Trail Signage						
Regulatory Allowance	1	LS	\$3,000.00	\$3,000		Allowance
Wayfinding Allowance	1	LS	\$3,000.00	\$3,000		Allowance
Interpretive Allowance	1	LS	\$5,000.00	\$5,000		Allowance
Trailhead Kiosks	1	EA	\$7,500.00	\$7,500		Allowance
Overlook	1	EA	\$7,500.00	\$7,500		Allowance
Storm Drainage	5,475	LF	\$12.38	\$67,781		Concentrated and Sheetflow Dispersion Through Native Vegetation per BMP's T5.11 and T5.12
New Culverts	1	EA	\$1,000.00	\$1,000		Quantities and costs per MAP
Wetland Mitigation- per ELS report	1	LS	\$56,575.00	\$56,575		Cost per wetland mitigation report by ELS, worst case scenario for wetland and buffers
Total - Other On-Site Improvements				\$151,356	\$151,356	
TOTAL ON-SITE IMPROVEMENTS				TOTAL	\$385,683	

Contractor Mobilization @ 5%	1	LS	\$23,424.89	\$23,425		Industry standard percentage
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TOTAL CONSTRUCTION				TOTAL	\$491,923
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Design and Construction Management (Soft Costs)						
Engineering/Design Consultants 20%	1	LS	\$98,384.52	\$98,385		
Construction Management 12%	1	LS	\$59,030.71	\$59,031		
Conditional Use, SEPA, SDAP Permitting Fees	1	LS	\$10,000.00	\$10,000		
TOTAL Design Soft Costs and Construction Management				TOTAL	\$167,415	

Total Project Costs (Construction and Soft Cost Estimate)				TOTAL	\$659,338
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Not Included in Costs:

Parking area improvements associated with existing or potential trailheads, rest area pullouts adjacent to steep trail sections (all are under 8.3%), site lighting, fencing, restrooms

Table 3AK: Cost Estimate - SEGMENT C-2 of the Preferred Alignment Continued



ESTIMATE OF PROBABLE PROJECT COSTS FOR THE PORT GAMBLE TRAIL FEASIBILITY STUDY
SEGMENT C-3
 2018 Dollars

CONSTRUCTION COSTS (Hard Costs)

ON-SITE PREPARATION						
Work Activity	QUANTITY	UNIT	UNIT COST	SUBTOTAL	TOTAL	NOTES
Site Clearing						
Clearing	3.07	AC	\$10,250.00	\$31,468		
Topsoil Strip/Cut	4,953	CY	\$3.10	\$15,354		12" STRIPPING DEPTH ASSUMED
Topsoil Fill	1,421	CY	\$5.15	\$7,318		ASSUME FILL SLOPES AMENDED WITH 12" TOPSOIL FROM ON-SITE
Topsoil Export	3,532	CY	\$25.60	\$90,419		
Total Site Clearing				\$144,559	\$144,559	Quantities and costs per MAP
Grading Cut						
Earth Cut	4,594	CY	\$15.40	\$70,748		
Total Grading Cut				\$70,748	\$70,748	Quantities and costs per MAP
Grading Fill						
Earth Fill	1,120	CY	\$20.00	\$22,400		
Total Grading Fill				\$22,400	\$22,400	Quantities and costs per MAP
Grading Export						
Earth Export	3,474	CY	\$25.60	\$88,934		
Total Grading Export				\$88,934	\$88,934	Quantities and costs per MAP
Retaining Wall	0	SF	\$39.43		\$0	Quantities and costs per MAP
Other Preparation						
Fine Grading Sub-Grade Prep	8,113	SY	\$4.10	\$33,263		
Erosion Control	3.07	AC	\$4,100.00	\$12,587		
Seeding/Slope Stabilization	1.49	AC	\$20,500.00	\$30,545		
Total Other Preparation				\$76,395	\$76,395	Quantities and costs per MAP
TOTAL ON-SITE PREPARATION					\$403,036	

Table 3AL: Cost Estimate - SEGMENT C-3 of the Preferred Alignment

ON-SITE IMPROVEMENTS						
Work Activity	QUANTITY	UNIT	UNIT COST	SUBTOTAL	TOTAL	NOTES
Paving - Trail Section						
Asphalt Paving - Trail on existing road	0	SY	\$21.98	\$0		2" HMA OVER 2" CSTC
Asphalt Paving - New Trail/Trail along ex road	5,335	SY	\$23.21	\$123,825		2" HMA OVER 2" CSTC OVER 6" GRAVEL BASE
CSTC Gravel Shoulders	840	Ton	\$41.00	\$34,440		4" COMPACTED DEPTH, 7-ft along trail, 4-ft along roads
Total Paving - Asphalt				\$158,265	\$158,265	Quantities and costs per MAP
Other On-Site Improvements						
Trail Signage						
Regulatory Allowance	1	LS	\$3,000.00	\$3,000		Allowance
Wayfinding Allowance	1	LS	\$3,000.00	\$3,000		Allowance
Interpretive Allowance	1	LS	\$5,000.00	\$5,000		Allowance
Trailhead Kiosks	1	EA	\$7,500.00	\$7,500		Allowance
Overlook	1	EA	\$7,500.00	\$7,500		Allowance
Storm Drainage	4,795	LF	\$12.38	\$59,362		Concentrated and Sheetflow Dispersion Through Native Vegetation per BMP's T5.11 and T5.12
New Culverts	1	EA	\$1,000.00	\$1,000		Quantities and costs per MAP
Wetland Mitigation- per ELS report	1	LS	\$50,370.00	\$50,370		Cost per wetland mitigation report by ELS, worst case scenario for wetland and buffers
Total - Other On-Site Improvements				\$136,732	\$136,732	
TOTAL ON-SITE IMPROVEMENTS				TOTAL	\$294,997	
Contractor Mobilization @ 5%	1	LS	\$34,901.70	\$34,902		Industry standard percentage
TOTAL CONSTRUCTION				TOTAL	\$732,936	
Design and Construction Management (Soft Costs)						
Engineering/Design Consultants 20%	1	LS	\$146,587.12	\$146,587		
Construction Management 12%	1	LS	\$87,952.27	\$87,952		
Conditional Use, SEPA, SDAP Permitting Fees	1	LS	\$10,000.00	\$10,000		
TOTAL Design Soft Costs and Construction Management				TOTAL	\$244,539	
Total Project Costs (Construction and Soft Cost Estimate)					\$977,475	

Not Included in Costs:

Parking area improvements associated with existing or potential trailheads, rest area pullouts adjacent to steep trail sections (all are under 8.3%), site lighting, fencing, restrooms

Assumption:

Type A trail (along road) in OPG development: OPG will provide rough grading. Cost estimate assumes final grading, base course and final pavement on trail.

Table 3AM: Cost Estimate - SEGMENT C-3 of the Preferred Alignment Continued



ESTIMATE OF PROBABLE PROJECT COSTS FOR THE PORT GAMBLE TRAIL FEASIBILITY STUDY
SEGMENT D
 2018 Dollars

CONSTRUCTION COSTS (Hard Costs)

ON-SITE PREPARATION						
Work Activity	QUANTITY	UNIT	UNIT COST	SUBTOTAL	TOTAL	NOTES
Site Clearing						
Clearing	0.34	AC	\$10,250.00	\$3,485		
Topsoil Strip/Cut	551	CY	\$3.10	\$1,708		12" STRIPPING DEPTH ASSUMED
Topsoil Fill	0	CY	\$5.15	\$0		ASSUME FILL SLOPES AMENDED WITH 12" TOPSOIL FROM ON-SITE
Topsoil Export	551	CY	\$25.60	\$14,106		
Total Site Clearing				\$19,299	\$19,299	Quantities and costs per MAP
Grading Cut						
Earth Cut	511	CY	\$15.40	\$7,869		
Total Grading Cut				\$7,869	\$7,869	Quantities and costs per MAP
Grading Fill						
Earth Fill	10	CY	\$20.00	\$200		
Total Grading Fill				\$200	\$200	Quantities and costs per MAP
Grading Export						
Earth Export	501	CY	\$25.60	\$12,826		
Total Grading Export				\$12,826	\$12,826	Quantities and costs per MAP
Retaining Wall	0	SF	\$39.43		\$0	Quantities and costs per MAP
Other Preparation						
Fine Grading Sub-Grade Prep	6,966	SY	\$4.10	\$28,561		
Erosion Control	0.34	AC	\$4,100.00	\$1,394		
Seeding/Slope Stabilization	0.16	AC	\$20,500.00	\$3,280		
Total Other Preparation				\$33,235	\$33,235	Quantities and costs per MAP
TOTAL ON-SITE PREPARATION					\$73,428	

Table 3AN: Cost Estimate - SEGMENT D of the Additional Upper Route

AO

ON-SITE IMPROVEMENTS						
Work Activity	QUANTITY	UNIT	UNIT COST	SUBTOTAL	TOTAL	NOTES
Paving - Trail Section						
Asphalt Paving - Trail on existing road	4,496	SY	\$21.98	\$98,822		2" HMA OVER 2" CSTC
Asphalt Paving - New Trail/Trail along ex road	637	SY	\$23.21	\$14,785		2" HMA OVER 2" CSTC OVER 6" GRAVEL BASE
CSTC Gravel Shoulders	579	Ton	\$41.00	\$23,739		4" COMPACTED DEPTH, 7-ft along trail, 4-ft along roads
Total Paving - Asphalt				\$137,346	\$137,346	Quantities and costs per MAP
Other On-Site Improvements						
Trail Signage						
Regulatory Allowance	1	LS	\$3,000.00	\$3,000		Allowance
Wayfinding Allowance	1	LS	\$3,000.00	\$3,000		Allowance
Interpretive Allowance	1	LS	\$5,000.00	\$5,000		Allowance
Trailhead Kiosks	1	EA	\$7,500.00	\$7,500		Allowance
Overlook	1	EA	\$7,500.00	\$7,500		Allowance
Storm Drainage	3,300	LF	\$12.38	\$40,854		Concentrated and Sheetflow Dispersion Through Native Vegetation per BMP's T5.11 and T5.12
New Culverts	2	EA	\$1,000.00	\$2,000		Quantities and costs per MAP
Wetland Mitigation- per ELS report	1	LS	\$39,055.00	\$39,055		Cost per wetland mitigation report by ELS, worst case scenario for wetland and buffers
Total - Other On-Site Improvements				\$107,909	\$107,909	
TOTAL ON-SITE IMPROVEMENTS				TOTAL	\$245,255	

Contractor Mobilization @ 5%	1	LS	\$15,934.16	\$15,934		Industry standard percentage
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TOTAL CONSTRUCTION				TOTAL	\$334,617	
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Design and Construction Management (Soft Costs)						
Work Activity	QUANTITY	UNIT	UNIT COST	SUBTOTAL	TOTAL	NOTES
Engineering/Design Consultants 20%	1	LS	\$66,923.46	\$66,923		
Construction Management 12%	1	LS	\$40,154.08	\$40,154		
Conditional Use, SEPA, SDAP Permitting Fees	1	LS	\$10,000.00	\$10,000		
TOTAL Design Soft Costs and Construction Management				TOTAL	\$117,078	

Total Project Costs (Construction and Soft Cost Estimate)					\$451,695	
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Not Included in Costs:
 Parking area improvements associated with existing or potential trailheads, rest area pullouts adjacent to steep trail sections (all are under 8.3%), site lighting, fencing, restrooms

Assumption:
 Type A trail (along road) in OPG development: OPG will provide rough grading. Cost estimate assumes final grading, base course and final pavement on trail.

Table 3AO: Cost Estimate - SEGMENT D of the Additional Upper Route



ESTIMATE OF PROBABLE PROJECT COSTS FOR THE PORT GAMBLE TRAIL FEASIBILITY STUDY
SEGMENT E
 2018 Dollars

CONSTRUCTION COSTS (Hard Costs)						
ON-SITE PREPARATION						
Work Activity	QUANTITY	UNIT	UNIT COST	SUBTOTAL	TOTAL	NOTES
Site Clearing						
Clearing	0.00	AC	\$10,250.00	\$0		
Topsoil Strip/Cut	0	CY	\$3.10	\$0		12" STRIPPING DEPTH ASSUMED
Topsoil Fill	0	CY	\$5.15	\$0		ASSUME FILL SLOPES AMENDED WITH 12" TOPSOIL FROM ON-SITE
Topsoil Export	0	CY	\$25.60	\$0		
Total Site Clearing				\$0	\$0	Quantities and costs per MAP
Grading Cut						
Earth Cut	0	CY	\$15.40	\$0		
Total Grading Cut				\$0	\$0	Quantities and costs per MAP
Grading Fill						
Earth Fill	0	CY	\$20.00	\$0		
Total Grading Fill				\$0	\$0	Quantities and costs per MAP
Grading Export						
Earth Export	0	CY	\$25.60	\$0		
Total Grading Export				\$0	\$0	Quantities and costs per MAP
Retaining Wall	0	SF	\$39.43		\$0	Quantities and costs per MAP
Other Preparation						
Fine Grading Sub-Grade Prep	11,575	SY	\$4.10	\$47,458		
Erosion Control	0.00	AC	\$4,100.00	\$0		
Seeding/Slope Stabilization	0.00	AC	\$20,500.00	\$0		
Total Other Preparation				\$47,458	\$47,458	Quantities and costs per MAP
TOTAL ON-SITE PREPARATION					\$47,458	

Table 3AP: Cost Estimate - SEGMENT D of the Additional Upper Route

AQ

ON-SITE IMPROVEMENTS						
Work Activity	QUANTITY	UNIT	UNIT COST	SUBTOTAL	TOTAL	NOTES
Paving - Trail Section						
Asphalt Paving - Trail on existing road	838	SY	\$21.98	\$18,419		2" HMA OVER 2" CSTC
Asphalt Paving - New Trail/Trail along ex road	7,085	SY	\$23.21	\$164,443		2" HMA OVER 2" CSTC OVER 6" GRAVEL BASE
CSTC Gravel Shoulders	735	Ton	\$41.00	\$30,135		4" COMPACTED DEPTH, 7-ft along trail, 4-ft along roads
Total Paving - Asphalt				\$212,997	\$212,997	Quantities and costs per MAP
Bridges						
Bridge	1	LS	\$100,000.00	\$100,000		
Abutments	2	LS	\$10,000.00	\$20,000		
Install + Crane	1	LS	\$150,000.00	\$150,000		
Total Bridges				\$270,000	\$270,000	
County Road, 24' W from OPG property to Ride Park						
Paved Road	1,230	LF	\$240.00	\$295,200		Costs per Triad (OPG Engineer based on development costs of OPG road)
Total Bridges				\$295,200	\$295,200	
Other On-Site Improvements						
Trail Signage						
Regulatory Allowance	1	LS	\$3,000.00	\$3,000		Allowance
Wayfinding Allowance	1	LS	\$3,000.00	\$3,000		Allowance
Interpretive Allowance	1	LS	\$5,000.00	\$5,000		Allowance
Trailhead Kiosks	1	EA	\$7,500.00	\$7,500		Allowance
Overlook	1	EA	\$7,500.00	\$7,500		Allowance
Crosswalk- at Rose Loop	1	LS	\$600.00	\$600		
Crosswalk- at Rose Court	1	LS	\$600.00	\$600		
Crosswalk- at Gamble Way NE	1	LS	\$600.00	\$600		
Crosswalk- at Parking Near Gamble Way NE	1	LS	\$600.00	\$600		
Storm Drainage	540	LF	\$12.38	\$6,685		Concentrated and Sheetflow Dispersion Through Native Vegetation per BMP's T5.11 and T5.12
New Culverts	2	EA	\$1,000.00	\$2,000		Quantities and costs per MAP
Storm Drainage participation with OPG	1	LS	\$100,000.00	\$100,000		County and OPG to neogtiate based on future detailed engineering
Wetland Mitigation- per ELS report	1	LS	\$81,395.00	\$81,395		Cost per wetland mitigation report by ELS, worst case scenario for wetland and buffers
Total - Other On-Site Improvements				\$218,480	\$218,480	
TOTAL ON-SITE IMPROVEMENTS				TOTAL	\$996,677	
Contractor Mobilization @ 5%	1	LS	\$52,206.74	\$52,207		Industry standard percentage
TOTAL CONSTRUCTION				TOTAL	\$1,096,342	
Design and Construction Management (Soft Costs)						
Engineering/Design Consultants 20%	1	LS	\$169,268.31	\$169,268		Excludes 20% of Bridge Estimate- Design & Enginnering are included in cost
Construction Management 12%	1	LS	\$131,560.98	\$131,561		
Conditional Use, SEPA, SDAP Permitting Fees	1	LS	\$10,000.00	\$10,000		
TOTAL Design Soft Costs and Construction Management				TOTAL	\$310,829	
Total Project Costs (Construction and Soft Cost Estimate)					\$1,407,171	

Not Included in Costs:
 Parking area improvements associated with existing or potential trailheads, rest area pullouts adjacent to steep trail sections (all are under 8.3%), site lighting, fencing, restrooms

Assumption:
 Type A trail (along road) in OPG development: OPG will provide rough grading. Cost estimate assumes final grading, base course and final pavement on trail.
 County will provide full road and trail development from the end of the OPG road up to the Ride Park at \$approximately \$240/LF. This cost has been included as the road is necessary for the development of a trail over 8.3% slope.



IMPLEMENTATION AND
NEXT STEPS

A



Figure 4A: Large Group Activity Along a Shared-Use Path

CHAPTER 4: IMPLEMENTATION AND NEXT STEPS

Acceptance of this feasibility study by County Commissioners and incorporation into the County’s TIP will allow additional planning, inclusion into adopted transport plans and implementation to commence. The preliminary plans in this document were developed using existing LIDAR topographic information provided by the County. The horizontal and vertical trail alignments are based on 2 foot contour intervals. Final engineering of the trail alignment will require a detailed land survey and additional field work to fit the trail into the landscape. Land use and required environmental and construction permits, which are listed below, will need to be acquired during detailed engineering design prior to implementation. An easement will also need to be created for a corridor within OPG’s privately owned lands. An MOU will need to be developed between the County and OPG to define funding, implementation, management, maintenance and enforcement of the trail corridor. An formal easement will also need to be obtained by County Public Works from County Parks for the trail corridor.

Potential Funding Sources

- State and County Transportation Funds and/or Grants; TAP and STP funds
- Capital Campaigns
- Kitsap County Transportation or Parks Funds
- Grants from private foundations such as Birkenfeld
- Assistance from Non-Governmental Agencies such as Trust for Public Land, Forterra, or Great Peninsula Conservancy
- State Recreation, Conservation Grants including RCO, and WWRP
- Puget Sound Acquisition and Restoration Fund (PSAR)
- Special Assessments
- Tax Assessments or Bonds

Required Permits

Wetland & Buffer Permits

The permits needed for construction of the trail through wetlands and buffers vary depending on the level of impact on the wetlands, streams and buffers. Wetland impacts are regulated by the U.S. Army Corps of Engineers (Corps), Washington Department of Ecology (Ecology), and Kitsap County, when proposing filling, ditching, and/or dredging. Hydraulic Project Approvals (HPA) will be required from the Washington Department of Fish and Wildlife for stream crossings that require installation of culverts. Wetland impacts are mitigated to achieve a no net loss of wetland acreage and/or function to compensate for the loss of acreage and function in the impacted wetland. Buffer impacts do not result in direct impacts to wetland areas so are usually regulated only by local agencies.

Kitsap County- Impacts to wetlands and buffers are regulated by Kitsap County and require submittal of Site Development Activity Permit (SDAP). A State Environmental Policy Act (SEPA)

checklist must be submitted along with the SDAP permit package. Wetland delineation and wetland/buffer mitigation plan reports are required as part of the SDAP permit. No individual critical area or wetland permits are required by Kitsap County. Mitigation for wetland impacts are varied and depend on the category of wetland and the method of mitigation (creation/reestablishment, rehabilitation, and/or enhancement). The lowest ratio for mitigation is 1.5:1 for wetland impacts to Category IV wetlands and the highest are 4:1 for Category I wetland impacts when proposing creation/reestablishment. The highest range of ratios is required when enhancement is proposed as compensation for wetland impacts because it does not result in a no-net-loss of wetland acreage. Kitsap County will usually defer to the U.S. Army Corps of Engineers and Washington Department of Ecology for mitigation of wetland impacts but require submittal mitigation and delineation reports. Buffer impacts are mitigated at a ratio of 1:1.

U.S. Army Corps of Engineers (Corps)- The Corps regulates direct impacts to wetland through Section 401 of the Clean Water Act, Nationwide Permit (NWP) process, which requires submittal of wetland delineation and mitigation plan reports along with the Joint Aquatic Resources Permit Application (JARPA). The list of possible NWPs for which a project can apply is extensive and the NWP for a specific project dependent on the type of activity and project proposed. This trail project will likely meet the criteria for NWP 14-Linear Transportation Project or NWP 18-Minor Discharges depending on the extent of impact and whether it meets all of the criteria. As part of the Corps process, cultural resources and biological assessment reports may be required if features of cultural importance are identified in the project area and if there will be impacts to endangered or threatened wildlife species, respectively. The Corps determine if these additional reports will be required. Consultation with the U.S. Fish and Wildlife Service (USFWS) and NOAA Fisheries (NOAA) will be necessary if a biological assessment is required to concur with the results of the assessment.

Washington Department of Ecology (Ecology)- Ecology regulates direct wetland impacts through the Water Quality Certification (WQC) process. The WQC is issued following issuance of the NWP and is sometimes issued as part of the NWP by the Corps who determines if the project meets the criteria of the WQC. The delineation and mitigation reports submitted to the Corps



Figure 4B: Western Red Cedar

are also submitted to Ecology during the permitting process.

Washington Department of Fish and Wildlife (WDFW)- The WDFW issues Hydraulic Project Approval (HPA) for projects proposing to cross or otherwise disturb streams below the Ordinary High Water Mark (OHWM) or critical habitat. An HPA will be required for the culvert crossings of state regulated streams to ensure that the crossings will not have adverse impacts on the stream and habitat areas.

Construction Permits

A Site Development Activity Permit (SDAP) is a permit that the Department of Community Development reviews for land disturbing activities for a major development or a development in critical drainage areas. It provides a mechanism to ensure stormwater quantity and quality, as well as other infrastructure, including roads, utilities and landscape are addressed. A temporary erosion and sediment control plan for construction activities is required as part of the SDAP review, as well as site development construction plans and other stormwater



Figure 4C: Forest Near Proposed Trail Route

design documents. The SDAP process can be expected to take approximately 6 months to gain approval.

A National Pollution Discharge Elimination System (NPDES) Construction Stormwater Permit will be required by the Washington State Department of Ecology because more than 1 acre will be disturbed.

Other Permits That May Be Required

- Permit to Work in a County Right-of-Way (Public Works Permit)
- Permit to Use, Alter, and/or Improve Unopened County Right-of-Way (Public Works Permit)
- Forest Practice Application (FPA)
- Building Permit (for Structures, Lighting, Detention Vaults, Retaining Walls)
- Appropriate Land Use Approvals (as needed)

Next Steps

- Review and adoption of Plan by Kitsap County Commissioners
- Integrate Plan into County Comprehensive Plan- Transportation, Land Use, Rural and Resource Lands, Park, Recreation and Open Space elements
- Integrate Plan into the Capital Facilities Plan and annual work plans for County Departments
- Integrate Plan into Puget Sound Regional Council (PSRC) plan
- Land Acquisition- Continue negotiations with Olympic Property Group to acquire the land or easements in manner that conforms to federal regulations
- Land Acquisition- County Public Works to obtain formal easements from County Parks for the trail corridor

- Land Acquisition- Continue to discuss phasing of OPG development and engineering of road to accommodate a separated path
- Develop Funding Plan- Continue partnerships, submit grant applications and explore other funding sources
- Design Development, final engineering, environmental documentation and permits, construction documents and building/construction permits
- Work with NKTA to develop a comprehensive wayfinding, signage, interpretive and educational plan for the entire Sound to Olympics Trail
- Permits- Develop a comprehensive strategy and complete the required documentation

Conclusion

This study demonstrates that a shared-use path within the project area can be engineered to meet local, state and federal shared-use path design standards, allowing the project to be eligible for the fullest extent of funding possible. Due to the existing terrain, steep trail grades will be necessary in locations. However, the trail can be engineered and mitigation measures applied to meet applicable standards. Implementation would come at considerable cost- \$5,517,389 for the preferred Combo alignment and an additional \$1,858,866 for the Upper segment. Most proposed routes utilize existing maintenance and logging road corridors to reduce cost and minimize environmental impact. The proposed trail alignment would provide for a successful transportation corridor and recreation amenity for the community.

