Tigard Greenways
Trail System Master Plan

FINAL PLAN

April 2011

PREPARED BY:

KITTELSON & ASSOCIATES, INC.

ALTA PLANNING + DESIGN

Acknowledgements

The City of Tigard appreciates the efforts of the numerous residents and other walking/bicycling enthusiasts who participated in the development of this plan. Their creativity, energy, and commitment were the driving force behind this planning effort. In addition, the following residents, staff, and other agency and organization members contributed regularly to the Tigard Greenways Trail System Master Plan.

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The contents of this document do not necessarily reflect views or policies of the State of Oregon.

Table of Contents

Executive Summary i

1. Introduction 1
2. Planning Framework 4
3. Existing Conditions 6
4. Greenway Trails Classification System 33
5. Trail Design Guidelines 44
6. Evaluation Process 90
7. Recommended Greenway Trails 94
8. Implementation Plan 134

Appendix A. Public Input

Appendix B. Greenway Trail Alignment Feasibility Assessment

Appendix C. Environmental Assessment

Appendix D. Evaluation Matrix

EXECUTIVE SUMMARY

The Tigard Greenway Trails System Master Plan seeks to improve opportunities for active transportation (walking and bicycling), recreation, and nature education in Tigard and the surrounding region by increasing the connectivity of the existing trail network and setting priorities for future trail development. Greenway trails complement the City's neighborhood trails (short trails that provide direct off-street connections between destinations within the City), sidewalks, and bicycle lanes; connect distant parts of Tigard and surrounding cities; and facilitate long-distance non-motorized travel. Improvements to the greenway trail system recommended in this Plan will help the City make progress toward State and regional goals to reduce single occupant vehicular travel, create a balanced transportation system, and improve air quality. The resulting trail system will also provide an inexpensive transportation option to Tigard residents and facilitate healthier lifestyles.

Project Vision & Objectives

Greenway trails are a key component of the non-motorized transportation network; these trails facilitate convenient connections to local destinations, and connect Tigard residents to the region's extensive trail network. The Tigard Greenways Trail System Master Plan will enhance greenway trails within the City by:

- ***Providing information to facilitate completing and upgrading trails (existing and proposed) that compose the City's greenway trail network;***
- ***Addressing the Fanno Creek, Washington Square Loop, Tualatin River, Pathfinder-Genesis, Tigard Street, Summer Creek and Krueger Creek trails;***
- ***Contributing to the presence of pleasant and uninterrupted greenway trails for pedestrian and bicyclist transportation in the City; and,***
- ***Continuing to promote healthier lifestyles, improved air quality, increased access to transit, and opportunities for non-auto travel.***

To satisfy the Vision, the successful Tigard Greenways Trail System Master Plan will:

- ***Increase opportunities for walking, bicycling, and accessing transit by identifying and developing trail improvement projects that complete the greenway trail system;***
- ***Create a framework for implementing the remaining sections of the greenway trail system through recommended revisions to the City's TSP, Capital Improvement Program and engineering and development standards; and,***
- ***Identify locations for potential new greenway trails as a means to further promote sustainable, non-auto travel and healthy lifestyles.***

Planning Process & Public Involvement

City staff, trail experts, stakeholder groups, and Tigard residents helped guide the identification, evaluation, and prioritization of trails addressed in this Plan via multiple venues:

- **Project Website Interactive Map & Comment Tool:** A website featuring an interactive map allowed users to provide comments on existing trails, potential new trail alignments, and other locations where a trail would benefit the community.
- **Greenway Trail System Neighborhood Surveys:** During the summer of 2010, City staff distributed a survey to 1,500 residents within ¼ mile of select trails to assess reception to potential improvements, in-fills, and extensions of these trails.
- **Open Houses:** Two public open houses – one including Spanish language interpreters - were held in January 2011, enabling residents and other interested individuals to provide feedback on potential trail alignments, express concerns, and share ideas for improvements.
- **Stakeholder Advisory Committee (SAC):** The SAC included private citizens and representatives from coordinating agencies, and met regularly over the course of the planning process.

The input received from each of these sources and venues was included in the evaluation and prioritization of trail alternatives.

Existing Greenway Trails

The Tigard Greenway Trails System Master Plan builds upon previous City planning efforts and provides recommendations for completing the seven of the eight greenway trails addressed in the 2009 Tigard Parks System Master Plan Update:

- Fanno Creek Trail
- Krueger Creek Trail
- Pathfinder Genesis
- Tigard Street Trail
- Tualatin River Trail
- Summer Creek Trail
- Washington Square Loop Trail

The planned Westside Trail, a Metro regional trail which will pass through Tigard, is subject to a separate ODOT-funded planning process and is not addressed in this Plan; however, potential for connections to this and other regional trails was considered when evaluating trail projects.

Opportunities & Challenges

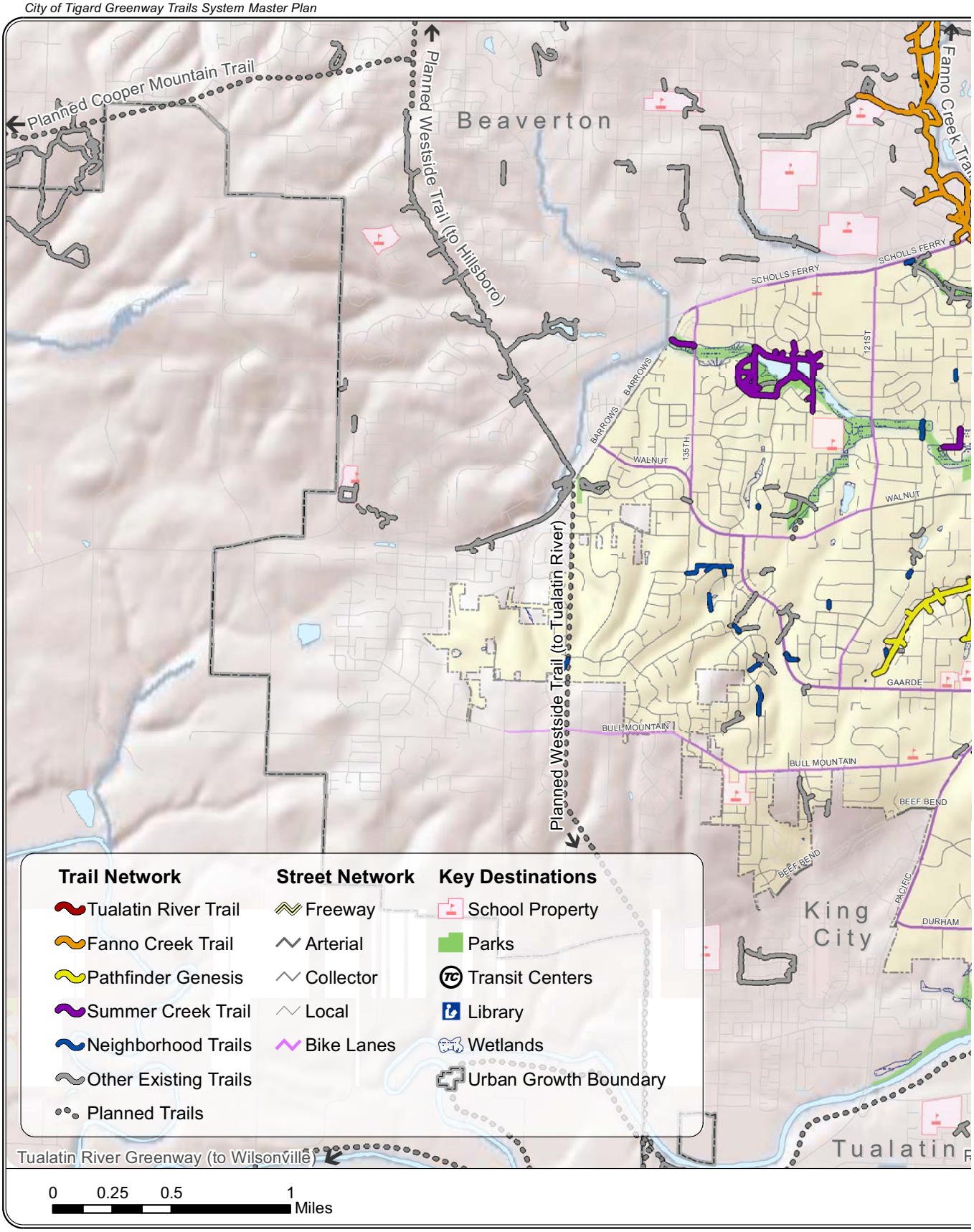
The City of Tigard faces many unique challenges and opportunities related to greenway trail development. Currently, there are gaps in the greenway trail system and areas of Tigard that are not served by the existing greenway trail system. Current plans to expand the greenway trail system address many of these issues; however, there is a need for additional improvements to more comprehensively improve trail connectivity and increase the greenway trail service area. This Plan considers a variety of trail-related opportunities and challenges and provides guidance to the City to effectively plan and implement priority trail projects that address challenges and leverage opportunities.

OPPORTUNITIES

- Provide low cost, low environmental impact, healthy transportation options for Tigard residents by developing a connected trails network.
- Create Safe Routes to School opportunities for students throughout Tigard.
- Provide opportunities for nature education.
- Develop and link to regional trail facilities that facilitate long-distance transportation and recreational trips and contribute to State, regional, and local planning goals.
- Leverage Tigard's investment in bicyle lanes, sidewalks, transit, and other multimodal facilities.

CHALLENGES

- Lack of connectivity between existing greenway trails within Tigard and the surrounding region.
- Need to minimize trail impacts on wetlands, riparian areas, and sensistive habitat.
- Lack of bicycle and pedestrian friendly east-west connections over Highway 217 or a bicycle and pedestrian friendly north-south route east of Highway 217.
- Large portions of Tigard that are not served by trails (more than 1/2 mile from existing trails).
- Limited funding and land availability for filling gaps in the existing trail network.


Planned Cooper Mountain Trail
Planned Westside Trail (to Hillsboro)
Beaverton
Fanno Creek Trail
SCHOLLS FERRY
BARROWS
135TH
121ST
WALNUT
GAARDE
BULL MOUNTAIN
BEEF BEND
PACIFIC
DURHAM
King City
Tualatin
Planned Westside Trail (to Tualatin River)
Tualatin River Greenway (to Wilsonville)
Trail Network
Tualatin River Trail
Fanno Creek Trail
Pathfinder Genesis
Summer Creek Trail
Neighborhood Trails
Other Existing Trails
Planned Trails
Street Network
Freeway
Arterial
Collector
Local
Bike Lanes
Key Destinations
School Property
Parks
Transit Centers
Library
Wetlands
Urban Growth Boundary
0
0.25
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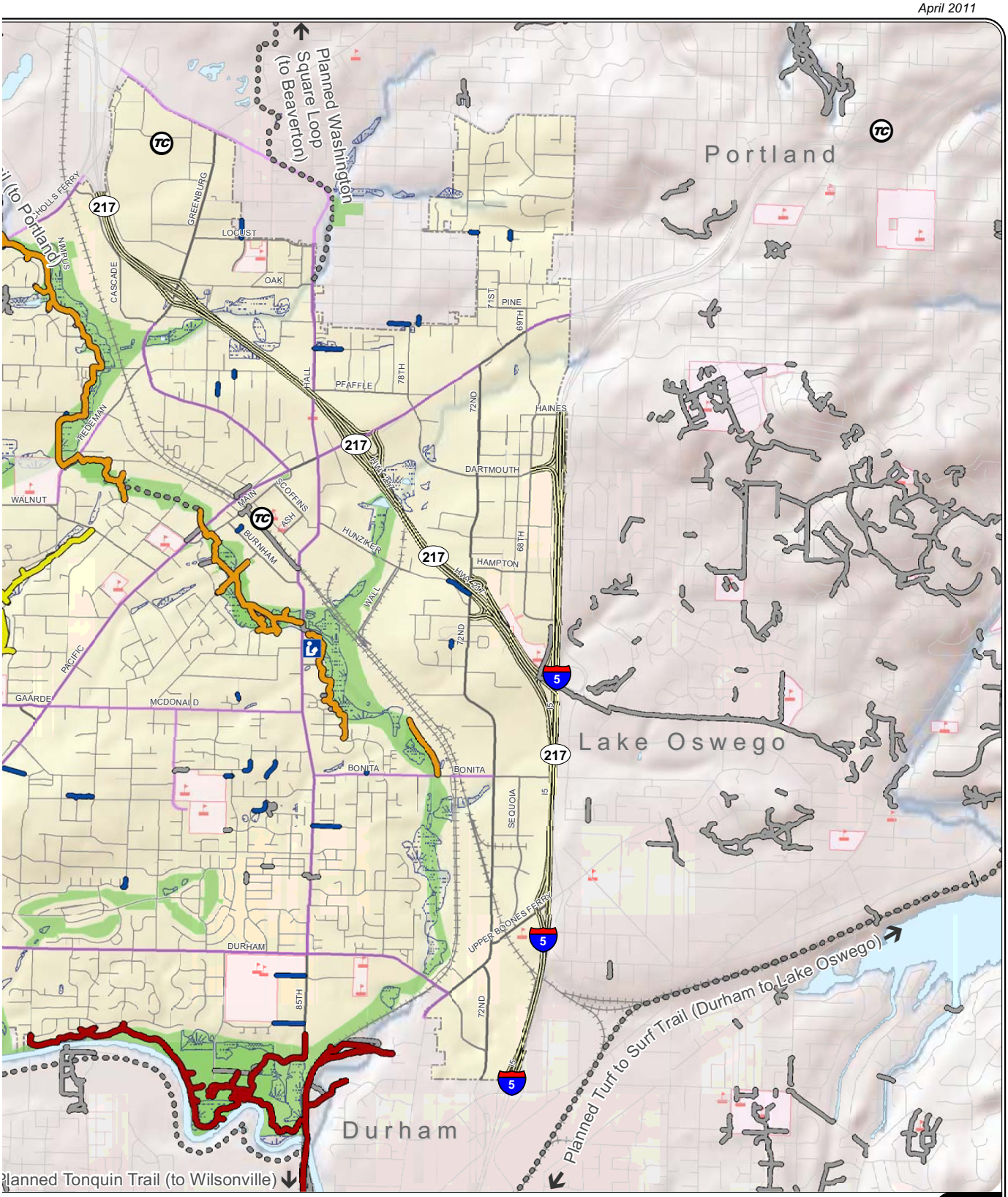
Miles

April 2011



EXISTING & CURRENTLY PLANNED TRAILS
TIGARD, OR.

FIGURE
ES-1

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Tigard Trail Classification System

The Tigard trail system consists of a core system of regional trails that serve as the backbone of the trails network, supported by a complementary system of community trails and neighborhood trails. This hierarchical system of trails provides community members high quality trail opportunities throughout the City of Tigard and pedestrian/bicycle connectivity to other parts of the Portland Metro region.

The Tigard trail classification system recommends standard sections and design guidelines for different types of facilities and presents additional information on supporting features and amenities. The classification system also helps to establish when to widen existing trails and best practices for transitions from unpaved to paved trail facilities.

Design Guidelines

Proper design of greenway trails to fit their intended users, role within the trail network, and surrounding environment is vital to the trail network's success. There are many options for trail design, including surface materials, road crossing treatments, and amenities (e.g., signage, lighting). Design choices determine the types of users that can enjoy the trail, construction costs, maintenance costs, and other factors. This Plan presents a variety of options for greenway trail design in Tigard and provides design recommendations for priority trail projects.

EXAMPLE SURFACE OPTIONS

Asphalt is the most common surface for multi-use trails, as it is suitable for a variety of users and is less jarring on people's joints than concrete. The edges can crumble over time and an overlay or renovation is needed every 15-20 years.

Boardwalk may be used in sensistive areas such as stream environment zones and in areas of steep slopes. Boardwalk construction is typically much more expensive than traditional paved paths and typically lasts 10 years.

Permeable Asphalt is similar to asphalt, but it allows rain to seep through the surface, reducing run-off. Permeable surfaces must be regularly maintained to prevent pores from filling.

Bark Chip/Mulch is an inexpensive and easily-applied surface. However, bicyclists and pedestrians in wheelchairs may not be able to use a mulch path. Bark chip must be top-dressed annually and lasts 1-3 years.

EXAMPLE TRAIL AMENITIES

Lighting improves trail safety by increasing visibility during non-daylight hours. There are many lighting options available for trails, including solar-powered LEDs that can provide over 100,000 hours of pathway lighting.

Marked Crosswalks increase trail user visibility at street crossings. A crosswalk can be combined with warning lights or flashers. Paths can be curved to orient users toward oncoming traffic, slowing their pace.

Wayfinding Signs show direction of travel, location of destinations, and other information. Wayfinding signs provide information to help trail users select routes, locate off-road facilities, and identify geographical features.

Curb Ramps provide an accessible route from the roadway to the trail. A trail without a curb ramp can be challenging to someone in a wheelchair, as well as to cyclists crossing at an intersection

Interpretive Signs enrich the trail user experience, focus attention on unique community attributes such as natural and cultural resources, and provide educational opportunities.

Emergency Call Stations help provide fast notification and response to emergency situations. Emergency phones or call buttons act as a crime deterrent and provide additional sense of safety/security for trail users.

Evaluation Process

The project team evaluated multiple alternative alignments for the majority of the potential greenway trail segments addressed in this Plan. Where feasible, both greenway and upland or on-street alternative alignments were considered. The table below describes the primary criteria taken into account to evaluate and prioritize alignment options. Most of the evaluation criteria are based on qualitative assessments conducted during site visits and feedback obtained from stakeholders. Many of these criteria do not use a quantitative scoring or weighting systems; however, where possible, Geographic Information Systems (GIS) and other readily obtainable information were used to inform the evaluation for each criteria.

EVALUATION CRITERIA

Criteria	Definition	Measures
Connectivity	Evaluates connectivity and access to residential, commercial or employment areas as well as schools.	• Provides the most direct access to destinations, such as major employers and commercial centers. • Minimizes out of direction travel
Safety and Security	Addresses the safety concerns of trail users traveling along the trail. The better the sightlines, the higher the score.	• Surrounding area is open and visible from all angles • Trail users have good lines of sight along the trail and to immediate adjacent surrounding area • No buildings or large structures obscure views of the trail
User Experience	Measures the quality of the users' experience of the trail. Considers potential views, environmental aesthetics, comfort and characteristics such as noise, and air quality.	• Limits proximity of the trail major roads • Limits views of industrial/commercial activity • Minimizes level of noise from surrounding land uses such as roadways and railroads • Potential and ease of providing amenities (e.g. directional signage)
Topographical Constraints	Considers topographical constraints and the ease of providing for ADA accessibility. Higher scores if earth moving, retaining walls and long ramps are not needed or minimized.	• Minimizes number of slopes associated with option • If present, slopes are minimized • Ample room to grade trail to meet ADA accessibility • Minimizes length of ramps needed
Environmental Impacts	Evaluates whether each alignment minimizes environmental impacts.	• Minimizes impacts to floodplain, wetland, or Clean Water Services designated Sensitive Areas, or Goal 5 habitat
Cost	Scores options based on the cost of design, engineering, and/or construction, based on the minimum cost estimates (the low design cost option).	• Minimizes cost of easement / acquisition • Minimizes cost of design/engineering/construction • Minimizes cost of maintenance
Right-of-Way	Addresses the number of property owners that the City will need to work with in order to construct the alignment.	• Alignment on land that is owned by the City of Tigard, Metro, or other public body • Minimizes impacts on private property

Recommended Trail Projects

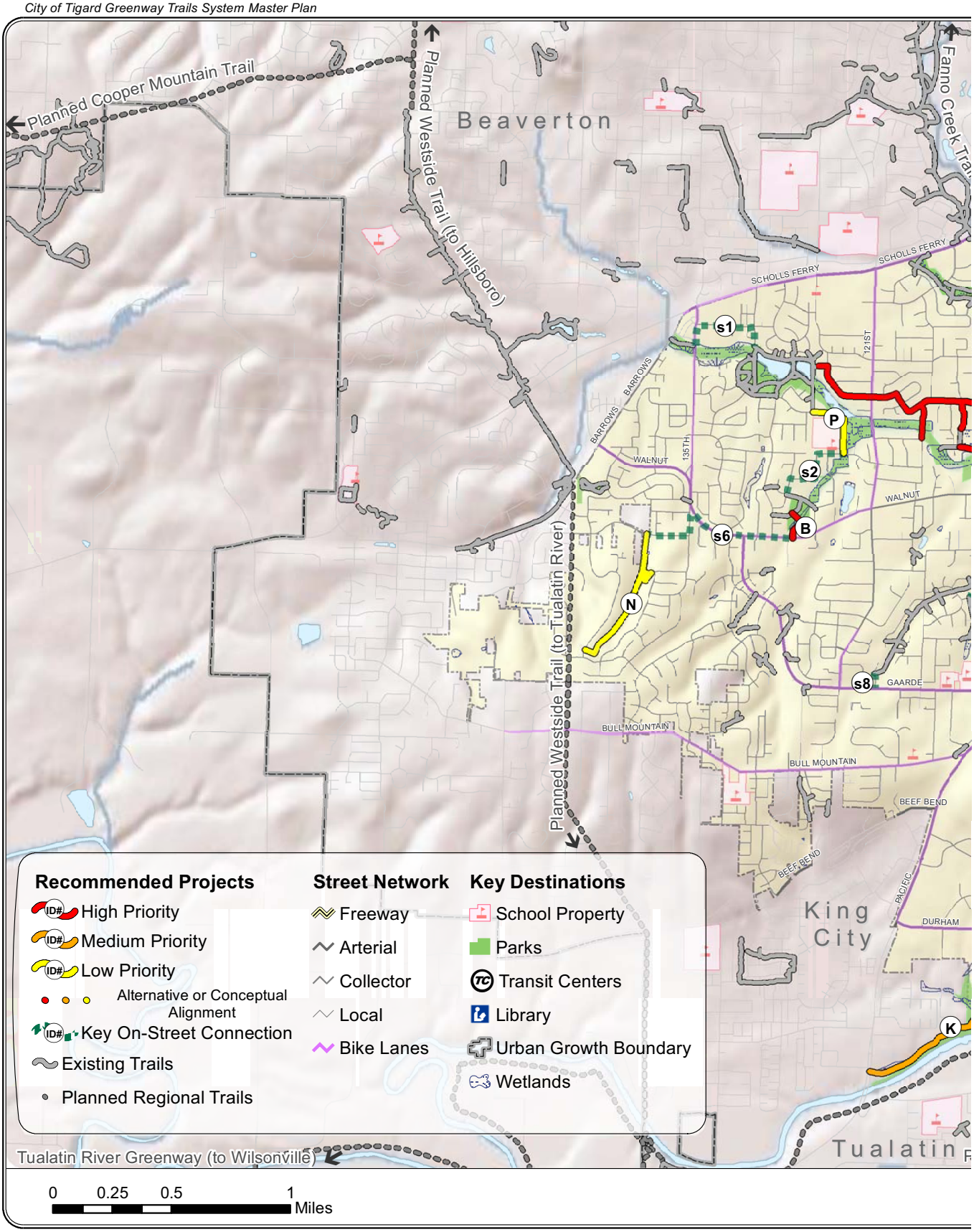
Based on the results of the trail evaluation, 16 projects that are currently feasible and would provide benefits (e.g., transportation, nature education, safe routes to school) to Tigard residents were identified as priority projects and assigned a High, Medium, or Low priority ranking.

- **High-priority projects** – have a significant amount of demand or public support, provide public benefits, have limited challenges, and are the most feasible projects for construction in the short term (one to 10 years). High-priority projects are recommended for inclusion in the 2012-2017 City Capital Improvement Plan (CIP) update.[1]
- **Medium-priority projects** – are good candidates for filling gaps in the trail network or providing connections to destinations in the medium term (five to 15 years), but do not have as much demand, face additional hurdles, and/or would be more difficult to construct than the high priority projects.
- **Low-priority projects** – are recommended projects that fill gaps in the trail network, provide connections to destinations, and/or contribute to regional trail connectivity, but may be more difficult to construct due to right-of-way, slopes, environmental considerations, or community support. These projects are feasible for construction in the long term (10 or more years).

Several projects were not prioritized due to existing constraints or because they fell outside the scope of the current planning effort, but should not be removed from consideration in future planning efforts. These projects are described in detail in Chapter 7. In addition, multiple "key on-street connections" were identified involving small, feasible projects—primarily involving bicycle boulevard treatments, sidewalk infill, or crossing improvements—that provide bicycle and pedestrian friendly on-street connections where a greenway trail alignment is not currently feasible or is not a short-term priority.

Note that the priority ranking of projects are subject to change based on available funding; changing priorities; public support; opportunities to develop trails coincidental with new development/redevelopment, roadway or other infrastructure improvements; and other factors. Project identification (ID) numbers are shown for identification purposes only and do not indicate the relative rank or importance of individual projects within their priority category.

[1] The City of Tigard defines a CIP project as "any public facility project that improves or adds value to Tigard's infrastructure, costs $50,000 or more, and has a useful life or extends the useful life of a facility for five years or more."


Planned Cooper Mountain Trail
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SCHOLLS FERRY
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s1
P
s2
B
s6
N
s8
GAARDE
BULL MOUNTAIN
BEEF BEND
PACIFIC
DURHAM
King City
K
Planned Westside Trail (to Tualatin River)
Tualatin River Greenway (to Wilsonville)
Tualatin
Recommended Projects
High Priority
Medium Priority
Low Priority
Alternative or Conceptual Alignment
Key On-Street Connection
Existing Trails
Planned Regional Trails
Street Network
Freeway
Arterial
Collector
Local
Bike Lanes
Key Destinations
School Property
Parks
Transit Centers
Library
Urban Growth Boundary
Wetlands
0
0.25
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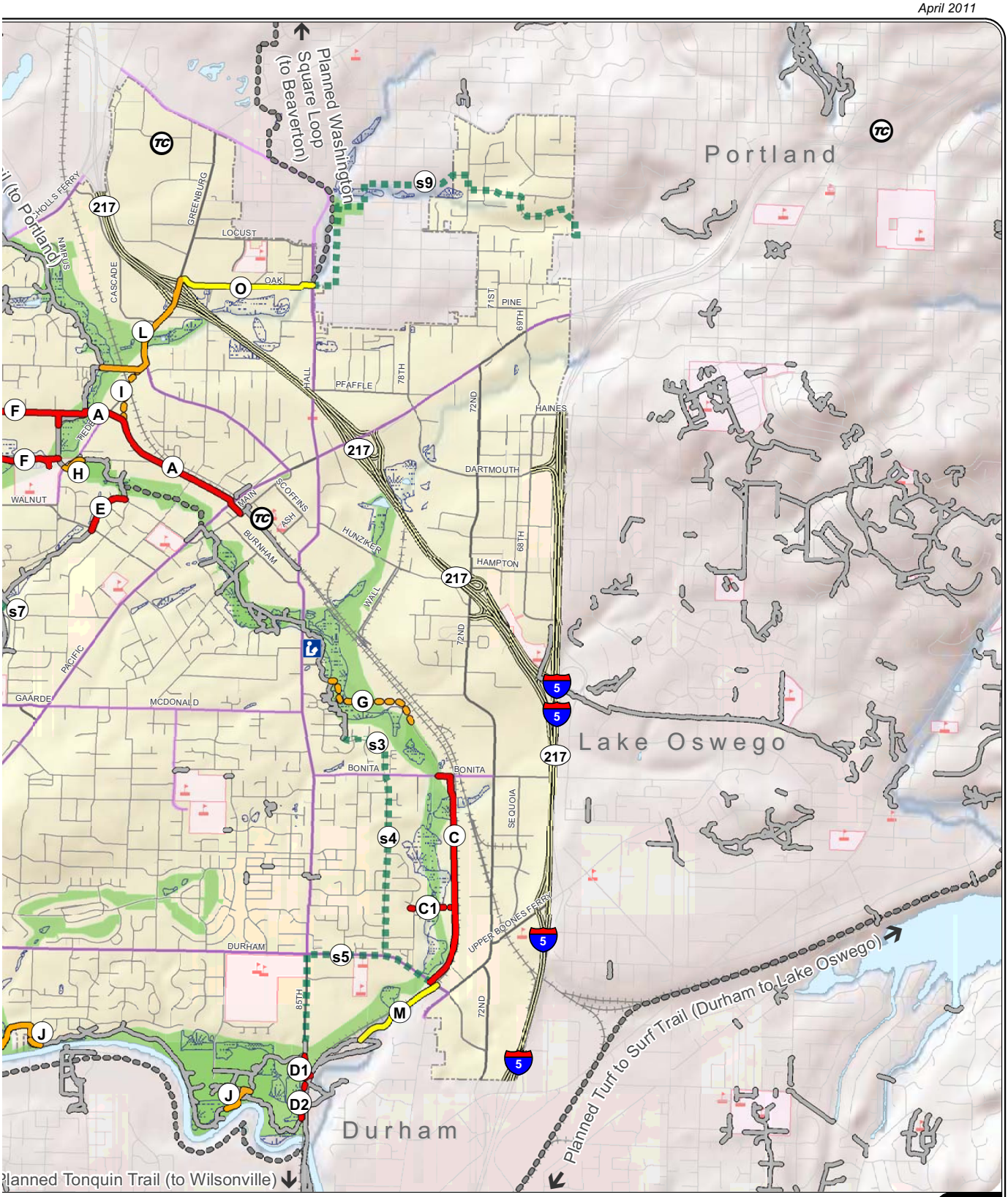
Miles

April 2011



RECOMMENDED GREENWAY TRAIL PROJECTS
TIGARD, OR.

FIGURE
ES-2

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PRIORITIZED RECOMMENDED PROJECT LIST*

ID	Trail Name	Description	Cost Opinion ($1,000)	Priority
N/A	Fanno Creek	Woodard Park to Grant (partially funded)	$670	High
N/A	Fanno Creek	Grant to Main (partially funded)	$300	High
N/A	Westside Trail	Planned Portland to Tualatin Expansion (currently being planned as part of a separate ODOT funded project)	N/A	High
A	Tigard Street	Fanno Creek/Tigard Street to Tigard Transit Center	$498 - $770	High
B	Krueger Creek	Walnut Street to Jack Park	$111 - $209	High
C & C1	Fanno Creek	74th Avenue Sidepath, Bonita Road to Durham Road	$552 - $1,528	High
D1 & D2	Fanno Creek & Tualatin River	85th Avenue Trail to Durham City/Ki-A-Kuts	$131 - $3,088	High
E	Pathfinder-Genesis	Fanno Creek to Pathfinder Court Trail	$725	High
F	Summer Creek	Summer Crest Drive and Tigard Street Sidewalk and Bikeway Improvements, Fowler Nature Education Trail	$516 - $969	High
G	Fanno Creek	Tigard Public Library to Milton Court/Bonita Road	TBD	Medium
H	Fanno Creek	Tiedeman Avenue Crossing Realignment	$139 - $274	Medium
I	Tigard Street	Fanno Creek/North Dakota Street to Tiedeman Street	TBD[1]	Medium
J	Tualatin River	108th Avenue Grading and Existing Trail Improvements	$26 - $254	Medium
K	Tualatin River	108th Avenue to Pacific Highway Extension	$1,746 - $2,354	Medium
L	Washington Square Loop	Fanno Creek to Highway 217 Sidewalk and Bikeway Improvements	$183	Medium
M	Fanno Creek	Durham Road to Tualatin River Trail	$1,320 - $1,943	Low
N	Ascension	Ascension Trail Improvements	$332 - $590	Low
O	Washington Square Loop	Highway 217 to Hall Boulevard Sidewalk and Bikeway Improvements	$666	Low
P	Krueger Creek & Summer Creek	Summer Creek Trail to Mary Woodard School	$473 - $518	Low

[1] Cost opinion depends upon the final configuration of the Tiedeman/North Dakota realignment project. The initial cost opinion for a railside alignment from Tiedeman to North Dakota Street (given current street alignments) was $278,000.

*This project list is intended to address only projects related to the eight greenway trails identified in the 1999 Tigard Park System Master Plan which are the focus of the Greenway Trails Master Plan. This list does not preclude other trail projects from consideration for funding.

Implementation

To facilitate implementation of the recommended greenway trails, this Plan identifies minor changes to regulatory amendments, a financial strategy, and an action plan. These are summarized here, with additional detail provided in the Implementation chapter of the Plan.

- **Recommended Regulatory Amendments** - The City of Tigard *Transportation System Plan*, *Comprehensive Plan*, *Municipal Code* and *Public Improvement Design Standards* guide the development of pedestrian and bicycle pathways, including greenway trails. Minor policy and regulatory changes are recommended to prioritize, program, fund and construct projects on the recommended greenway trails project list.
- **Financial Strategy -** Fully implementing the recommended greenway trails will require funding. Existing, potential and anticipated funding sources that are available to the City of Tigard to fund greenway trails were identified, and potential funding sources available for each trail have been considered for each of the recommended greenway trail projects.
- **Action Plan** - The action plan is provided to guide the City of Tigard toward the vision identified in this Plan and to provide a framework for constructing the proposed trails, strategically implementing prioritized projects, acquiring right-of-way, and creating a long-term strategy for developing the recommended trail projects, as well as other future trail projects. The Action Plan has two parts:
  - **Land Acquisition** provides a summary of how the City can expand the greenway trail system by taking advantage of opportunities to acquire land for trails through acquisition, easements and right-of-way vacations.
  - **Implementation Strategies** links specific funding opportunities with recommended projects to implement the recommended greenway trails and outlines a proposed implementation strategy for acquiring the resources to fund the recommended greenway trails.

1. INTRODUCTION

The Tigard Greenway Trails System Master Plan seeks to improve opportunities for active transportation (walking and bicycling), recreation, and nature education in Tigard and the surrounding region by increasing the connectivity of the existing trail network and setting priorities for future trail development. Greenway trails are a key component of the Tigard transportation system. These trails complement the City's neighborhood trails (short trails that provide direct off-street connections between destinations within the City), sidewalks, and bicycle lanes; connect distant parts of Tigard and surrounding cities; and facilitate long-distance non-motorized travel. Improvements to the greenway trail system recommended in this Plan are consistent with State Transportation Planning objectives and Metro regional planning objectives to reduce single occupant vehicular travel, create a balanced city-wide transportation system, and improve air quality. The resulting trail system will also provide an inexpensive transportation option to Tigard residents and facilitate healthier lifestyles.

The Tigard Greenway Trails System Master Plan builds upon previous City planning efforts and provides recommendations for completing seven of the eight greenway trails addressed in the 2009 Tigard Parks System Master Plan Update:

- Fanno Creek Trail
- Krueger Creek Trail
- Pathfinder Genesis Trail
- Tigard Street Trail
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- Washington Square Loop Trail

The planned Westside Trail, a Metro regional trail which will pass through Tigard, is subject to a separate ODOT-funded planning process and is not addressed in this Plan; however, potential for connections to this and other regional trails was considered when evaluating trail projects.

Funding for this plan was provided through the Oregon Department of Transportation (ODOT) Transportation Growth Management Program (TGM). When completed, the Plan's Prioritized Recommended Project List will be incorporated into the City's Transportation System Plan

(TSP), and recommended projects will be considered for future funding as part of the City's public facilities Capital Investment Plan.

Plan Organization

The Tigard Greenway Trails System Master Plan is organized as eight chapters and three appendices. These include:

- **Chapter 1: Introduction** describes the purpose of the Plan and the organization of this document.
- **Chapter 2: Planning Framework** describes the project vision and objectives, the planning process, and public involvement in the Plan development.
- **Chapter 3: Existing Conditions** describes the existing and planned greenway trail network in Tigard and the surrounding region, existing plans and policies that impact trail development, land use issues, and opportunities and constraints related to greenway trail connectivity in Tigard.
- **Chapter 4: Greenway Trail Classifications and Typical Sections** defines a classification system for greenway trails (regional, community, neighborhood) and provides standard cross-sections for each trail classification.
- **Chapter 5: Design Guidelines** provides design guidelines for greenway trails, including: pavement width and type, lighting, signage, and amenities.
- **Chapter 6: Evaluation Process** describes the criteria used to evaluate and prioritize potential greenway trail projects.
- **Chapter 7: Recommended Greenway Trail Projects** presents specific project recommendations for filling gaps in Tigard's existing greenway trail system and increasing regional trail connectivity. Recommendations include planning level cost estimates and are prioritized as short, medium, and long-term projects for inclusion in the City's Capital Investment Plan.
- **Chapter 8: Implementation Plan** presents strategies for the City to pursue to achieve the recommended improvements to the greenway trail system, including policy revisions and potential funding sources.
- **Appendices** include a summary of public input on the Plan received through the public outreach efforts described in Chapter 2, the detailed descriptions and feasibility analyses for all of the potential trail alignments evaluated throughout the planning process, the environmental assessment of potential trail alignments, and an evaluation

matrix showing the performance of all evaluated potential trail alignments against the prioritization criteria described in Chapter 6.

2. PLANNING FRAMEWORK

This chapter summarizes the vision and objectives of the Tigard Greenway Trails System Master Plan, as well as the planning process and public involvement strategies used in the Plan development.

Vision and Objectives

To facilitate a successful project, the project team and stakeholders developed a project vision and objectives to guide project activities and outcomes. The Vision statement describes the Plan's primary purpose and overarching goals, while the Objectives define specific elements of the Vision and describe how the Vision will be accomplished.

VISION

Greenway trails are a key component of the non-motorized transportation network; these trails facilitate convenient connections to local destinations, and connect Tigard residents to the region's extensive trail network. The Tigard Greenways Trail System Master Plan will enhance greenway trails within the City by:

- Providing information to facilitate completing and upgrading trails (existing and proposed) that compose the City's greenway trail network;
- Addressing the Fanno Creek, Washington Square Loop, Tualatin River, Pathfinder-Genesis, Tigard Street, Summer Creek and Krueger Creek trails;
- Contributing to the presence of pleasant and uninterrupted greenway trails for pedestrian and bicyclist transportation in the City; and,
- Continuing to promote healthier lifestyles, improved air quality, increased access to transit, and opportunities for non-auto travel.

OBJECTIVES

To satisfy the Vision, the successful Tigard Greenways Trail System Master Plan will:

- Increase opportunities for walking, bicycling, and accessing transit by identifying and developing trail improvement projects that complete the greenway trail system;

- Create a framework for implementing the remaining sections of the greenway trail system through recommended revisions to the City's TSP, Capital Improvement Program and engineering and development standards; and,
- Identify locations for potential new greenway trails as a means to further promote sustainable, non-auto travel and healthy lifestyles.

Planning Process, Public & Agency Involvement

City staff, trail experts, stakeholder groups, and Tigard residents helped guide the identification, evaluation, and prioritization of trails addressed in this Plan. Public involvement included the following key components:

- **Project Website Interactive Map & Comment Tool:** During the data collection phase of the project, the project team created a website featuring an interactive map that allowed users to provide comments on existing trails, potential new trail alignments, and other locations where a trail may be feasible and would benefit the community.
- **Greenway Trail System Neighborhood Surveys:** During the summer of 2010, City staff distributed a neighborhood survey to 1,500 residents within ¼ mile of potential Kruger Creek, Pathfinder-Genesis, and Summer Creek Trail alignments. City staff performed the survey to assess neighborhood reception to potential improvements, in-fills, and extensions of these trails.
- **Open Houses:** Two public open houses – one including Spanish language materials and interpreters - were held in January 2011, enabling residents and other interested individuals to provide feedback on potential trail alignments, express concerns, and share ideas for improvements.
- **Stakeholder Advisory Committee:** A Stakeholder Advisory Committee (SAC) identified bicycle/pedestrian, community, environmental, and other issues related to trails from the standpoint of various interest groups and organizations. The SAC included private citizens and representatives from coordinating agencies, and met regularly over the course of the planning process.

The input received from each of these sources and venues was included in the evaluation and prioritization of trail alternatives. Appendix A provides a detailed summary of the public comments received through the project website, open houses, and neighborhood survey.

3. EXISTING CONDITIONS

This chapter summarizes background information regarding the City of Tigard's existing policies and plans, land use and connectivity, existing and planned greenway trails, and opportunities to improve greenway trail connectivity.

Tigard is a community of approximately 47,500 residents, with a total land area of 11.5 square miles. The City's population has grown by some 15% since the 2000 Census and is expected to continue to grow for the foreseeable future. Tigard was a rural community for much of its history and the vast majority of its population growth has occurred since 1970.[2] Consequently, many of the City's developed areas are characterized by the disconnected street networks popular for subdivisions built in the 1970s and 1980s. The result is out-of-direction connections that discourage bicycle and pedestrian travel for many trips. The Greenway Trail System, along with the Neighborhood Trails System, can connect the different activity hubs within the City and make Tigard more bicycle and pedestrian friendly.

Existing Trail-Related Policies and Plans

The following subsections discuss pertinent transportation related goals and policies from the *Oregon Bicycle and Pedestrian Plan*, Metro's *Regional Trails and Greenways Plan*, City of *Tigard Comprehensive Plan*, *Tigard Transportation System Plan*, *Tigard Park System Master Plan* and *Tigard Neighborhood Trails Plan*. Also discussed below are environmental regulatory rules as well as potential on-going and planned non-trail-related projects that may influence the *Tigard Greenway Trail System Master Plan*. Standards and guidance related to trail design and amenities are discussed Chapter 5 of this Plan.

OREGON BICYCLE AND PEDESTRIAN PLAN

The *Tigard Greenway Trail System Master Plan* is consistent with the vision expressed in the *Oregon Bicycle and Pedestrian Plan*. The *Oregon Bicycle and Pedestrian Plan* envisions a transportation system where:

- People can bicycle or walk safely and conveniently to all destinations within reasonable walking or bicycling distance;

[2] http://tom.mipaca.com/Oregon/TigardHistory.php

- People can walk or ride to and from their transit stops and have a comfortable and convenient place to wait or transfer;
- Touring bicyclists can enjoy Oregon's natural beauty on roads and highways that are designed for bicycle travel;
- Appropriate transportation choices are available to all; and
- Streets, roads and highways are designed to encourage bicycling and walking.

The *Tigard Greenway Trail System Master Plan's* vision and objectives support this statewide vision of facilitating bicycle and pedestrian travel and active outdoor recreation.

METRO'S REGIONAL TRAILS AND GREENWAYS PLAN

Metro's Regional Trails and Greenways Plan describes existing regional trails and greenways and proposes over twenty-five additional (and/or extensions of) existing trails or greenways. Four of these trails either currently pass through Tigard or are planned to pass through Tigard. These are the Fanno Creek Trail, the Westside Trail, the Tualatin River Trail, and the Washington Square Loop Trail. The Fanno Creek, Tualatin River and Washington Square Loop Trails are incorporated into the scope of the *Tigard Greenway Trail System Master Plan*. The Westside Trail is identified in the plan, but is not studied in specific detail since it is currently being master planned as part of an on-going regional project. The *Tigard Greenway Trail System Master Plan* will provide the technical information needed to implement the greenway trail system so that Tigard residents are well connected to the local trails and on-street facilities that can take them to local and regional destinations.

CITY OF TIGARD COMPREHENSIVE PLAN

The *Tigard Greenway Trail System Master Plan* will address two of the goals enumerated in *Tigard Comprehensive Plan*. These two goals and the associated policies are given below.

Chapter 8, Parks, Recreation, Trails and Open Spaces

- **Goal 8.2 -** Create a Citywide network of interconnected on- and off-road pedestrian and bicycle trails.
  - Policy 1 - The City shall create an interconnected regional and local system of on- and off-road trails and paths that link together neighborhoods, parks, open spaces, major urban activity centers, and regional recreational opportunities utilizing both public property and easements on private property.

- Policy 2 - The City shall design and build greenway trails and paths to minimize their impact on the environment, including on wildlife corridors and on rare, and state or federally listed species.

Chapter 12 Transportation, Section 5 Pedestrian and Bicycle Pathways

- Goal 12 - Transportation which requires local jurisdictions to provide and encourage a safe, convenient, and economic transportation system.
  - Policy for Chapter 12, Section 5 - The City shall locate bicycle/pedestrian corridors in a manner which provides pedestrian and bicycle users safe and convenient movement in all parts of the City by developing the pathway system shown in the adopted pedestrian/bikeway plan.

CITY OF TIGARD TRANSPORTATION SYSTEM PLAN

The goals and policies discussed below are included in the *Draft 2035 Tigard Transportation System Plan* (TSP) released in June 2010. Final and full adoption of the *Draft 2035 TSP* is pending approval from City Council.

- Goal 1 – Land Use and Transportation Coordination - Develop mutually supportive land use and transportation plans to enhance the livability of the community.
  - Policy 3 - The City shall maintain and enhance transportation functionality by emphasizing multi-modal travel options for all types of land uses.
  - Policy 4 - The City shall promote land uses and transportation investments that promote balanced transportation options.
  - Policy 9 - The City shall coordinate with private and public developers to provide access via safe, efficient, and balanced transportation system.
- Goal 3 – Multi-Modal Transportation System
  - Policy 2 - The City shall develop and maintain neighborhood and local connections to provide efficient circulation in and out of neighborhoods.
  - Policy 4 - The City shall develop and implement public street standards that recognize the multi-purpose nature of the street right-of-way.

- Policy 5 - The City shall design all public streets within Tigard to encourage pedestrian and bicycle travel.
- Policy 7- The City shall require and/or facilitate the construction of off-street trails to develop pedestrian and bicycle connections that cannot be provided by a street.
- Policy 8- The City shall require appropriate access to bicycle and pedestrian facilities for all schools, parks, public facilities, and commercial areas.

- Goal 4 – Safe Transportation System
  - Policy 3 - The City shall coordinate with the appropriate agencies to provide safe, secure, connected, and desirable pedestrian, bicycle, and public transit facilities.
  - Policy 4 - The City shall consider the intended uses of a street during the design to promote safety, efficiency, and multi-modal needs.

Supporting TSP Strategies

In addition to the goals and policies from the current *Draft 2035 TSP*, there also are strategies identified in the TSP that are consistent with the purpose and goals of the *Tigard Greenway Trail System Master Plan*. The most pertinent of these strategies are listed below.

- Create a more complete network of pedestrian facilities by prioritizing gaps within the current sidewalk and trail system.
- Develop pedestrian and bicycle corridors to neighborhoods, schools, parks, recreation users, activity centers, and transit stops.
- Prioritize transit, pedestrian, and bicycle investments in areas serving high proportion of disadvantaged or transit dependent communities.
- Fill in gaps in the bicycle network to provide for greater citywide bicycle mobility.
- Develop bicycle routes that connect neighborhoods, schools, parks, recreation users, and activity centers.
- Develop a bicycle signage program to help cyclists find routes on relatively level terrain with low vehicle traffic volumes.
- Improve pedestrian crossing treatments at high traffic volume streets and/or locations with high levels of pedestrian demand (e.g., schools, retail centers, transit stops).

TIGARD PARK SYSTEM MASTER PLAN

The recommendations contained in the *Tigard Greenway Trail System Master Plan* will take into consideration existing park locations, recommendations to improve Tigard parks, as well as recommendations to improve trail connectivity between the parks as documented in the *Tigard Park System Master Plan*. The *Park System Master Plan* identifies trail opportunities to further connect existing and proposed parks by bicycle and pedestrian trails. The currently planned trails discussed later in this chapter already capture the primary trail linkage opportunities recommended in Chapter 6 of the *Tigard Park System Master Plan*. As the development of the *Tigard Greenway Trail System Master Plan* moves forward, the recommendations in the *Tigard Park System Plan* will continue to be integrated.

TIGARD NEIGHBORHOOD TRAILS PLAN

The recommendations contained in the *Tigard Neighborhood Trails Plan* will inform the recommendations of the Tigard Greenway Trails Master Plan. Connectivity to neighborhood trails as well as regional trails will be considered when prioritizing greenway trail projects. The vision and objectives presented in the *Neighborhood Trails Plan* are similar to those for the *Tigard Greenway Trail System Master Plan*. As a result, the *Neighborhood Trails Plan* will be closely integrated into the *Greenway Trail System Master Plan*.

ENVIRONMENTAL AND REGULATORY RULES

Projects within environmentally sensitive areas, will need to comply with federal, state, and local environmental regulations. Typically, ground disturbing activities associated with trail projects will have some level of impacts on biological and possibly wetland or water resources. If a project is likely to impact wetlands or water resources, the following laws and regulations could apply:

- National Environmental Policy Act (Lead federal agency varies)
- Section 404 of the Clean Water Act (administered by the U.S. Army Corps of Engineers)
- Section 401 of the Clean Water Act Water Quality Certification (administered by the Oregon Department of Environmental Quality)
- Oregon Removal Fill Law (administered by the Oregon Department of State Lands)
- Water Quality Sensitive Areas and Vegetated Corridors (administered by Washington County's Clean Water Services)

If a project is likely to impact protected species or their habitats, the following laws and regulations could apply:

- National Environmental Policy Act (Lead federal agency varies)
- Federal Endangered Species Act (administered by either the U.S. Fish and Wildlife Service or the National Marine Fisheries Service)
- Federal Migratory Bird Treaty Act (enforced by the U.S. Fish and Wildlife Service)
- State Endangered Species Act (administered by the Oregon Department of Fish and Wildlife or the Oregon Department of Agriculture)
- Oregon Fish Passage Law (administered by the Oregon Department of Fish and Wildlife)

POTENTIAL ON-GOING OR PLANNED PROJECTS AFFECTING GREENWAY TRAILS

Discussions with City of Tigard staff identified one planned non-trail related project that is anticipated to affect the *Greenway Trails System Master Plan*; the realignment of Tiedeman Avenue to connect with north Dakota Street. This project and its relation to the potential Tigard Street Trail is discussed later in this Plan. Trail-related on-going and/or currently planned projects are discussed below in the sub-section titled Existing and Currently Planned Greenway Trails.

Existing Land Uses and Major Trail Destinations

This section summarizes current land use issues in Tigard as they relate to greenway trails. Particular attention is given to major destinations for pedestrian and bicycle trips, and areas within the City where connectivity is a major barrier to non-motorized transportation.

Tigard's current boundaries generally are defined by Scholls Ferry Road to the north, I-5 to the east, the Tualatin River to the south, and SW Barrows Road and a saw-toothed line extending as far as SW 154th Avenue to the west. Figure 1 shows the existing natural features, transportation network and land use designations within Tigard. As also shown in Figure 1, Tigard possesses several facilities that divide the City, including Oregon 99W, which crosses the City from Southwest to Northeast, and the Portland & Western Railroad, Fanno Creek, and Oregon 217, all of which cross the City from Northwest to Southeast.

Figure 1 shows the majority of Tigard is zoned for residential uses, and most of the City is comprised of single-family residential development. Connecting these residential areas to one another and to commercial, recreational, and transit destinations was a key priority for the *Neighborhood Trails Plan* completed in 2009. The *Greenway Trail System Master Plan* will build on the *Neighborhood Trails Plan* and strive to further connect Tigard's residential areas to the primary shopping, schools, recreational, and other top destinations for pedestrian and bicycle travel within

Tigard. The *Greenway Trail System Master Plan* also aims to call attention to potential additional connections to TriMet's transit service within Tigard. Each of these land uses, the corresponding activity hubs within Tigard, and transit service within Tigard are discussed below.

SHOPPING

Commercial land-uses in Tigard are located in three key areas: Washington Square, the Oregon 99W corridor, and downtown Tigard. Washington Square is located adjacent to Oregon 217 along the boundary between Tigard and Beaverton. The area is anchored by the Washington Square Mall, a large shopping center with over 1 million square feet of retail space, and includes numerous shopping destinations and several office buildings. The area also is a designated Regional Center in the *Metro 2040 Plan*.

Because of these features, Washington Square has the potential to be a key destination for non-motorized trips. Connecting surrounding residential areas to Washington Square is particularly important. Washington Square also is served by TriMet's WES Commuter Rail service making pedestrian and bicycle connections even more important.

The Oregon 99W corridor is another primary location for commercial activity in Tigard. As shown in Figure 1, almost all land adjacent to Oregon 99W is zoned for commercial uses. For the most part, this development comprises traditional strip malls and large retailers, including several major grocery stores. Finally, downtown Tigard is located adjacent to Oregon 99W on Main Street between SW Greenburg Road and SW Johnson Street. Downtown serves as a community center for Tigard residents and includes numerous pedestrian-oriented shops and restaurants. Consequently, connectivity improvements that allow residents to more easily access the destinations on Oregon 99W and in downtown will greatly benefit pedestrian and bicycle conditions.

SCHOOLS

Another key priority for the *Greenway Trail System Master Plan* is to improve pedestrian and bicycle access to schools by supplementing Tigard's neighborhood trails with greenway trails. Increasing the number of children walking and biking to school has the potential to both reduce traffic congestion and increase physical activity. A total of eight schools owned by the Tigard-Tualatin School District are located within the City of Tigard. These school properties are spread throughout the City. While most are located in residential areas, several properties are also within commercial areas along Oregon 99W or Washington Square.

PARKS

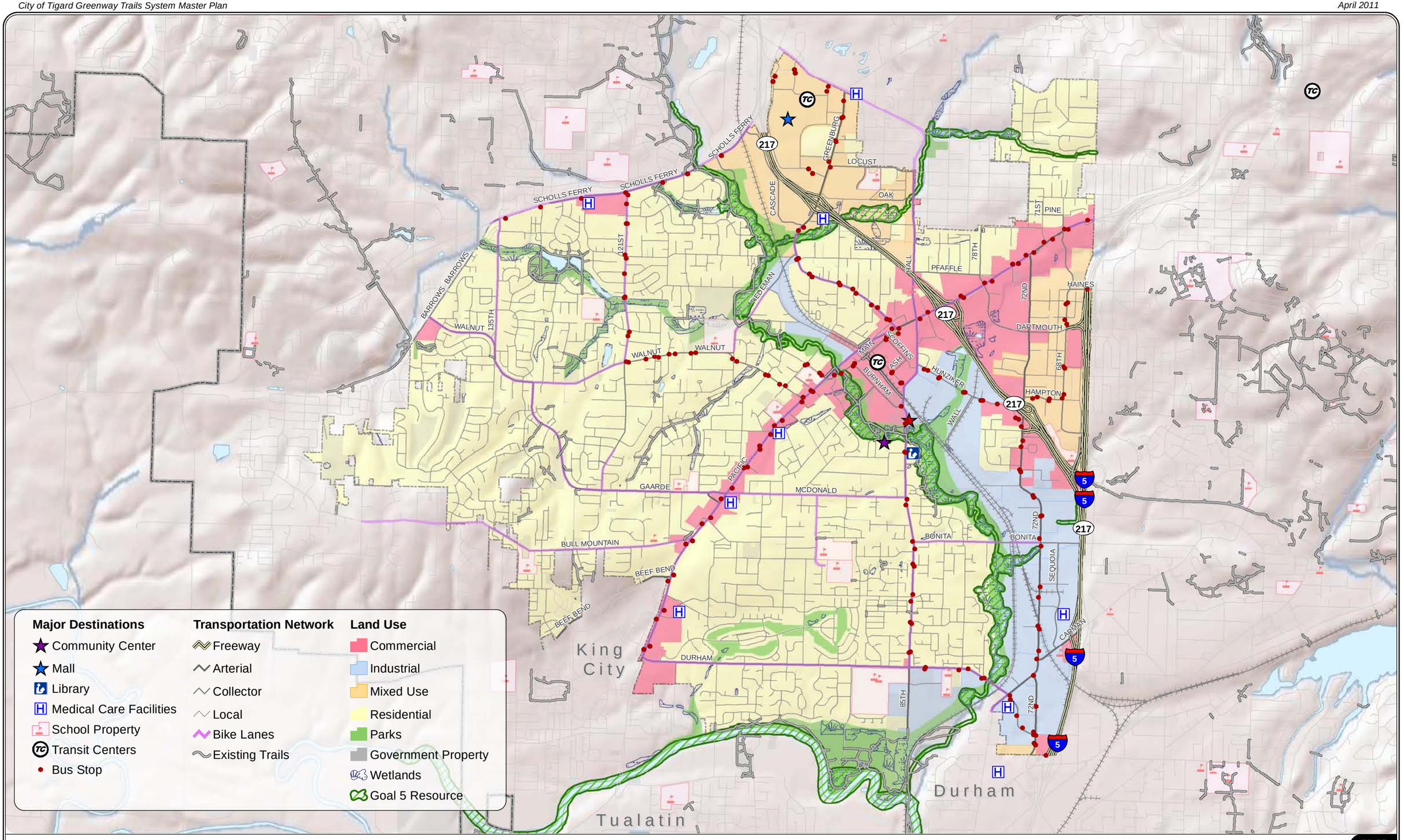
As with schools, improved connections to recreational areas are a project priority. Better access to parks improves livability for residents and is one of the goals of the *Transportation System Plan* (TSP). Tigard's open spaces are generally concentrated along greenways located within the City. For example, several of Tigard's parks are located along the Fanno Creek Greenway. Other large parks of note include Cook Park located along the Tualatin River in the southern portion of Tigard and Summer Lake Park in northwest Tigard. In addition to these large-acre parks, several smaller parks are located throughout Tigard. Finally, the Tigard Senior Center located south of downtown, and Tigard Swim Center located at Tigard High School, are other important destinations for non-motorized trips that should be considered during the planning and prioritization process.

TRANSIT

Tigard is served by several existing TriMet bus routes, as shown in Table 1. Bus stop locations are also displayed in Figure 1.

Table 1 Existing Tigard Transit Service

Route Number	Route Name	Description
12	Barbur Boulevard	Service along Oregon 99W for full length of City
38	Boones Ferry Road	Service along 72nd Avenue between Oregon 217 to Lower Boones Ferry Road
43	Taylor's Ferry Road	Service along Greenburg and Washington Square Road connecting to Hall Boulevard
45	Garden Home	Service along Scholls Ferry, 121st Avenue, and Walnut Street to Tigard Transit Center
56	Scholls Ferry	Service south along Scholls Ferry to Washington Square
62	Murray Boulevard	Service east along Scholls Ferry to Washington Square
64X	Marquam Hill/Tigard TC	Express bus with service along Oregon 99W east of Tigard Transit Center
76	Beaverton/Tualatin	North/South Service along Washington Square Road, Greenburg, Main Street, Commercial, Hall, and Durham
78	Beaverton/Lake Oswego	Service to Washington Square along Washington Square Road, Greenburg, Main, Hunziker, Hampton, and 69th
92X	South Beaverton Express	Express bus with service along Scholls Ferry from Hall to Conestoga.
94	Sherwood-Pacific Highway Express	Express bus with service along Oregon 99W for full length of City



Major Destinations
- Community Center
- Mall
- Library
- Medical Care Facilities
- School Property
- Transit Centers
- Bus Stop

Transportation Network
- Freeway
- Arterial
- Collector
- Local
- Bike Lanes
- Existing Trails

Land Use
- Commercial
- Industrial
- Mixed Use
- Residential
- Parks
- Government Property
- Wetlands
- Goal 5 Resource

0 0.25 0.5 1 Miles

EXISTING DESTINATIONS, TRANSPORTATION NETWORK, AND LAND USES TIGARD, OR.

FIGURE 1

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In addition to existing bus routes, Tigard is served by TriMet's WES Commuter Rail. The WES commuter rail runs from Wilsonville to Beaverton Transit Center and includes stations in downtown Tigard and near Washington Square in Beaverton. WES Commuter Rail provides service to destinations throughout the Portland region, making high-quality non-motorized access to the stations in and near Tigard another project priority.

Per the City's draft 2035 TSP released in June 2010, transit amenities and service improvements include:

- Adding amenities such as benches, shelters, and real-time information to transit stops on the Highway 99W corridor to support the existing high frequency bus service;
- Implementing local bus connector service from the Tigard Triangle to Downtown Tigard and/or Washing Square Mall; and
- Conducting high capacity transit planning alternatives analysis to improve and enhance transit service provided to Tigard residents.

Existing and Currently Planned Greenway Trails

The following two sub-sections present information on the existing greenway trails in Tigard and current plans to extend those trails and/or add new trails. Improving the connectivity of these trails and further integrating them into the existing and planned local bicycle and pedestrian network is the primary focus of the *Tigard Greenway Trail System Master Plan*.

EXISTING GREENWAY TRAILS

The existing greenway trails in Tigard are Fanno Creek, Tualatin River, Pathfinder-Genesis, and Summer Creek. Table 2 summarizes the approximate limits of each existing trail within Tigard as well as key information regarding each trail's physical condition. Figure 2 illustrates the existing greenway trails in Tigard noted in Table 2.

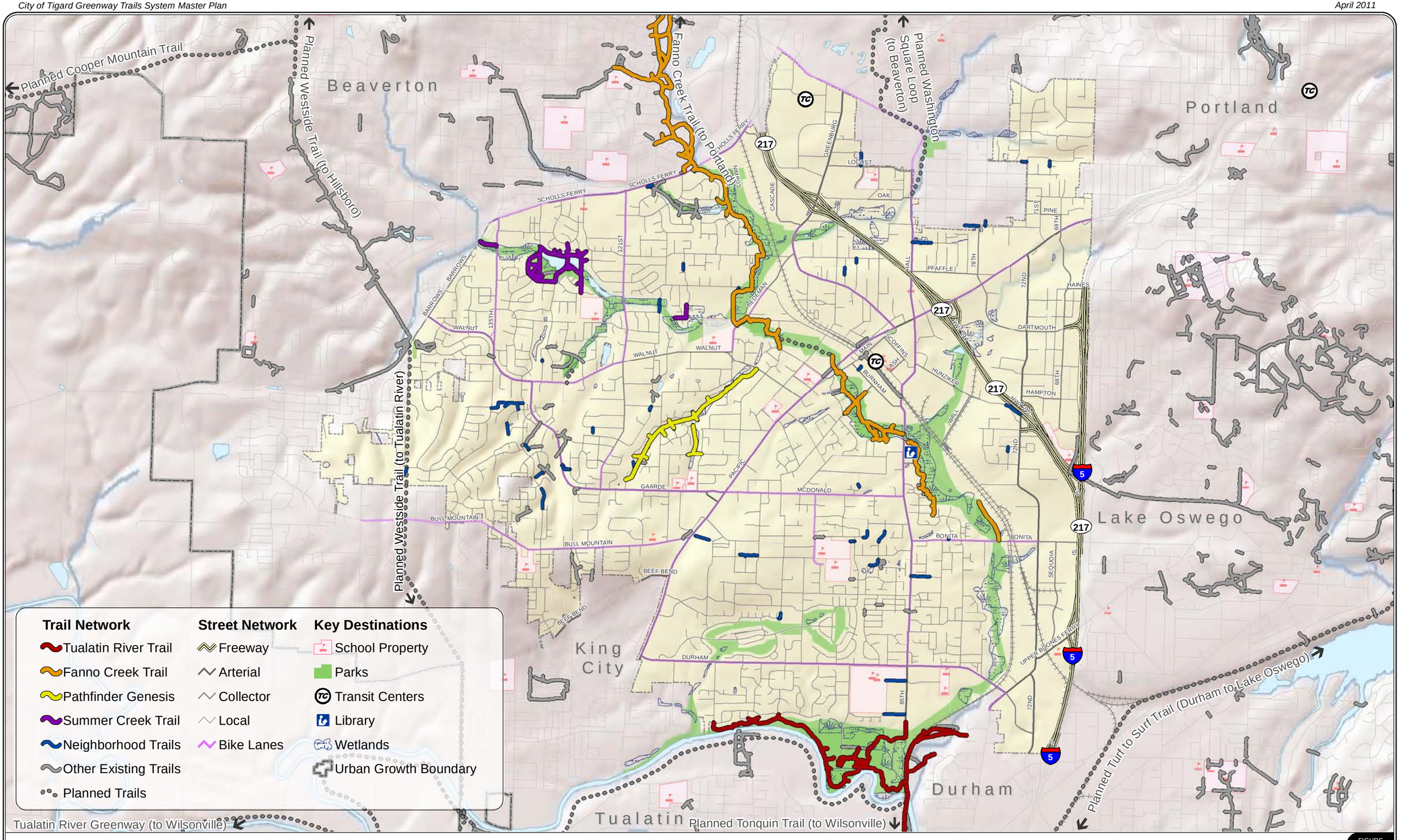
Table 2 Existing Greenway Trails

Name	Limits within Tigard	Comments on Existing Physical Conditions
Fanno Creek Trail	Scholls Ferry south to MacDonald. Alignment is primarily off-street and adjacent to Fanno Creek.	The existing trail is paved. Section near Dee Ann Count is known for several, abrupt 90-degree turns.
Tualatin River Trail	Follows the Tualatin River.	The Tualatin River trail is a mixture of land trail and waterway trail. The land trails are primarily paved with a few short unpaved sections.
Pathfinder-Genesis Trail	Has a "Y"-shaped alignment. It extends south from Walnut Road. One fork of the "Y" extends to near SW Gaarde Street. The other fork of the "Y" extends to SW Fairhaven Street.	Consists of paved and unpaved sections. Many are in poor condition. These poor condition sections generally are narrow, overgrown with vegetation and not ADA accessible.
Summer Creek Trail	Currently loops around Summer Lake with a few extensions into adjacent neighborhoods.	The existing trail is paved.

CURRENTLY PLANNED GREENWAY TRAILS

The currently planned greenway trails as identified in the *Park System Master Plan* include extensions of Fanno Creek, Pathfinder-Genesis, Summer Creek, Tualatin River, and Westside trails. The currently planned trails also include a new alignment of the Krueger Creek Trail (realigned from the route proposed in the 1999 Park System Master Plan) and the new Washington Square Loop trail. Conditions on these trails are summarized in Table 3. Figure 2 shows the general locations of currently planned trails.

The planned Westside Trail, a Metro regional trail which will pass through Tigard, is subject to a separate ODOT-funded planning process and is not addressed in this Plan. However, it is discussed in this Plan for the purpose of identifying greenway trail connectivity throughout Tigard and for the purpose of identifying opportunities to improve bicycle and pedestrian mobility and access within Tigard and from Tigard to other cities in the Portland region.



Trail Network
- Tualatin River Trail
- Fanno Creek Trail
- Pathfinder Genesis
- Summer Creek Trail
- Neighborhood Trails
- Other Existing Trails
- Planned Trails

Street Network
- Freeway
- Arterial
- Collector
- Local
- Bike Lanes

Key Destinations
- School Property
- Parks
- Transit Centers
- Library
- Wetlands
- Urban Growth Boundary

0 0.25 0.5 1 Miles

EXISTING & CURRENTLY PLANNED TRAILS
TIGARD, OR.

FIGURE **2**

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Table 3 Currently Planned Greenway Trails

Name	Potential Alignment	Comments
Extensions of Fanno Creek Trail • Bonita Road to Durham Road • Durham Road to Existing Trail	Three potential alignments have been identified for the extension from Bonita to Durham Road to Existing Trail	Once these extensions are complete, the Fanno Creek Trail will run the full length of Tigard City limits from North to South (Scholls Ferry Road to the Tualatin River Trail). This will be a regionally significant connection.
Extension of Pathfinder-Genesis Trail	Extend the trail north of Walnut Street connecting to Fanno Creek trail around or near Woodard City Park.	Extension is in planning stages.
Extension of Summer Creek Trail	Extend the trail east from Summer Lake Park passing through or adjacent to open greenspace, continue east parallel to Katherine Street and connect into Fanno Creek Trail north of Tiedeman and south of North Dakota.	Extension is in planning stages.
Tigard Street Trail	This trail is planned to extend from Tiedeman to Main Street along an inactive railroad corridor, linking Fanno Creek Trail, downtown, and the Tigard Transit Center.	In the planning stages.
Krueger Trail	Trail is planned to extend from the Summer Creek extension from an open greenspace area southwest along Jack City Park and into green space between SW Ascension Drive and SW Essex Drive.	A segment of the proposed Krueger Trail exists today as an unpaved/soft trail. Approximately half of the proposed alignment passes through city-owned riparian natural area. The other half, the upper portion, primarily passes through privately owned land.
Washington Square Loop	Planned to connect to Fanno Creek Trail near North Dakota and extend to the northeast along Ash Creek.	In the planning stages; will be a regionally significant connection.
Extension of Tualatin River Trail	The future Tualatin River Trail will extend along the Tualatin River passing outside Tigard city limits and intersecting with the future Westside Trail extension south of Tigard.	A 16-mile trail to connect the Tualatin and Willamette Rivers; a portion of this land and water trail passes through Tigard.
Extension of Westside Trail	Planned to follow power line alignment south through the western portion of Tigard.	Once built, will be a regional connection north to Beaverton and Portland and south to King City and Tualatin. This will be a regionally significant connection.

Opportunities and Constraints for Greenway Trail Connectivity

The following sub-sections discuss opportunities and constraints for expanding greenway trail connectivity and for expanding the area the greenway trail system serves.

Connectivity in Tigard is hampered by the physical barriers created by the Portland & Western Railroad, Fanno Creek, and Oregon 217. All three of these parallel each other and run generally from southeast to northwest through the eastern portion of the City. The result of these barriers is that only a few facilities are available to travel from northeast to southwest within Tigard (e.g. Scholls Ferry Road, North Dakota Street, Oregon 99W, and Bonita Road). These facilities are by nature higher use and less friendly for bicycle and pedestrian travel. Thus, providing a well-integrated set of greenway and neighborhood trail connections to allow travelers to bypass busier thoroughfares are preferred where possible.

GAPS IN THE GREENWAY TRAIL SYSTEM AND OPPORTUNITIES TO FILL GAPS

There are gaps in the existing greenway trail system and there are areas of Tigard that are under served or not served at all by the existing greenway trail system. Current plans to expand the greenway trail system address many of these gaps in connectivity and service area. However, there is a need for additional expansion to more comprehensively improve trail connectivity and increase the greenway trail service area.

Existing Bicycle/Pedestrian Connectivity and Greenway Trails' Service Area

The existing greenway trail connectivity is poor, particularly when considering the trails as a means for transportation as opposed to a place for recreation. Figure 2 illustrates existing and planned greenway trails and neighborhood trails as well as existing streets with bicycle lanes. The Fanno Creek Trail provides the most mobility and access for bicyclists and pedestrians in Tigard because it connects residents to potential trip destinations. Fanno Creek Trail is the primary existing pedestrian and bicycle facility in the City providing north-south connectivity and serving as a connection to the Metro regional trail system.

In contrast, the existing portion of the Summer Creek Trail that circles Summer Lake does not have a strong connection to other trails or bicycle/pedestrian facilities in Tigard nor is it connected to a regional trail. Therefore, it is operating as a place of recreation for bicycles and pedestrians. Similarly, the existing Pathfinder-Genesis Trail provides some north-south mobility in central Tigard, but does not have any strong connections to other trails or bicycle/pedestrian facilities, nor does it provide any connection between different land use types. It also is operating as a place for recreation or as a local neighborhood connector. Finally, the existing Tualatin River Trail provides some east-west mobility in southern Tigard but does not connect into any other bicycle/pedestrian facilities.

Currently, with the exception of the Fanno Creek Trail, the existing greenway trails in Tigard lack sufficient connectivity to be widely used as means for non-auto travel (as opposed to recreation).

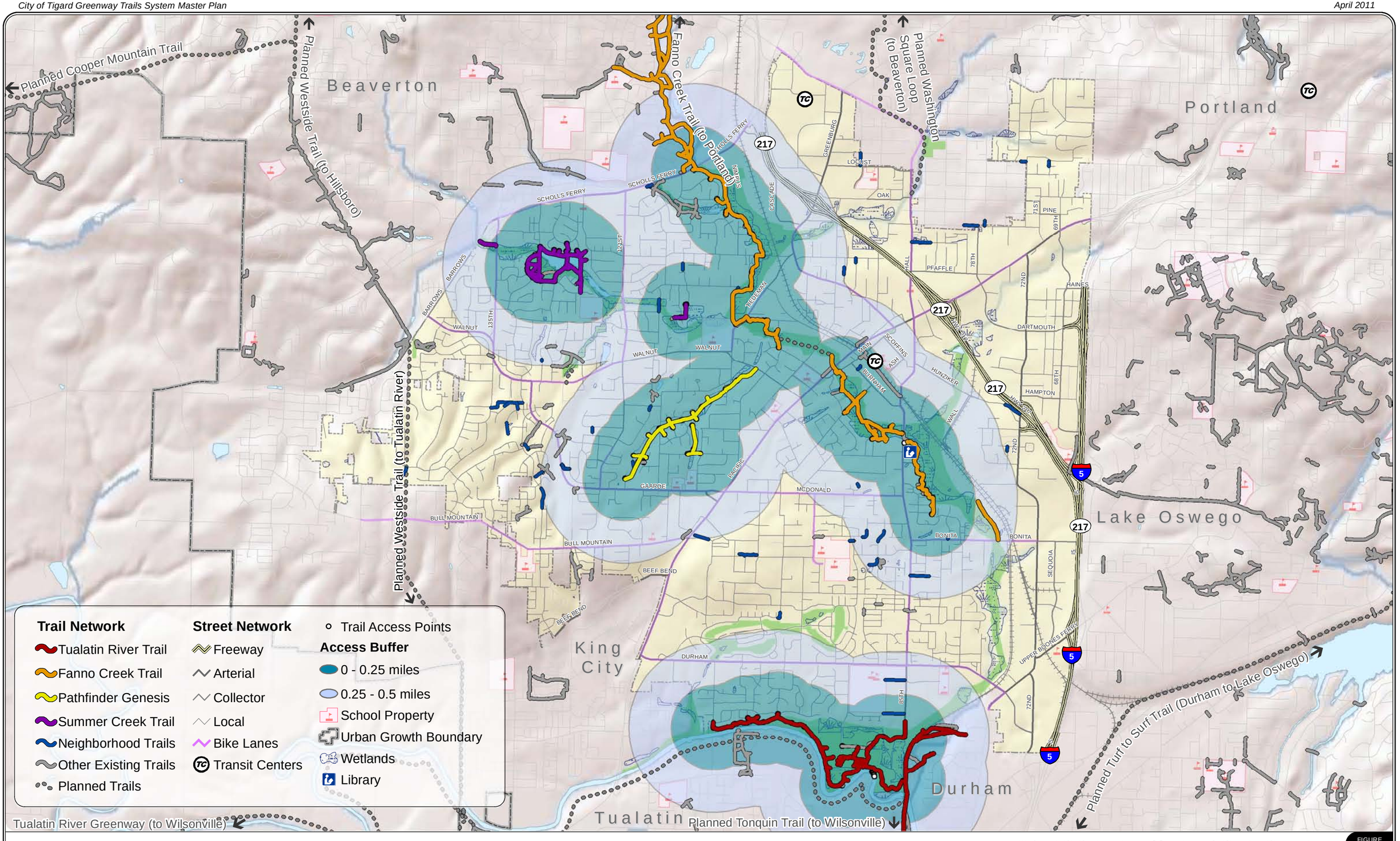
The current greenway trails also leave large portions of Tigard further than a half mile from an access to the existing greenway trail system. Figure 3 illustrates access points along the existing trails. Quarter mile and half mile buffers were drawn from the existing access points to identify areas in Tigard in need of better greenway trail system access. The largest areas of Tigard in need of improved trail access (i.e., areas further than a half mile from existing greenway trail access) are southwest Tigard, the area south of Gaarde Street/McDonald Street and north of Durham Road, and areas northeast of Highway 217.

Connectivity and Service Area Improvements with Currently Planned Greenway Trail Expansions

The planned extensions of the greenway trail system and the planned neighborhood trails, also shown in Figure 3, will increase connectivity for bicycles and pedestrians in Tigard. Similarly, these extensions will also increase the number of residents who are within at least a half mile or quarter mile of access to the greenway trail system.

The planned extension of Summer Creek Trail and Pathfinder-Genesis Trail to connect into Fanno Creek Trail will provide greater east-west and north-south connectivity within Tigard and a connection to destinations beyond the City limits. This will help transform Summer Creek and Pathfinder-Genesis trails from recreational areas to trails that can be used for transportation. Similarly, the planned Washington Square Loop Trail will help connect Tigard's residential land uses west of Highway 217 with the hub of commercial and employment activities east of Highway 217, facilitating bicycle and pedestrian travel as an alternative to the automobile. The Washington Square Loop trail will also extend outside the City limits, providing another a regional connection; this is particularly significant because it will provide substantial east-west connectivity for Tigard residents.

The southern extension of the Fanno Creek Trail to connect with the Tualatin River Trail will create a continuous north-south link through Tigard and is particularly significant for bicycle/pedestrian connectivity due to its broader regional connectivity. The planned Westside Trail extension south through the western portion of Tigard will provide a second north-south bicycle/pedestrian facility to complement the north-south connectivity Fanno Creek provides on the east side of the City.



EXISTING GREENWAY TRAILS SERVICE AREA
TIGARD, OR.

FIGURE
3

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Creating Krueger Trail will connect a portion of residents in the southwest area of Tigard (where access to the existing greenway trail system is poor) to the Summer Creek Trail and in turn to the Fanno Creek and Washington Square Loop trails. These connections will provide mobility and access for bicyclists and pedestrians to commercial and employment activities within and beyond Tigard.

The pieces of planned neighborhood trails shown in Figure 3 will help fill in smaller gaps to help residents access the longer greenway trail alignments. There also are a number of bicycle lane and sidewalk extensions and additions identified in the City's current draft 2035 TSP that will further increase connectivity for pedestrians and bicyclists in Tigard.

Additional Opportunities for Improved Connectivity and Improved Trail Service Area

As noted above, the current plans for expanding the greenway trails contribute greatly to improved pedestrian and bicycle connectivity for Tigard residents. However, there are additional opportunities to continue to build on the connectivity created by the current plans. At the broadest level, the City is lacking east-west connections across the City and a north-south connection east of Highway 217 for pedestrians and bicyclists. At a more detailed level, there are some specific opportunities to connect planned and/or existing trails to create a grid of trails within Tigard and some opportunities to extend bike lanes on key roadway facilities to provide better connections to existing and planned greenway trails.

Figure 4 illustrates opportunities to improve bicycle and pedestrian connectivity in Tigard. The opportunities shown in Figure 5 are discussed below.

East-West Bicycle and Pedestrian Connections

The east-west pedestrian/bicycle connections shown in Figure 3 tend to be fragmented, require out of direction travel and/or do not connect to regionally significant locations such as the Tigard Transit Center. There are two opportunities to improve east-west connectivity for bicyclists and pedestrians.

1. **East-West Connection Opportunity #1** - In an ideal setting, or one where there was a blank canvas from which to work, there would be a continuous east-west greenway trail connection extending from the western edge of unincorporated Tigard near 164th Street east to Fanno Creek Trail (a currently planned portion of Fanno Creek). This new east-west trail would parallel Gaarde Street and McDonald Street about a quarter-mile or half-mile to the south. This would provide an east-west connection for residents living in the relatively

isolated (in terms of bicycle and pedestrian trails) southwest region of Tigard as well as the similarly isolated residents south of Gaarde Street and north of Durham Road.

2. **East-West Connection Opportunity #2** - Similar to the opportunity discussed above, a second east-west connection from the planned western edge of Krueger Trail to the western City boundary would further connect residents, in the relatively isolated southwest portion of Tigard, to bicycle and pedestrian facilities that can take them to destinations throughout and beyond the City.

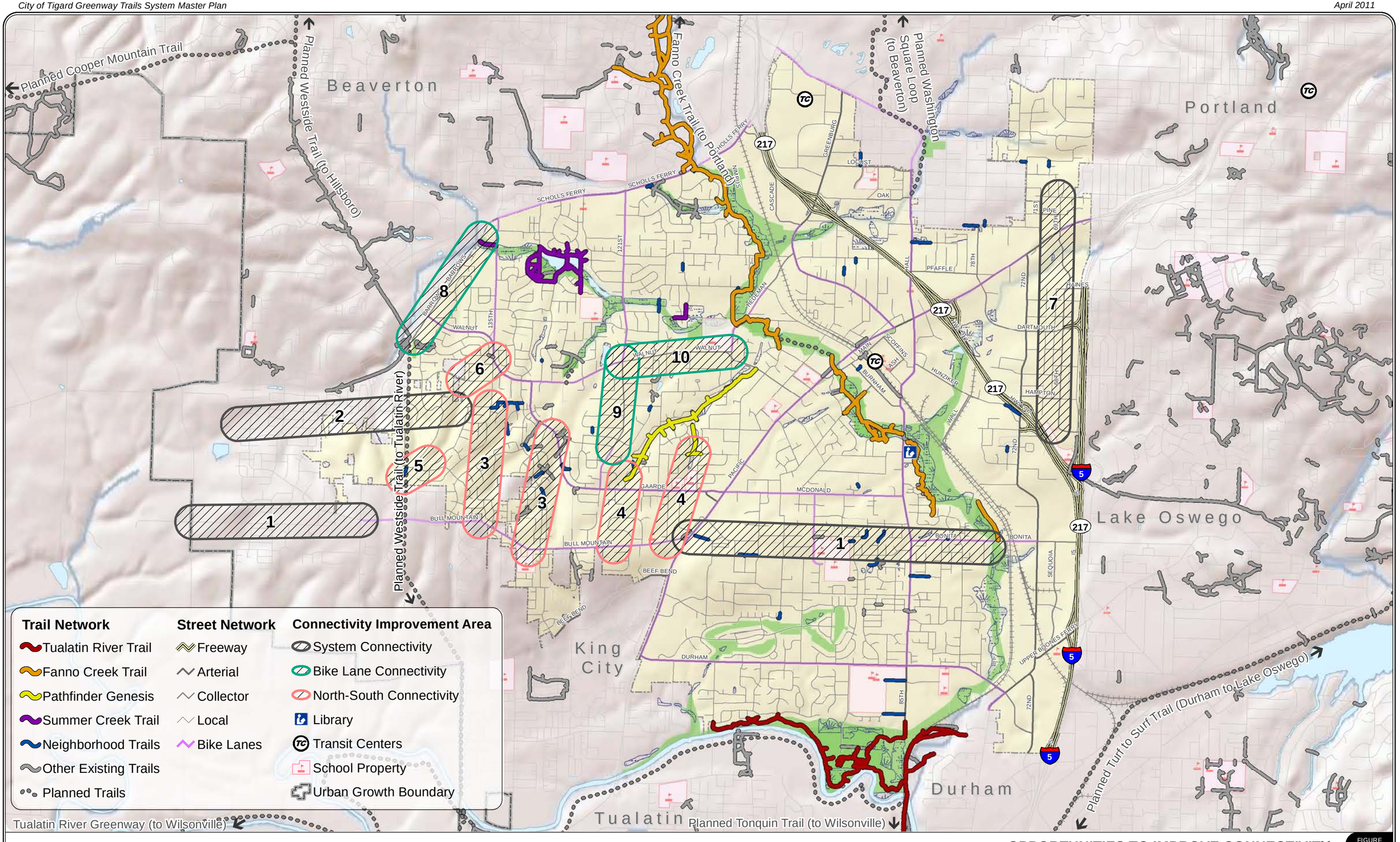
Both new proposed east-west trail connections would be a significant contribution to pedestrian/bicycle connectivity within Tigard and would open up bicycle and pedestrian travel to numerous regional destinations. The new east-west connections would also connect into the proposed Westside Trail extension providing additional access to Metro's regional trail system.

Opportunities to Create a Grid of Trails for Pedestrians and Bicyclists in Tigard

There are four extensions of currently planned or existing greenway trails that could help create a grid of pedestrian and bicyclist trails in west Tigard. These are:

3. The planned Krueger Trail could be extended further south to connect into the southern proposed east-west connection (East-West Connection Opportunity #1 discussed above).
4. A similar extension south could also be constructed for the Pathfinder-Genesis Trail to connect into the southern proposed east-west connection (East-West Connection Opportunity #1 discussed above).
5. The southwest portion of Krueger Trail could also be extended to connect to the planned Westside Trail extension.
6. The northern end of Krueger Trail could be extended to connect to 135th Street. This would be beneficial because 135th Street is equipped with bicycle lanes and crosses the planned Summer Creek Trail further north.

These additional connections would create a grid of greenway trails for bicyclists and pedestrians to travel throughout Tigard west of Highway 217. The grid would be connected to the eastern portion of Tigard via the Fanno Creek and Washington Square Loop trails. Collectively, these proposed extensions and additions would place all Tigard residents west of Highway 217 within a half-mile of a greenway trail that could then connect them to Metro's regional trail system.



Trail Network
- Tualatin River Trail
- Fanno Creek Trail
- Pathfinder Genesis
- Summer Creek Trail
- Neighborhood Trails
- Other Existing Trails
- Planned Trails

Street Network
- Freeway
- Arterial
- Collector
- Local
- Bike Lanes

Connectivity Improvement Area
- System Connectivity
- Bike Lane Connectivity
- North-South Connectivity
- Library
- Transit Centers
- School Property
- Urban Growth Boundary

0 0.25 0.5 1 Miles

OPPORTUNITIES TO IMPROVE CONNECTIVITY
TIGARD, OR.

FIGURE 4

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East Tigard Bicycle and Pedestrian Connections

East of Highway 217 the planned Washington Square Loop Trail will help increase bicycle/pedestrian connectivity for residents across Tigard and will help increase trail service coverage east of Highway 217. A complementary north-south greenway trail or pedestrian/bicycle facility of some sort east of Highway 217 would further enhance bicycle/pedestrian connectivity and the trail service area. Based on a review of existing maps and conditions, there are no immediate clear locations for such a trail or facility; a potential alignment could be north-south along or parallel to 68th Street (see area 7 in Figure 4).

Bicycle Lane Extensions

Finally, three locations are depicted in Figure 4 where extending existing bicycle lanes would help increase bicycle connectivity in locations critical for accessing the greenway trail system. These locations are along Barrows Road, 121st Street, and Walnut Road (areas 8, 9, and 10 in Figure 4, respectively). These bicycle lane extensions would help further enhance overall bicycle connectivity within Tigard.

CHALLENGES TO FILLING GAPS AND INCREASING SERVICE AREA

There are three fundamental challenges to filling gaps in the trail system and expanding the service area of the trail system; they are: funding, land availability/acquisition, and topographical constraints.

Funding for trail construction is an overarching constraint for the currently planned greenway trail system expansion as well as any additional expansions identified as part of this master plan development. The more the greenway trail system is developed to serve bicycle and pedestrian activity for the purpose of transportation (e.g., serving trips that would have previously been taken by automobile) the easier it will be to secure supporting funds from regional, state, and/or federal programs.

The availability and acquisition of land will have to be considered on a case-by-case basis for the proposed and planned trails. In some instances, feasible alignments may be found on publically owned lands and in others, easements will have to be placed on private property as it is sold or redeveloped. However, there are no mechanisms or legal basis for placing easements on properties for the purpose of constructing greenway trails. Therefore, when proposed alignments traverse private property, constructing those portions of trails will require consent and cooperation from private land owners.

Similarly, topographical constraints will need to be addressed on a trail specific basis such that environmentally sensitive areas are protected and trails are constructed in the most cost-effective way while meeting trail standards of safety and accessibility.

As this project to develop the *Tigard Greenway Trail System Master Plan* moves forward, these constraints will be considered and addressed to the fullest extent possible within the scope of the master plan. The primary goal will be to provide sufficient guidance for the City to begin to implement the highest priority greenway trail extensions and to effectively plan to implement subsequent priorities.

4. GREENWAY TRAILS CLASSIFICATION SYSTEM

This chapter outlines a classification system recommended for the Tigard trail system, recommends standard sections and guidelines for each facility type, and presents additional information on supporting features and amenities. The information in this section also touches on factors that affect the ability and desire to widen existing trail facilities, as well as best practices for transitions from unpaved to paved trail facilities.

Tigard Trail Classifications

A hierarchical trail system consists of a core system of regional trails that serve as the backbone of the trails network, which are supported by a complementary system of community trails and neighborhood trails (see Exhibit 1). This hierarchical system of trails provides community members high quality trail opportunities throughout the City of Tigard and pedestrian/bicycle connectivity to other parts of the Portland Metro region. The trails system will connect communities, neighborhoods, schools, parks, and other public areas.

Table 4 provides a quick reference chart for the various types of trails and the proposed vision and purpose of each type.

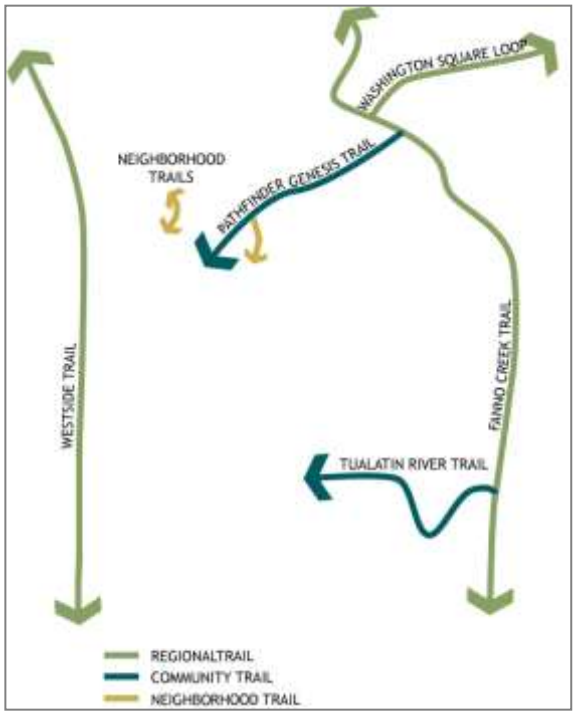


Exhibit 1. Hierarchical Trail System in Tigard.

Table 4 Trail Vision and Purpose

Trail Hierarchy	Regional Trail	Community Trail	Neighborhood Trail	
			Urban Trail	Natural Trail
Vision	Accommodate long bicycle rides. Provides recreational opportunities for families and users of all ages. Maybe accessed by auto at a trailhead. Supports transportation trips.	Used locally for shorter recreational trips, family outings, and for commuting purposes.	Provide critical connections, encouraging short bicycle and pedestrian trips for transportation and recreation.	Formalize commonly-used connection or connection through sensitive habitat that minimizes negative impacts.
Purpose	Spans multiple jurisdictions and provides connections to regionally-important parks and other destinations.	Connects to regional trails and areas of local interest, including schools, transit hubs, parks, and other destinations.	Provides a local connection to a bicycle- or pedestrian-oriented destination, such as a bus stop, school, neighborhood park, or local retail.	Provides a local connection to a pedestrian-oriented destination, such as a bus stop, school, neighborhood park, or local retail.

REGIONAL TRAILS

Regional trails connect residents within the city to adjacent communities—Hillsboro, Portland, unincorporated Washington County, and the greater Portland metropolitan region—and to regionally significant features such as the Tualatin River Wildlife Refuge, Cooper Mountain Natural Area, and other areas. There are four regional trails in Tigard identified in Metro's *Regional Transportation Plan* (RTP).

- **Fanno Creek Greenway Trail**: This trail begins at Willamette Park on the Willamette River Greenway, just south of downtown Portland. It stretches 15 miles to the west and south through Beaverton, Tigard, Durham, and ends at the Tualatin River in Tualatin. Approximately half of the trail is complete.
- **Westside Trail:** Following the power line corridor, the Westside Trail will pass through the western end of Tigard, connecting 16 miles from the Tualatin River to Forest Park, the Willamette River Greenway, and the 40-Mile Loop at the St. Johns Bridge in Portland.
- **Washington Square Loop:** This trail will provide an additional loop from the Fanno Creek Greenway, passing through the Washington Square area and connecting back to the Fanno Creek Greenway in Beaverton.
- **Tualatin River Trail:** This trail follows along the Tualatin River at Tigard's southern boundary with Tualatin. The Metro Regional Trails map calls for the extension of this trail further west to connect into the planned Westside Trail.

COMMUNITY TRAILS

Community trails link important land uses and areas of interest within Tigard, including retail areas, schools, parks, transit centers, churches, major employers, libraries, and other desirable areas. Community Trails also connect users to adjacent communities and the regional trail system. Community trails within Tigard include the following:

- **Pathfinder-Genesis Trail**: This trail extends south from Walnut Road. One fork of the "Y" extends to near SW Gaarde Street. The other fork of the "Y" extends to SW Fairhaven Street.
- **Summer Creek Trail:** This trail primarily loops around Summer Lake with a few extensions into adjacent neighborhoods.
- **Park Trails:** Trails in parks include Cook Park, Durham Park, and Englewood Park.

NEIGHBORHOOD TRAILS

Neighborhood trails primarily serve pedestrians with safe and direct connections to local features such as schools, parks, natural areas, and community centers. Some neighborhood trails may also be appropriate for bicycling and skating. While neighborhood trails may have their own right-of-way, others may follow neighborhood streets for a short segment, in which case pedestrians are accommodated with a sidewalk or shared-use path and bicyclists share the roadway with vehicles. There are two classes of neighborhood trails:

- **Urban trails** are typically paved or made of a smooth surface to accommodate most trail users, and are found in more urban areas to provide an accessible connection to a neighborhood park or other destination. One example of an urban trail is Aspen Ridge Drive to 122nd Avenue Extension.

Exhibit 2. Natural neighborhood trail provides a cut-through to Twality Middle School from SW 92nd Avenue.

- **Natural trails** are soft-surface trails typically found in undeveloped parks and natural areas and aim to provide a natural outdoor experience. These trails are usually for pedestrians only. Examples of natural trails include:

- Twality Middle School to SW 92nd Avenue (see Exhibit 2);
- Lauren Lane Extension;
- Thornwood Trail to Autumn View Street; and
- Alpine Crest Way Extension to Bull Mountain Road.

Recommended Cross Sections for Greenway Trail Classifications

The City of Tigard has standard cross-sections for "pedestrian paths or bikeways." The standards do not include guidelines for multi-use trails. Shown in Exhibit 3, the standards dictate a 5-foot minimum width for pedestrian ways and 10-foot minimum for multi-use paths. They further state:

- Concrete shall be 3000 P.S.I. at 28 days, 6 sac mix, slump range of 1 ½"-3";
- Concrete panels shall be square, ¾" deep scribes at joints 5 feet apart, edged on 4 sides and have a light broom finish;
- Fabric to be a woven geotextile (Amoco 2006) or approved equal; and
- Compact and sterilize subgrade.

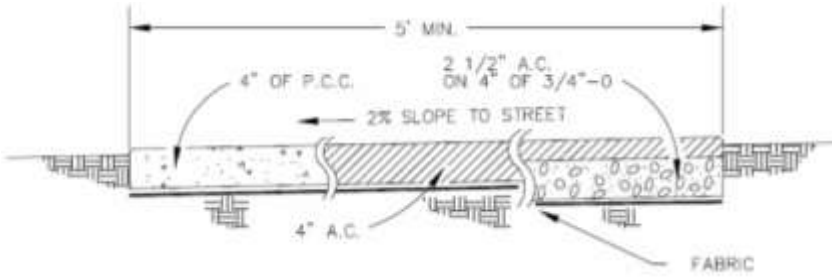


Exhibit 3. Existing "Pedestrian Paths and Bikeways" Design Standards[3]

In addition, City Code 18.810.110 states that the minimum width of a bikeway should be five feet per bicycle travel lane, and that the minimum width of an off-road multi-use path should be ten feet. Eight feet is acceptable, given environmental or other constraints. For a natural neighborhood trail, the minimum width is five feet.

[3]Source:http://www.tigard-or.gov/city_hall/departments/cd/capital_construction/standard_details/docs/pdfs/street-combined.pdf

The Tigard *Public Improvement Design Standards* (1998) specify that bikeways should meet the requirements of the AASHTO *Guide for the Development of Bicycle Facilities* (1999). Additional guidance is provided as follows:

> *Bikeways not within a street shall be constructed upon compacted subgrade that has been sterilized. If it is an asphaltic concrete bikeway, it should be constructed to one of the following pavement section designs:*
>
> - *4 inches of asphalt concrete (full depth);*
> - *2-1/2 inches of asphalt concrete with 4 inches of ¾"- 0" rock base; or*
> - *4 inches of Portland cement concrete.*
>
> *Design standards regarding horizontal alignment, grade, sight distance, intersections, signing, marking, structures, drainage and lighting shall conform to the AASHTO standards. When bikeways are integrated with a curb all inlet grates shall be designed to protect the bicyclist from the grate or opening.*

Table 5 provides a quick reference chart for the various types of trails and the accepted guidelines. The following cross-sections illustrate standard treatments for most trails in Tigard. This section includes guidance from other trail design documents, including:

- American Association of State Highway and Transportation Officials (AASHTO) *Guide for the Development of Bicycle Facilities*, 1999. www.transportation.org
- AASHTO *Policy on Geometric Design of Streets and Highways*, 2001. www.transportation.org
- City of Tigard, Public Improvement Design Standard, 1998.
- City of Tigard, Transportation System Plan, Draft 2010
- Federal Highway Administration *Manual on Uniform Traffic Control Devices* (MUTCD), 2009. http://mutcd.fhwa.dot.gov
- Oregon Department of Transportation *Oregon Bicycle and Pedestrian Master Pla*n, 1994.
- Metro, Green Trails: Guidelines for Building Environmentally Friendly Trails, 2004.

Table 5 Recommended Trail Sections

	Regional Trail	Community Trail	Neighborhood Trail	
			Urban Trail	Natural Trail
Facility Type	Shared-use path	Shared-use path	Shared-use path/sidewalk	Soft surface trail
Users	bicyclists pedestrians wheelchairs baby strollers skaters	bicyclists pedestrians wheelchairs baby strollers skaters*	bicyclists pedestrians wheelchairs*# baby strollers skaters*	bicyclists pedestrians
Width	Approx. 10-14 ft 2 ft gravel shoulders	Approx. 8-10 ft 1–2 ft gravel shoulders	3-8 ft 1–2 ft gravel shoulders (optional)	3–8 ft 1–2 ft gravel shoulders (optional)
Surface	Paved or other smooth-rolling surface to accommodate all trail users	Paved or other smooth-rolling surface to accommodate all trail users	Paved or other smooth-rolling surface to accommodate all trail users	Earth, gravel, wood chips, or other soft surface material

Source: design guidelines adapted from the documents listed above.

Notes:

* Depends upon chosen trail surface – inline skates and skateboards will not roll well on surfaces other than asphalt or concrete.

Paved park trails may still be too steep to safely accommodate wheelchair and other disabled users.

REGIONAL TRAILS

Regional trails generally have their own right-of-way and have minimal conflict with automobile traffic. These trails are designed to meet the *Americans with Disabilities Act* (ADA) standards, *American Association of State Highway and Transportation Officials* (AASHTO) guidance, Oregon Department of Transportation (ODOT) standards and other state and federal guidelines, which make them eligible for State and Federal transportation funding. Regional trails serve bicyclists, pedestrians, wheelchair users, skaters, and others.

Exhibit 4 illustrates a typical shared-use path design that is appropriate for regional trails and some community trails. This trail is designed to accommodate two-way bicycle and pedestrian traffic, typically has its own right-of-way, and can accommodate maintenance and emergency vehicles. This type of trail is typically paved (asphalt or concrete) but can also be a surface that provides a smooth surface, as long as it meets ADA requirements. Wider gravel shoulders should be provided for runners/joggers if space allows.

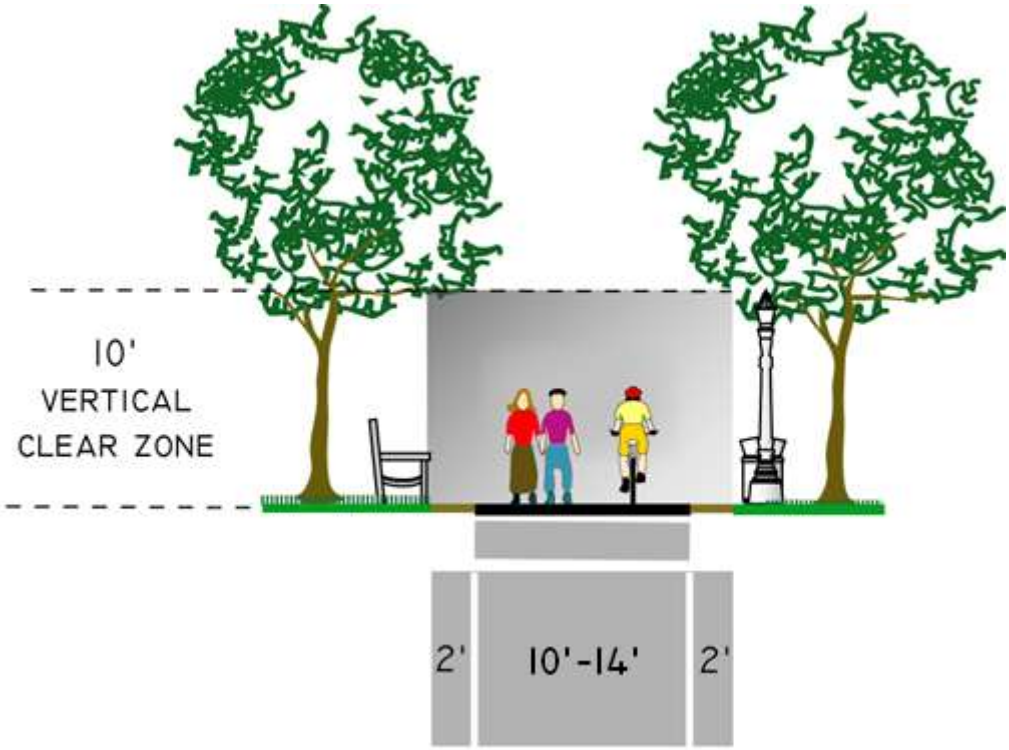


Exhibit 4. Regional Trail Design

COMMUNITY TRAILS

Most community trails in Tigard are off-street shared-use paths that meet State and Federal standards. However, some community trails may follow neighborhood streets for a short stretch, in which case pedestrians are accommodated with a sidewalk or shared-use path and bicyclists share the roadway with vehicles.

Community trails provide access for most, if not all, trail users within neighborhoods, parks, green spaces, and other recreational areas. They are similar to regional trails in that they typically have their own right-of-way and serve only non-motorized users. These trails should be at least eight feet wide, wider if heavy bicycle use is anticipated. Exhibit 5 illustrates a typical community trail design.

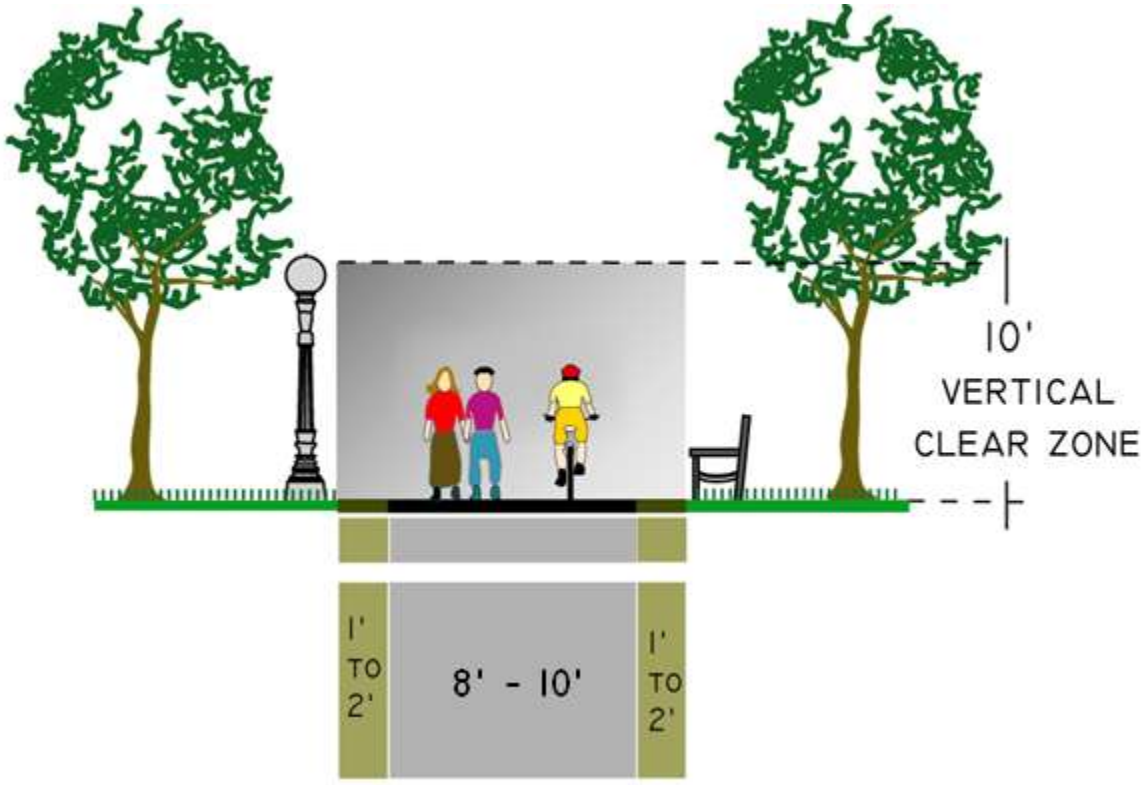


Exhibit 5. Community Trail Design

NEIGHBORHOOD TRAILS

Neighborhood trails primarily serve pedestrians with safe and direct connections to local features. Efforts should be made to ensure that at least one ADA accessible trail is available and serves the most desirable parts of the area (e.g., picnic areas, viewpoints, playground equipment).

Urban Neighborhood Trails

Neighborhood trails can be paved to accommodate most trail users. Where they provide a direct connection to a park or other neighborhood attraction, urban trails have their own right-of-way, separated from the street system (Exhibit 6).

Many of the existing demand trail locations in Tigard pass closely between two houses. In these situations, it is important to consider the privacy of the homeowners and to provide sufficient landscaping and amenities to make the trail an important community asset. The width of urban neighborhood trails depends on their predicted usage. Heavily-used urban neighborhood trails should optimally have a 12-foot right-of-way with a centered 8-foot wide paved surface and two 2-foot planter strips. Eight feet is the minimum width generally recommended for a two-way multi-use path that will experience significant use, and is compliant with Tigard design standards. In less-heavily trafficked areas, paved neighborhood trails can be as narrow as 4 feet to allow for one-directional pedestrian travel, and even narrower if constraints exist. If such a trail is long, bulb-outs should be provided, to allow pedestrians to pass each other.

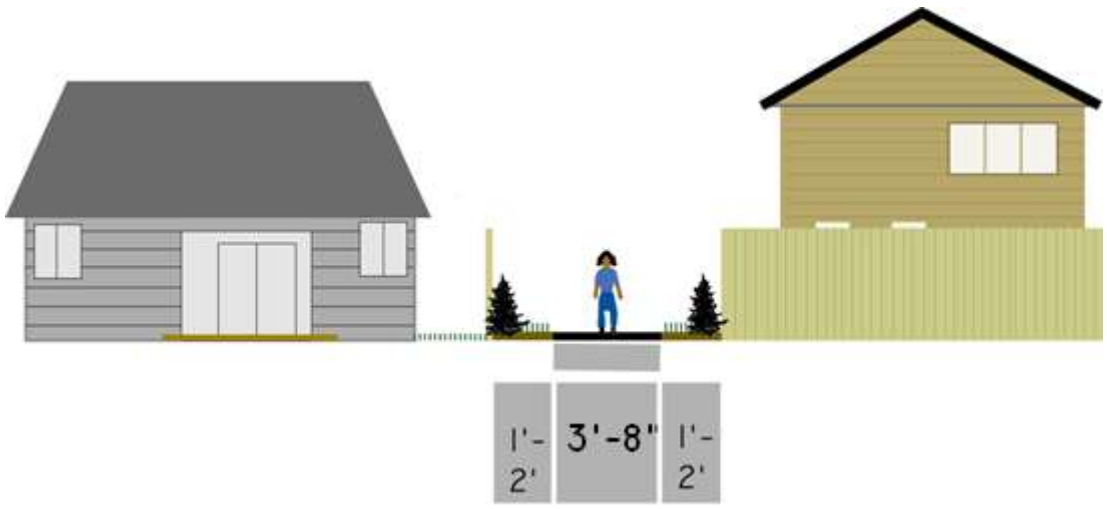


Exhibit 6. Urban Neighborhood Trail Design

Natural Neighborhood Trails

Natural trails are usually considered when a trail is desired next to a natural resource or if the expected use will be minimal, as in the case of minor neighborhood trails. They are also appropriate

where a paved trail would be incompatible with the surroundings. Natural trails should take into account issues such as drainage, erosion, compaction/impaction from anticipated use, presence of waterways and sensitive riparian areas, habitat areas, environmental guidelines, such as *Green Trails: Guidelines for Environmentally Friendly Trails* by Metro, and regulations including Clean Water Services code for trails in water quality resource areas. They should be designed to minimize illegal activity and trash dumping.

Trail width will depend on the number and characteristics of intended users and the width of available right-of-way. For example, narrower paths intended only for walking use may be necessary in constrained areas. Larger areas with natural trails (i.e., natural parks and green spaces) should have a complimentary accessible route that meets or exceeds ADA standards in addition to the natural trail. A soft surface trail should have a 5-foot to 8-foot trail width, and can be as narrow as 3 feet if constraints exist[4]. As these trails are designed to protect habitats and minimize impacts on the environment, narrow widths are desired. In addition, natural trails have a tendency to widen on their own, due to dogs or people walking side-by-side.

The trail width should include one- or two-foot shoulders where possible (Exhibit 7), which can be planted with a bio-swale or low shrubbery. This area is meant to prevent the tunnel effect that can occur if fences come directly up to the edge of the trail. Clearance to overhead obstructions should be 8 feet minimum, with 10 feet of clearance recommended.

[4] Natural neighborhood trails are not formal paved urban trails, and can vary from the City of Tigard 'pedestrian paths and bikeways' standards discussed on page 27. Due to low expected usage, lack of available right-of-way, and in order to fit in with the residential character that is typically their context, natural neighborhood trails can be narrower than the standard 5 feet minimum.

Exhibit 7. Natural Neighborhood Trail Design

5. TRAIL DESIGN GUIDELINES

This chapter presents typical surfacing options and design elements for greenway trails. The first section of this chapter presents an overview and typical sections of both soft and hard trail surfacing options, as well as a variety of design elements, including retaining walls, lighting, trail crossings, and other features. The second section provides a cost sheet of all surface options and design elements. The chapter closes with an analysis of the trade-offs between different surfacing options and a consideration of typical design features. The trail classification system described in Chapter 4 aids in identification of the design guidelines and options appropriate to a specific trail or trail segment. The guidelines in this document are not requirements, and flexibility should be used for specific site contexts and constraints.

Recommended designs are based on the City's existing standards for design and construction, the *Oregon Bicycle and Pedestrian Plan*, and the *City of Tigard Neighborhood Trails Plan*. Additional federal guidelines and design best practices include:

- Alta Planning + Design. (2009). *What's Under Foot? Multi-use Trail Surfacing Options*. http://atfiles.org/files/pdf/AltaTrailSurface.pdf
- American Association of State Highway and Transportation Officials. (1999). *AASHTO Guide for the Development of Bicycle Facilities*. Washington, DC. www.transportation.org
- Federal Highway Administration. (2009). *Manual on Uniform Traffic Control Devices (MUTCD).* Washington, DC. http://mutcd.fhwa.dot.gov
- Federal Highway Administration. (2005). *Report HRT-04-100, Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations.* http://www.tfhrc.gov/safety/pubs/04100/
- Federal Highway Administration. (1999). Designing Sidewalks and Trails for Access. http://www.fhwa.dot.gov/environment/sidewalks/index.htm
- National Center on Accessibility. (Fall 2001, revised October 2007). *Trail surfaces: what do I need to know now?* http://www.ncaonline.org
- United States Access Board. (2007). *Public Rights-of-Way Accessibility Guidelines (PROWAG).* Washington, D.C. http://www.access-board.gov/PROWAC/alterations/guide.htm
- Metro. (No Date). *Green Trails: Guidelines for environmentally friendly trails.*

Environmental Impacts of Trails

Metro's *Green Trails* guide provides a framework for minimizing environmental impacts of greenway trails. The guide opens with the following principles for assessing potential trail corridors in urbanized settings:

1. **Best case:** Look for long-established routes or boundaries that may already have become trail routes, such as fence lines, old trolley lines, railroad lines, social trails (also known as demand trails) and utility corridors.

2. **Next best case:** Use an alignment or human imposed "edge" between two adjacent different land uses such as the boundary between a developed area and an adjacent natural area.

3. **Last resort:** Use a right-of-way along an established transportation corridor.

The guide recommends avoiding or minimizing impacts in riparian areas, but states that trails should avoid high-quality resources in lieu of already-disturbed areas, in particular locations where social or demand trails exist. The guide also notes that bringing a new trail into an area can provide an opportunity to restore a disturbed area. Examples of restoration projects include replacing non-native plants with native vegetation and rehabilitating wet meadow systems in urban greenspaces whose hydrology is affected by old roads.

PROTECTING VEGETATION AND HABITATS

Where trails are adjacent to or cross sensitive habitat, they should be elevated, such as on a boardwalk. Native vegetation or other barriers can be used to prevent trail users from diverting off the trail. Setbacks and perpendicularly crossing streams also minimize impacts to sensitive habitats. Culvert sizes for stream crossings should be determined by an environmental engineer.

Trails in water resource areas should be surfaced with materials that allow infiltration of rainfall and that will not be washed by runoff into the water resource area.

ADA Compliance

Where possible, shared-use paths should be designed according to ADA standards. Greenway trails may face constraints that make meeting ADA standards difficult and sometimes prohibitive. Prohibitive impacts include harm to significant cultural or natural resources, a significant change in the intended purpose of the trail, requirements of construction methods that are against federal, state or local regulations, or presence of terrain characteristics that prevent compliance.

Exhibit 8 The transition from the trail to the sidewalk at an intersection should be accessible for pedestrians in wheelchairs.

ADA guidelines for trails include:

- Minimum clear width of three feet, and where less than five feet a passing space should be provided at least every 100 feet.
- Signs shall be provided indicating the length of the accessible trail segment.
- Curb ramps shall be provided at roadway crossings and curbs. Tactile warning strips and auditory crossing signals are recommended.
- The trail surface shall be firm and stable.6

Slopes typically should not exceed 5 percent. However certain conditions may require the use of steeper slope. For conditions exceeding a 5 percent slope, the recommendations are as follows:

- Up to an 8.3 percent slope for a 200-foot maximum run, landings or resting intervals must be provided at minimum of 20 feet. If steeper segments are incorporated into the shared-use path, the total running grade that exceeds 8.33 percent should be less than 30 percent of the total trail length.
- Up to a 10 percent slope for a 30-foot maximum run, with resting intervals spaced every 30 feet at a minimum.
- Up to 12.5 percent slope for a 10-foot maximum run, with resting intervals spaced at 10 feet minimum.7

Surfacing Options

There are many options related to trail surfacing. This choice determines the types of users who can enjoy the trail, as well as construction cost, maintenance cost, and other factors. The most common surfacing material for a paved path is concrete, asphalt, or permeable asphalt, while unpaved paths can be surfaced with gravel, bark chips, or other natural materials. Cost estimates per linear foot of each surface option are provided in the following section, while the final section of

---

[6] The *Forest Service Accessibility Guidelines* defines a firm surface as a trail surface that is not noticeably distorted or compressed by the passage of a device that simulates a person who uses a wheelchair. Where rights-of-way are available, paths can be made more accessible by creating side paths that meander away from a roadway that exceeds a 5% slope. Additionally, the National Center on Accessibility has detailed information: http://www.ncaonline.org

[7] FHWA. (2001*). Designing Sidewalks and Trails for Access,* Chapter 14: Shared Use Path Design, Section 14.5.1: Grade.. http://www.fhwa.dot.gov/environment/sidewalk2/sidewalks214.htm

the chapter discusses trade-offs and factors that affect surface material choice for a particular trail location.

SOFT SURFACE (JOINT-FRIENDLY) OPTIONS

In locations where environmental sensitivity or the characteristics of the trail environment do not make a paved trail appropriate, many options exist for soft-surface trails. Soft surfaces such as gravel, dirt, and even asphalt are less jarring on the joints than concrete. Fitness experts encourage people to avoid concrete surfaces for healthier knees and joints. For these reasons, runners and joggers often prefer softer surfaces than asphalt or concrete. An unpaved track can be provided parallel to the main trail segment for running. Wider soft surface shoulders or a parallel trail may be appropriate through a park, where slower-moving pedestrians would prefer a route out of the way of faster-moving bicyclists.

Nike Grind

The Nike Grind surface was developed for the Nike Reuse-A-Shoe program in 1993. The rubber from post-consumer, non-metal-containing athletic shoes is used to create a trail surface that is used primarily on running tracks. The surface is too soft for bicycles to traverse easily, and heavy loads should be avoided. Maintenance includes reapplication of the binding agent every 5-6 years, and surface must be kept clean of dirt and sand. The surface must be replaced after 10 years.

Exhibit 9 Nike Grind at the Atlas Track.

Gravel/Crusher Fines

As a natural trail surface, gravel is a practical option for narrow facilities that will not see significant traffic. Gravel surfacing provides a more stable footing that will be less likely to collect rain water in the winter. Gravel is made from rounded rocks, while crusher fines (also called native pit-run fines) are made from angular rocks.

Exhibit 10 Crusher fines trail.

Costs for gravel trails include grading, vegetation clearing, aggregate base, and crusher fines. Maintenance of gravel paths includes annual inspection and repair of low spots or ruts to avoid erosion and tripping hazards. Gravel trails should last 5-7 years. Exhibit 11 shows a standard cross-section of a gravel trail.

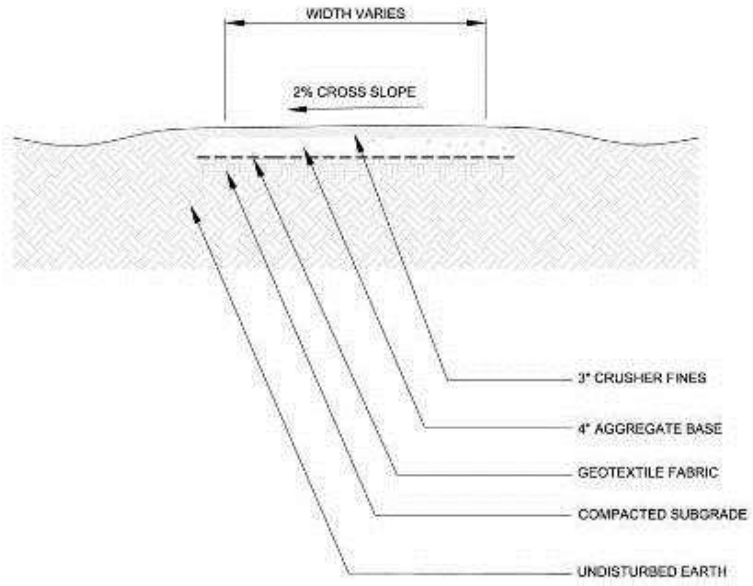


Exhibit 11 Gravel Cross-Section

Decomposed Granite

Widely used in California and the Southwestern United States, decomposed granite or DG is crushed granite particles, often a byproduct of granite quarries. DG provides an inexpensive paving option for soft surface trails in areas where granite is a local product. It provides a surface texture similar to lightly compacted sand. In areas exposed to significant rainfall and/or flooding puddling occurs and DG can deteriorate rapidly. DG paths on hillsides are prone to erosion. DG paths used for public access should have edging to keep the DG in place. Redwood header board or steel are commonly used for edging. A DG path with steel edging will cost about the same as a concrete path. Costs for DG paving include grading, vegetation clearing, edging, geotextile fabric, aggregate base, and decomposed granite fines. A heavily used DG path will need to have low spots or washout areas filled in and recompacted each year and complete reconstruction every five to seven years. DG With Stabilizers or resin will last much longer, seven to ten years, but will have very little permeability. Stabilized DG will have a texture similar to asphalt with loose sand or grit on the surface and will cost similar to asphalt.

Bark Chip/Mulch

Also known as wood mulch, bark chip is an inexpensive and easily-applied trail surface. However, bicyclists, roller bladers, and pedestrians in wheelchairs may not be able to use a mulch path. Bark chip is installed by placing a 3" layer of mulch on the trail surface, raking and shaping, then applying a second 3" of mulch after initial compaction and settlement. Bark chip must be top-dressed annually, and lasts from one to three years. Wood mulch decays rapidly when exposed to moisture, sun, wind, and heat. Standard elements of a bark mulch or other natural surface trail are shown in Exhibit 13 .

Exhibit 12 Bark chip trail.

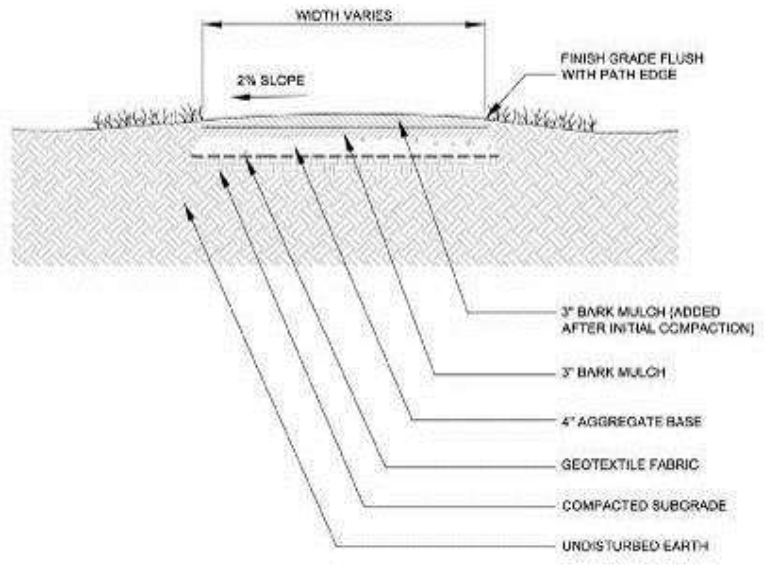


Exhibit 13 Bark Mulch or Filbert Shell Cross-Section

Bark mulch or wood chips should not be used in the floodway (reserved area of the flood plain), in stream approaches, on portions of the trail with surface cross-drainage, or where trail drainage would transport the material to channels or wetland, as their decomposition in water can lower dissolved oxygen levels, contribute harmful tannins, and cause or exacerbate other water quality issues.[8]

[8] Metro. (2004). *Green Trails: Guidelines for environmentally friendly trails.*

Filbert Shells

While filbert shells are aesthetically appealing, shells must be raked regularly to keep them in place. They should be re-topped every five years, and last 7 to 10 years.

Native Soil

Depending on the soil type, native soil trails can be an inexpensive and context-sensitive pleasing natural trail surface. High clay content soils or soils in wet areas can become muddy and take a long time to dry out. A soil survey can be used to determine the potential for a native soil trail. Annual maintenance of native soil trails includes correcting drainage issues like low muddy spots, removing trail edges where berms tend to build up and where uphill slopes erode onto the trails. Similar to paved multi-use paths, the trail surface should be kept free of debris, loose gravel, leaves and stray branches. Decomposing leaf matter on the trail will trap water, block drainage and create muddy areas. The life span of a native soil trail will depend on the soil type, climate and maintenance. Areas with poorer soils, heavy rainfall and little or no maintenance will need to rebuild trails every five years.

HARD SURFACE OPTIONS

Standard surfacing materials for a paved path are concrete or asphalt. Permeable options are also available to minimize drainage issues in sensitive areas.

Concrete

The use of concrete surfacing for paths has proven to be the most suitable for long-term use (Exhibit 14). Using modern construction practices, concrete provides a smooth ride with low maintenance costs that is suitable for all users. Runners may prefer to use the softer surface along the sides of the trail. Concrete paths cost more to build than asphalt paths, yet they do not become brittle, cracked and rough with age, or deformed by roots and weeds as with asphalt. They last approximately 30 years, and must be periodically inspected for uplift and settlement, and repaired as needed. Exhibit 15 shows a typical section of a concrete trail.

Exhibit 14 Concrete Trail Surface

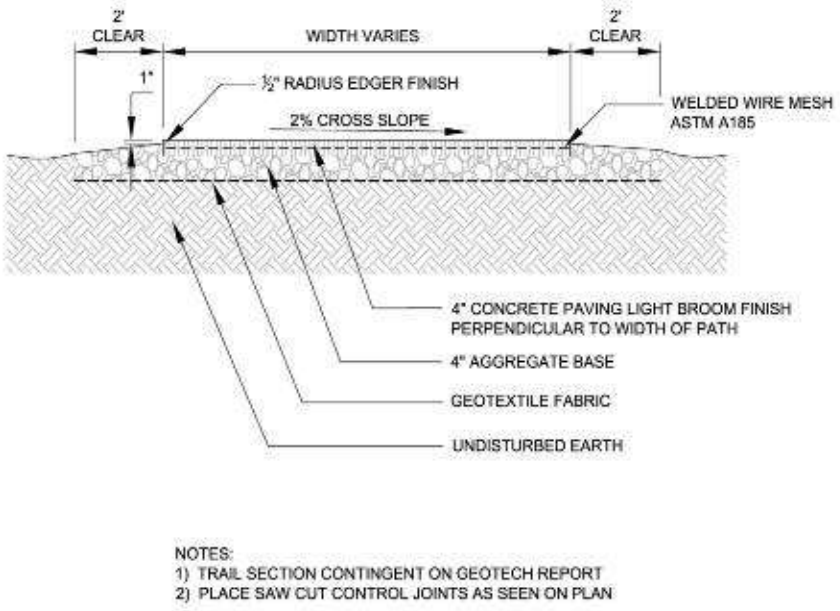


Exhibit 15 Concrete Trail Cross-Section[9]

Recycled Concrete Aggregate (RCA)

RCA is granular material manufactured by removing, crushing, and processing hydraulic-cement concrete pavement for reuse with a hydraulic cementing medium to produce fresh paving concrete. Except for removing steel, impurities, and contaminates, this process is identical to the process used to produce aggregate from virgin stone materials. Adding RCA to concrete pavement may reduce costs, depending on availability of RCA vs. virgin stone materials.[10]

Fly Ash

Fly ash is a fine, glass-like powder recovered from gases created by coal-fired electric power generation. U.S. power plants produce millions of tons of fly ash annually, which is usually dumped in landfills. Fly ash is an inexpensive replacement for Portland cement used in concrete, while it improves strength, segregation, and ease of pumping of the concrete. The techniques for working with this type of concrete are standard for the industry and will not impact the budget of a job.

[9] Note: The "clear" shoulders shown on the cross-section should be kept empty of buildings or fences; however, low-lying vegetation or bioswale plantings are encouraged in these areas. Depth of subbase should be determined by a soil analysis.

[10] Additional information available at: http://www.fhwa.dot.gov/pavement/t504037.cfm

Pervious Concrete

Pervious concrete allows rain to seep through the surface and percolate into the soil reducing run-off. The water is never trapped as it is on normal concrete paving. The use of pervious pavement systems attenuates the peak discharge of storm water into drainage systems. Regions that receive a lot of rain, and a small amount of snow in the winter are good places for pervious-surface asphalt. It is less successful in regions that receive a lot of snow and ice during the winter months as the asphalt tends to crack, similar to normal pavement. Pervious concrete lasts for approximately 15 years and requires a sweep and pressure wash four times per year.

Asphalt

Asphalt is the most common surface treatment for multi-use paths. The material composition and construction methods used can significantly affect the longevity of the pathway. Thicker asphalt sections and a well-prepared subgrade will reduce deformation over time and reduce long-term maintenance costs. Asphalt is suitable for a wide variety of trail users and is less jarring on people's joints than concrete. Exhibit 16 shows a typical section of an asphalt trail.

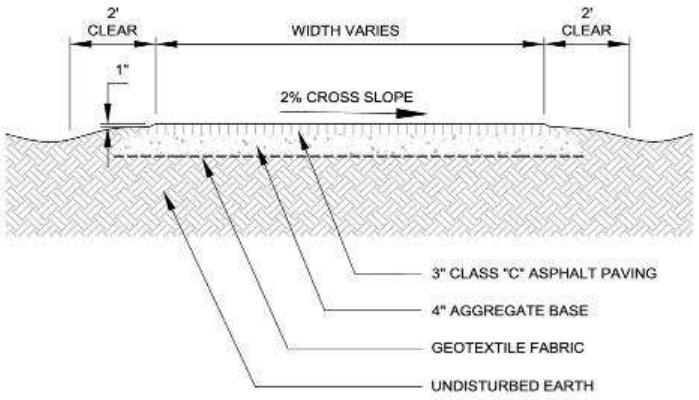


Exhibit 16 Asphalt Trail Cross-Section

The edges of asphalt often crumble over time, and the material is prone to cracking, doming, heaving, and settling. To improve the lifespan of the trail, provide an adequate pavement structural section to support the maintenance vehicles that will be using the trail. Also, if maintenance vehicles will be on the trail, then ten feet is the minimum width recommended. The added load of a vehicle on a narrower trail will cause the edges to crumble.

Based on observations and analysis of similar existing asphalt paths, the pavement surfacing will need an overlay or extensive replacement and renovation every 15 to 20 years. However, this extensive replacement could be mitigated and the expense reduced with preventative maintenance measures such as chip-sealing every five to eight years. Chip seal is not recommended for use near

water resources due to the potential for excess oil to be washed off the surface. Deteriorated sections are easier to remove and replace than concrete.

Recycled Materials in Asphalt[11]

Asphalt typically used for a paved trail tread can be composed of recycled materials that otherwise would end up in a landfill in-lieu of new base material. This reuse of materials reduces hauling-related energy consumption and construction waste management. These materials include:

- Glassphalt: A mixture of traditional asphalt and recycled glass. The glass is used to replace some of the sand that would otherwise be found in asphalt. Glassphalt can be installed using the same equipment and procedures as conventional asphalt.
- Reclaimed Asphalt Pavement (RAP): RAP can be used as an aggregate in the hot recycling of asphalt paving mixtures. RAP is routinely accepted in asphalt paving mixtures as an aggregate substitute and as a portion of the binder in nearly all 50 states. Substitution rates of 10 to 50 percent or more, depending on state specifications, are normally introduced in pavements, and recently developed technology has even made it possible to recycle 90 to 100 percent RAP in hot mix. http://www.fhwa.dot.gov/pavement/recycling/rap/index.cfm
- Rubberized Asphalt Concrete (RAC): Also known as asphalt rubber hot mix, uses crumb rubber from scrap tires. Below is a list of the benefits of rubberized asphalt according to the Rubberized Asphalt Concrete Technology Center,12 RAC:
  - Can save as much as $22,000 per mile of trail (or one lane of roadway) over conventional asphalt when resurfacing with a two-inch-thick layer
  - Is highly skid-resistant, quieter, and resists shoving and rutting when a gapgraded mix is used
  - Provides excellent, long-lasting color contrast for striping and marking
  - Resists reflective cracking

[11] Bondurant , Julie and Thompson, Laura. (2009). *Trail Planning in California Communities.*

[12] Source: www.rubberizedasphaILorgJindex.hlm

- Uses approximately 2,000 waste tires per trail mile (or one lane of roadway) for a two-inch resurfacing project

Pervious Asphalt

Similar in appearance to traditional asphalt, pervious asphalt allows rain to seep through the surface, reducing run-off. Trails that are along bodies of water or that may have flooding problems should consider using this surface.

Exhibit 17 Asphalt Trail Surface

Exhibit 18 Permeable Trail Surface

ADJOINING HARD AND SOFT TRAILS

Where a paved trail provides access to unpaved lower-order trails, users may benefit from additional signage, parking, or other information. In Tigard, one example of this transition is on the Tualatin River Trail in Cook Park. Where users can only continue a trail on the unpaved section, signs should be posted in advance so that road cyclists with narrow tires or pedestrians in wheelchairs are not forced to turn around unexpectedly.

If bicycles are prohibited on the unpaved trail, short-term parking staples should be provided to allow people to ride to access the trail, and leave their bicycles behind.

Information such as map kiosks can be helpful for trail users to determine alternate routes or routes within the unpaved trail section.

BOARDWALK

Boardwalk construction may be used in sensitive areas such as stream environment zones and in areas of steep slopes. Boardwalk construction is typically much more expensive than traditional paved paths. Cyclists may prefer paved paths over boardwalks because of the smoother surface and

better traction typically associated with paved applications. Their use should be considered in relation to environmental needs, budget, and potential user needs and management issues.

Trail width should be a minimum of 10 feet when no rail is used. A 12 foot width is preferred in areas with high anticipated use and whenever rails are used. AASHTO recommends carrying the clear area (or 2 foot space on either side of trail) across the structure. This provides an appropriate horizontal shy distance from the railing and allows for maneuvering space to avoid conflicts with users stopped on the structure. A 10 foot width is recommended only for low-use areas. Exhibit 19 depicts typical elements of a boardwalk.

Trail height should be set to allow for small animal movement under the structure, a minimum of 6" above grade. Trails less than 30" above grade may not require a railing according to current building standards. Six inch curb rails may be used. Trails higher than 30" above grade require a 42" high rail. It should be noted that AASHTO recommends 42" high railings on any structured path. Paths should also be designed to structurally support the weight of a small truck or a light-weight maintenance vehicle.

Boardwalk maintenance should include frequent inspection for structural integrity and immediate replacement of any defective pieces. The life span of a boardwalk will depend entirely on the materials used. Typically a wood boardwalk will last ten years.

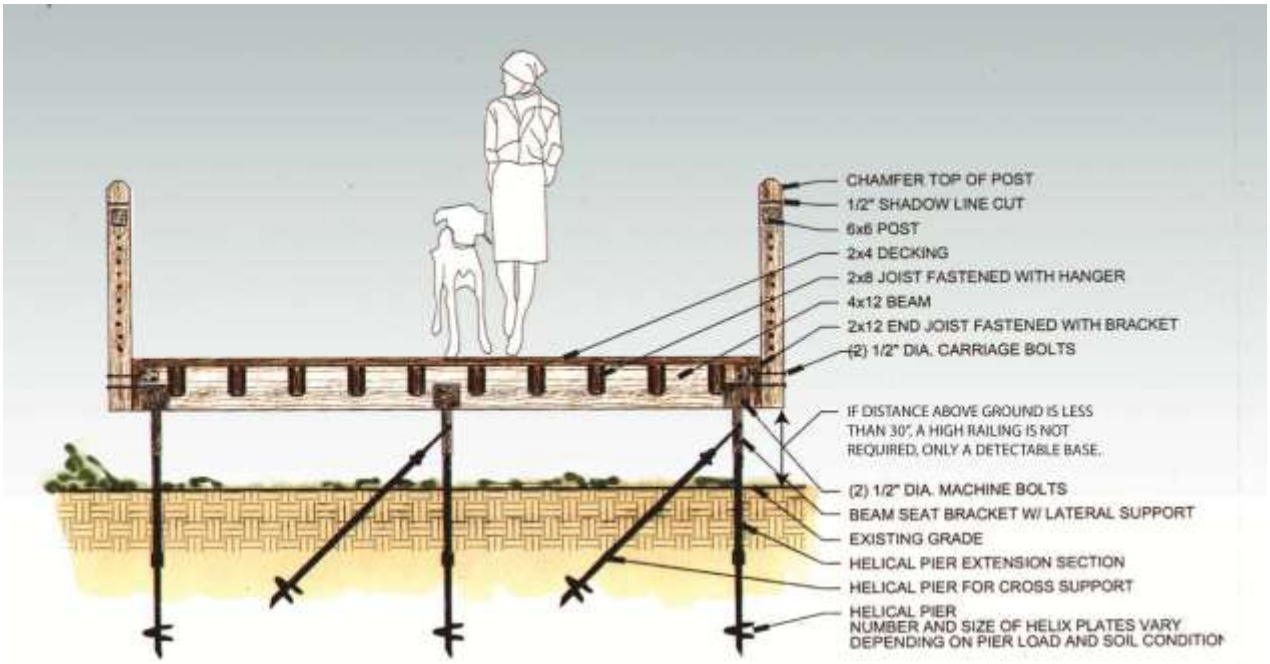


Exhibit 19 Boardwalk Cross-Section

SIDE PATHS

Shared-use paths that are located directly adjacent to roadways and within the street right-of-way are called 'side paths' (Exhibit 20). Side paths serve both bicyclists and pedestrians and are wider than a standard sidewalk.

Exhibit 20 Side Path

Side paths should have a buffer of at least 5' from the roadway or a physical barrier (AASHTO). At intersections, the side path should turn toward the street so path users cross at intersections. However, drivers at intersections or entering and existing driveways may not be expecting bicyclists traveling adjacent to the roadway and sometimes against the flow of traffic. Because bicyclists are expected to stop at every intersection on a side path even along a main street that has right-of-way, riding on a side path is slower than on-street riding and many commuter or long-distance riders may prefer riding in the street.

SHARED LANE MARKINGS

Shared lane markings are high-visibility pavement markings that help position bicyclists within the travel lane (***Exhibit 21***). These markings are often used on streets where dedicated bike lanes are desirable but are not possible due to physical or other constraints.

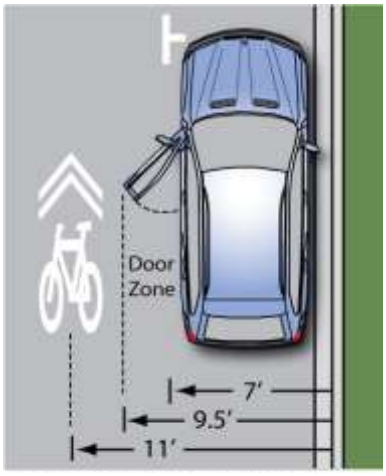


Exhibit 21 Shared lane marking placement guidance for streets with on-street parking.

Shared lane markings are placed strategically in the travel lane to alert motorists of bicycle traffic, while also encouraging cyclists to ride at an appropriate distance from the "door zone" of adjacent parked cars. While the City of Tigard does not presently use shared lane markings, these markings have been successfully used in many communities throughout the U.S, including in Oregon. Shared lane markings made of thermoplastic tend to last longer than those using traditional paint.

Trail Design Features

In addition to trail surface material, there are many other design elements that range from essential to the development of the trail, to amenities that benefit trail users and minimize trail impacts. This section addresses those features, and cost estimates are provided following.

BRIDGES

Bridges should be at least as wide as the paved path, with minimum of 2 feet clear horizontally on either side. The vertical space between the bottom rail and the deck surface should be a minimum of 3.5 inches or 9 to 12 inches for consistency with non head entrapment of playground railing fixtures for children. Decking material must be firm and stable. Bridges types with low profiles to provide minimal obstruction to flood flows, such as reinforced or pre-stressed concrete slab bridges or rolled steel beam bridges, are recommended. For longer spans, prefabricated steel truss spans are economical choices.

Exhibit 22 Single span concrete bridge.

Exhibit 23 Steel beam bridge.

Exhibit 24 Prefabricated steel truss bridge.

Exhibit 25 Concrete stress ribbon bridge
(Source: http://www.americantrails.org/resources/structures/CreativeCrossings.html) .

Bridges can be designed to pass over the sensitive habitat area, crossing streams as close to perpendicular as possible. Pilings should be located outside of the sensitive resource area, and vegetation or a barrier can be provided to discourage trail users from walking off of the trail. Some bridge designs, such as the 'concrete stress ribbon bridge' in Redding, California, can span long distances; the bridge pictured in Exhibit 25 is 13-feet wide and 420-feet long.

Additional resource for developing environmentally-sensitive bridge structures:

- Metro. *Green Trails: Guidelines for environmentally friendly trails.*
- National Trails Training Partnership, *Creative Crossings: innovative trail bridge and overpass designs* http://www.americantrails.org/resources/structures/CreativeCrossings.html

TRAIL CROSSINGS

A key consideration of trail design is connections to the on-street bikeway and sidewalk networks, as well as design of safe and convenient trail crossings of roadways. Whether or not the trail continues on the far side of the street, many trail users are likely to cross in order to continue their trip. Evaluation of path crossings involves analysis of vehicular and anticipated path user traffic patterns, including:

- Vehicle speeds.
- Street width.
- Traffic volumes (average daily traffic and peak hour traffic).
- Path user profile (age distribution, destinations served, particularly Safe Routes to School opportunities).
- Sight distance.

In addition, all trails approaching roadways should include warning signs both for vehicles and path users (discussed following), access to the sidewalk or roadway via curb ramps, and bollards to differentiate the trail from the roadway.

Table 6 summarizes guidelines for at-grade trail crossings.

Table 6 Summary of Path/Roadway At-Grade Crossing Recommendations[13]

Roadway Type	Vehicle ADT ≤9,000			Vehicle ADT > 9,000 to 12,000			Vehicle ADT > 12,000 to 15,000			Vehicle ADT > 15,00		
	Speed Limit (mph)**											
	30	35	40	30	35	40	30	35	40	30	35	40
2 Lanes	1	1	1/1+	1	1	1/1+	1	1	1+/3	1	1/1+	1+/3
3¤Lanes	1	1	1/1+	1	1/1+	1/1+	1/1+	1/1+	1+/3	1/1+	1+/3	1¤/3
Multi-Lane (4 +) w/ raised median***	1	1	1/1+	1	1/1+	1+/3	1/1+	1/1+	1+/3	1+/3	1+/3	1+/3
Multi-Lane (4 +) w/o raised median	1	1/1+	1+/3	1/1+	1/1+	1+/3	1+/3	1+/3	1+/3	1+/3	1+/3	1+/3

*__General Notes:__ Crosswalks should not be installed at locations that could present an increased risk to pedestrians, such as where there is poor sight distance, complex or confusing designs, a substantial volume of heavy trucks, or other dangers, without first providing adequate design features and/or traffic control devices. Adding crosswalks alone **will not** make crossings safer, nor will they necessarily result in more vehicles stopping for pedestrians. Whether or not marked crosswalks are installed, it is important to consider other pedestrian facility enhancements (e.g., raised median, traffic signal, roadway narrowing, enhanced overhead lighting, traffic-calming measures, curb extensions), as needed, to improve the safety of the crossing. **These are general recommendations; good engineering judgment should be used in individual cases for deciding which treatment to use.**

For each pathway-roadway crossing, an engineering study is needed to determine the proper location. For each engineering study, a site review may be sufficient at some locations, while a more in-depth study of pedestrian volume, vehicle speed, sight distance, vehicle mix, etc. may be needed at other sites.

** Where the speed limit exceeds 40 mi/h marked crosswalks alone should not be used at unsignalized locations.

*** The raised median or crossing island must be at least 4 ft (1.2 m) wide and 6 ft (1.8 m) long to adequately serve as a refuge area for pedestrians in accordance with MUTCD and AASHTO guidelines. A two-way center turn lane is not considered a median.

1= Type 1 Crossings. Ladder-style crosswalks with appropriate signage should be used.

1/1+ = With the higher volumes and speeds, enhanced treatments should be used, including marked ladder style crosswalks, median refuge, flashing beacons, and/or in-pavement flashers. Ensure there are sufficient gaps through signal timing, as well as sight distance.

1+/3 = Carefully analyze signal warrants using a combination of Warrant 4, Pedestrian Volume or 5, School Crossing (depending on school presence) and Equivalent Adult Unit (EAU) factoring (see MUTCD, Chapter 4). Make sure to project pathway usage based on future potential demand. Consider bicycle/pedestrian half signals in lieu of full signals. For those intersections not meeting warrants or where engineering judgment or cost recommends against signalization, implement Type 1 enhanced crosswalk markings with marked ladder style crosswalks, median refuge, flashing beacons, and/or in-pavement flashers. Ensure there are sufficient gaps through signal timing, as well as sight distance.

[13] This table is based on information contained in the U.S. Department of Transportation Federal Highway Administration Study, "Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations," February 2002.

REGULATORY AND WARNING SIGNING

Regulatory signs indicate to trail and road users the traffic regulations which apply at a specific time or place. Warning signs indicate in advance conditions on or adjacent to a road or trail that will normally require caution and may require a reduction in vehicle speed.

Exhibit 26 Required signing at all uncontrolled trail crossings of multi-lane roadways.

The *Manual on Uniform Traffic Control Devices (*MUTCD) requires yield lines and "Yield Here to Pedestrians" signs at all uncontrolled crossings of a multi-lane roadway. The MUTCD includes a trail crossing sign (Exhibit 26), which may be used where both bicyclists and pedestrians might be crossing the roadway, such as at an intersection with a shared-use path.

Intersection Warning (W2-1 through W2-5) signs may be used on a roadway, street, or shared-use path in advance of an intersection to indicate the presence of an intersection and the possibility of turning or entering traffic. A trail-sized stop sign (R1-1) should be placed on a pathway about 5 feet before the intersection.

BOLLARDS

Bollards are an effective way of keeping motor vehicle traffic off of trails. They are relatively inexpensive and can be installed to be removed to allow passage of maintenance or emergency vehicles. A single bollard located in the center of a trail entrance can be enough to keep cars out while multiple closely spaced bollards or bollards with a chain in between may be used to separate a path from a parallel roadway.

Exhibit 27 Bollards are used at road crossings to keep motor vehicle traffic off trails.

Minimize the use of bollards to avoid creating obstacles for bicyclists. Bollards, particularly solid bollards, have caused serious injury to bicyclists. Instead, design the path entry and use signage to alert drivers that motor vehicles are prohibited. Bollards also are used to slow down cyclists approaching a street crossing.

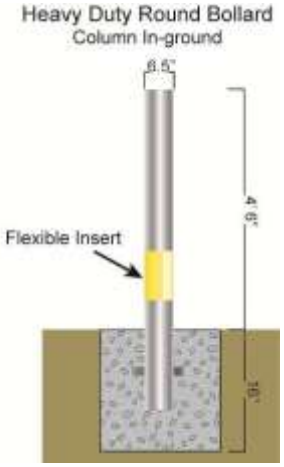
Flexible bollards and posts are designed to give way on impact and can be used instead of steel or solid posts. These bollards are typically made of plastic that is bolted to the roadway and bend and return to their original position when hit. They are intended to deter access, but allow vehicles through in an emergency.

Bollards typically are installed using one of two methods:

1) The bollard is attached to the surface by mechanical means (bolting the bollards or using epoxy glue and bolts (see Exhibit 28).

2) The bollard is set into concrete footing in the ground (see Exhibit 29).

Source: Lighthouse Bollards



Source: Andian Sales

Exhibit 28 Flexible Bollards

Source: Reliance Foundry Co. Ltd

Exhibit 29 Removable Bollards

Where removable bollards are used, the top of the mount point should be flush with the path's surface so as not to create a hazard or potentially be damaged by snow removal devices when the bollard is not in place. At the time of this publication, flexible bollards that do not leave an anchored mounting device on the path or roadway surface when removed are not commercially available.

All posts shall be permanently reflectorized for nighttime visibility and painted a bright color for improved daytime visibility.

Exhibit 31 shows a recommended pavement striping pattern to reduce the risk of user collisions with the bollard.

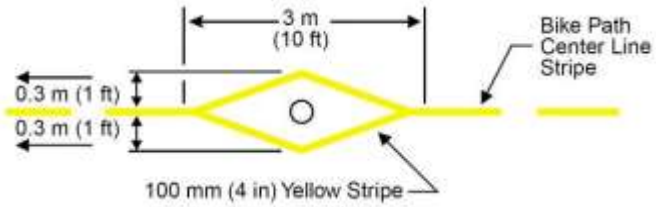


Exhibit 31 Bollard Striping

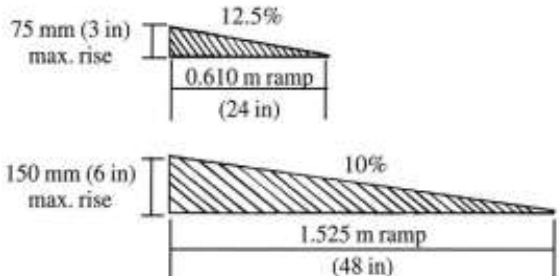


Exhibit 30 Curb ramp maximum rise.

When more than one post is used, an odd number of posts at 5-foot spacing is desirable. Wider spacing can allow entry by adult tricycles, wheelchair users and bicycles with trailers.

CURB RAMPS

Properly designed curb ramps ensure that the trail is accessible from the roadway. A trail without a curb ramp can be useless to someone in a wheelchair. The *Americans with Disabilities Act* (ADA) provides guidance for accessible curb ramps: the landing at the top of a ramp shall be at least 4-feet long and at least the same width as the ramp itself. It shall slope no more than 1:50 (2.0%) in any direction. If the ramp runs directly into a crosswalk, the landing at the bottom will be in the roadway. The landing, 4-feet long, shall be completely contained within the crosswalk and should have a running slope less than 1:20 (5.0%). If the ramp lands on a dropped landing within the sidewalk or corner area where someone in a wheelchair may have to change direction, the landing must be a minimum of 5-feet long and at least as wide as the ramp, although a width of 5-feet is preferred.

Raised tactile devices (also known as truncated domes) alert people with visual impairments to changes in the pedestrian environment and should be used at the base of curb ramps and the edge of depressed corners.

MARKED CROSSWALKS

Signage should always be used at a marked and unsignalized crossing. The marked crosswalk can be combined with other treatments, such as warning lights or flashers. Paths can be curved to orient users toward oncoming traffic, slowing their pace, and make them aware of oncoming vehicles. Vegetation and other obstacles should be kept out of the sight line for motorists and path users. Table 7 provides guidelines for unsignalized trail crossings; additional engineering judgment should be used to determine the appropriate level of traffic control and design.

Table 7 Unsignalized Trail Crossing Guidelines

Crossing Type	ADT	Posted Speed	Street Treatments	Trail Treatments	Sight lines
Residential /Collector	< 15,000	= < 25 MPH	"Path Xing" warning signs	"Stop" regulatory signs, slowing techniques (bollards/geometry)	155'
	< 15,000	= < 35 MPH			250'
Collector	<12,000	= < 35 MPH	Raised crosswalk, warning signs	"Stop" regulatory signs, slowing techniques (bollards/geometry)	
Arterial[14]	>15,000		Median refuge and/or active warnings, signs	"Stop" regulatory signs, slowing techniques (bollards/geometry)	

RECTANGULAR RAPID FLASH BEACON (RRFB)

Also known as Light Emitting Diode (LED) Rapid-Flash System, Stutter Flash or LED Beacons, RRFBs are user-activated amber LEDs that supplement warning signs at unsignalized intersections or mid-block crossings. They use an irregular flash pattern that is similar to emergency flashers on police vehicles are highly visible to motorists and can be manually activated or use a detection system.

Exhibit 32 RRFB

RRFBs are less expensive than traffic signals or hybrid signals such as HAWKs, but have been shown to increase driver yielding behavior at crosswalks significantly when supplementing standard pedestrian crossing warning signs and markings.

TRAIL CROSSINGS AT EXISTING SIGNALIZED INTERSECTIONS

Crossings within 350 feet of an existing signalized intersection with pedestrian crosswalks are typically diverted to the signalized intersection for safety purposes. For this option to be effective, barriers and signing may be needed to direct shared-use path users to the signalized crossings. In most cases, signal modifications would be made to add pedestrian detection and to comply with ADA.

[14] Trail crossings of multi-lane higher-volume arterials may be unsignalized where some or all of the following characteristics apply: excellent sight distance, sufficient crossing opportunities (more than 60 gaps per hour, defined as a space in traffic of sufficient length for a pedestrian traveling 3.5 ft/sec to cross), median refuges, and/or active warning devices like flashing beacons or in-pavement flashers. Such crossings would not be appropriate; however, if a significant number of schoolchildren used the path.

New signalized crossings may be recommended for crossings that meet pedestrian, school, or modified warrants, are located more than 250 feet from an existing signalized intersection and where 85th percentile travel speeds are 40 mph and above and/or ADT exceeds 15,000 vehicles. Each crossing, regardless of traffic speed or volume, requires additional review by a registered engineer to identify sight lines, potential impacts on traffic progression, timing with adjacent signals, capacity, and safety.

Shared-use path signals are normally activated by push buttons, but also may be triggered by motion detectors. The maximum delay for activation of the signal should be two minutes, with minimum crossing times determined by the width of the street. The signals may rest on flashing yellow or green for motorists when not activated, and should be supplemented by standard advanced warning signs.

Exhibit 33 Signalized crossing of trail at a multi-lane street.

MANAGING MULTIPLE TRAIL USERS

On trails that have high bicycle and pedestrian use, conflicts can arise between faster-moving bicyclists and slower bicyclists, as well as pedestrians and other users. On trails with widths appropriate to their classification and level of use, striping the centerline identifies which side of the trail users should be on (see Exhibit 36).

Where additional width is required, such as along a regional trail that passes through a park, bicyclists and pedestrians can be physically separated (Exhibit 37). A separate pedestrian path should be provided if possible. Differing surfaces suitable to each user group foster visual separation and clarity of where each user group should be. When trail corridors are constrained, physical separation could be provided in the form of a small hump or other crossable barrier.

The bicycle path should be located on whichever side of the path will result in the fewest number of anticipated pedestrian crossings. For example, the bike path should not be placed adjacent to large numbers of destinations. Site analysis of each project is required to determine expected pedestrian behavior.

Exhibit 36 Centerline striping encourages trail users to provide space for other users to pass.

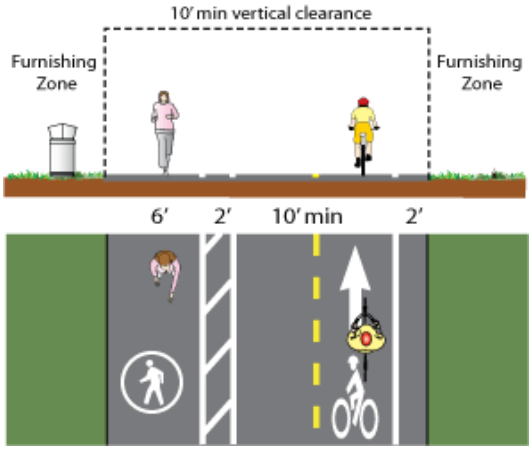


Exhibit 37 Recommended cross-section of trail with separated bicycle and pedestrian paths.

Edge Treatments

FENCING

Fencing is a means of assuring safety for both trail users and neighboring residents by preventing unwanted access onto or off of the trail. By definition, significant lengths of the Tigard neighborhood trail corridors are surrounded on both sides by residential properties. However, fencing both sides of the trail right of way can result in a "tunnel" effect with the perception of being trapped, resulting in a detrimental effect on the trail user experience. The narrow width of many corridors in the study area compounds this tunnel effect. Additionally, fencing could decrease public safety by preventing community surveillance of the trail.

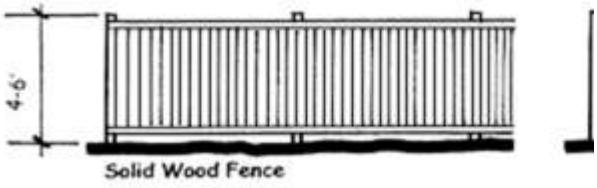


Exhibit 38 Example Wooden Fence

As a general policy, fencing requests should be reviewed on case-by-case bases. If credible evidence exists that trespassing and crime issues on a specific property is a result of the development of the trail, then installing fencing should be considered. There are numerous fencing types that can be considered. Solid fencing that does not allow any visual access to the trail should be discouraged. Fencing that allows a balance between the need for privacy, while simultaneously allowing informal

surveillance of the trail should be encouraged. If fencing is requested purely for privacy reasons, vegetative buffers should be considered.

Exhibit 39 shows an example wooden fencing option, and Exhibits 40 and 41 each show additional examples of different types of fences that have been used along trails. In addition to these, fencing can be made of metal or dense vegetation, or trails can be left with an open boundary, as discussed below.

Exhibit 39 Post and Wire Fence

Exhibit 40 Wooden Safety Fence

Exhibit 41 Metal Fencing

DENSE VEGETATION

Dense vegetation can be used to define the trail corridor and increase privacy, particularly in locations with preexisting plants. The major expense of this option is maintenance, which includes watering and trimming vegetation semi-regularly to maintain adequate path clearance.

OPEN BOUNDARY

In locations without significant vegetation, it is an option to maintain an open boundary around the trail. Users will tend to walk through an open area, so this option is not practical for areas where privacy or trespassing is a concern of landowners.

Lighting

Lighting improves the safety of the trail or path user by increasing visibility during non-daylight hours. Lighting should consider the surrounding land use to minimize light pollution in sensitive areas. The fixtures should be installed near benches, drinking fountains, bicycle racks, trailheads, and roadway and trail crossings. Depending on the location, average maintained horizontal illumination levels of 5 lux to 22 lux should be considered (AASHTO). Where special security problems exist, higher illumination levels may be considered.

Light standards (poles) should be installed to meet the recommended horizontal and vertical clearances from trail users. In addition to full height light standards, bollards also provide an effective mounting location for pathway lighting. Their low height and frequent locations reduce light pollution by keeping the illumination source close to the trail surface. There are many types of lighting bollards available. Solar powered bollards lit by LEDs can last about 20 times longer than incandescent bulbs and provide pathway lighting for over 100,000 hours.

PEDESTRIAN-SCALE LIGHTING

Pedestrian-scale lighting improves safety and enables the facility to be used year-round, particularly on winter afternoons. Adequate lighting is crucial for encouraging commuters to use the trails during winter months. However, lighting can be detrimental to sensitive habitats and undesired by neighbors.

Minimizing glare, maintaining a dark night sky, and protecting the light from vandalism are the three main issues lighting design should consider. Lights should not have a visible source, either to the trail users or to neighboring residences, as it can blind users and pollute the night sky. In addition, globes, acorns and other light types that are not reflected or shielded on the top light the sky and should be avoided. Low-level lighting, such as very short poles or bollards, can be problematic due to their easy access for vandalism.

If lights are desired, some neighborhood-scale options are available. A few of these include:

- In-ground lighting – dim lights which indicate the extent of the path;
- Bollards – low-level lighting, susceptible to vandalism; and
- Solar lighting – best used in situations where running power to the trail would be costly or undesirable.

Pedestrian scale lighting can have screens to deter the glare from affecting neighbors. In addition, lights can be programmed to detect motion to be actuated, or can dim or turn off later in the night. Lighting should not be used near sensitive wildlife habitat areas.

Exhibit 42 Lighting Bollard

Source: Knight Pedestrian Lighting

Exhibit 43 Solar lighting is used along the Metropolitan Branch Trail in Washington, D.C.

Source: ***http://www.thewashcycle.com***

SOLAR LIGHTING

Solar lighting is increasingly seen as a viable source for illumination of bicycle and pedestrian pathways. Benefits of solar power include:

- Reduced carbon emissions
- Potential cost reduction of infrastructure and related maintenance
- Increased flexibility in trail lighting design

A pathway illumination element is generally comprised of a photovoltaic panel, luminary unit, pole, battery, and connecting cabling. The scalability of the system allows for easy linear extension of the system, or placement of additional poles to increase the existing level of illumination. Examples of existing multi-use trails lit by solar power include trails on the University of Wisconsin campus; multi-use trails in the City of Pflugerville, Texas; and the Metropolitan Branch Trail in Washington D.C. (see).

Signing

Signs along the Tigard Greenway Trails system can indicate to pedestrians and bicyclists their direction of travel, location of destinations, and other information. Regulatory and warning signs

for both trail and road users was previously discussed in the trail crossings section. Other types of signs include guide and information signs, which indicate information for route selection, for locating off-road facilities, or for identifying geographical features or points of interest.

Signing style and imagery should be consistent throughout the trail to provide the trail user with a sense of continuity, orientation, and safety. Signs can impart a unique theme so path users know which path they are following and where it goes. A trail theme creates a cohesive and memorable trail, while establishing a distinct identity or "sense of place." The theme brands a trail segment or system with unifying materials, elements, images and colors. These features define the system as a unique place and provide a reason for people to experience it. A unifying theme serves to inform subsequent design elements from site furnishings to interpretive information. The theme can be conveyed in a variety of ways: engraved stone, medallions, bollards, and mile markers. However, the trail should not be over signed; where possible, incorporate signage into trailside vertical elements such as bollards.

Type of Sign	*Sign Type*	*Location/Frequency*
Mileage markers	Bollard	Every ¼ mile, starting from City line.
Directional signs	Blade	Where the trail crosses major roadways
Etiquette signs	Horizontal	At major and minor trailheads
Informational kiosks	Map and kiosk	At major trailheads

MILEAGE MARKERS

Mileage markers provide wayfinding information and act as a reference for maintenance crews or police officers, who track activity on the trail. Mileage markers should be placed at quarter to half mile increments along the corridor and should begin at a trailhead or at the city line. Mileage markers are also attractive to users who target exercise for set distances.

A variety of schemas for beginning to track mileage have been used on trails regionally. Typical starting places for mileage markers include:

- Distance from the main trailhead
- Distance from downtown center
- Distance from the city line
- Traditional railroad mileage (for rail-trails, shows distance from a junction or other railroad reference point)
- River mileage

Some communities recommend not installing the mile marker sign until all of the gaps are

completed.[15] However, it is preferable to mark the trail continuously and infill appropriate markers when the gaps are closed. While Metro does not have a regional standard, the Tualatin Hills Parks and Recreation District (THPRD) is conducting a study to recommend wayfinding guidelines. The City of Tigard should consider adopting the recommendations of the study for visual continuity along the greenway system. The City could establish a mileage system for trails within Tigard, such as the Pathfinder Genesis Trail (Exhibit 44 – Exhibit 46).

Exhibit 44 Mileage marker.

Exhibit 45 Directional sign.

Exhibit 46 Trail etiquette sign.

DIRECTIONAL SIGNS

Directional signs provide orientation to the trail user and emphasize trail continuity. At a minimum, street names should be called out at all trail intersections with roadways (Exhibit 47). Directional signage should identify key destinations along the trail route and include schools, parks, municipal centres, trails, and other points of interest.

[15] Jordan River Trail, UT. http://www.recreation.slco.org/planning/PDFdocs/5_Trail_Standards.pdf

TRAIL ETIQUETTE SIGNS

Establishing goals and policies sets a common framework for understanding trail rules and regulations. Rights and responsibilities of trail usage should be stated at main trail access points. Once rules and regulations are established, the trail managing agency has a means of enforcement. Local ordinances may be adopted to help enforce trail policies. Penalties such as fines or community service may be imposed in response to non-compliance.

Exhibit 47 Street crossings can be indicated by pavement markings.

INFORMATIONAL KIOSKS

Interpretive signage provides enrichment to the trail user experience, focuses attention on the unique attributes of the local community, and provides educational opportunities. Natural and cultural resources in trail corridors may provide opportunities for interpretation.

Bicycle Parking

In some locations along the trail system, it may be appropriate to provide bicycle parking, in order to enable trail users to continue along an unpaved trail segment, or to provide a user more flexibility. Bicycle racks permit the locking of the bicycle frame and at least one wheel to the rack and support the bicycle in a stable position without damage to wheels, frame or components. Racks should be placed outside of the clear right-of-way, particularly at trailheads or trail start- or end-points.

Exhibit 49 shows the space requirements of a standard bicycle rack.

Exhibit 48 Bicycle racks and informational kiosks benefit trail users at trailhead locations.

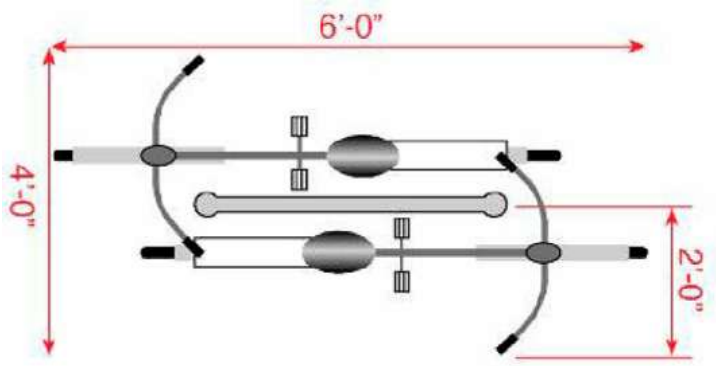


Exhibit 49 Staple rack parking configuration.

Other Amenities

A variety of additional amenities can be provided to improve the user experience on trails in Tigard and to provide a sense of place and continuity on the trail system.

PEDESTRIAN-SCALE FURNITURE

Providing benches at key rest areas and viewpoints encourages people of all ages to use the trail by ensuring that they have a place to rest along the way. Benches can be simple (e.g., wood slates) or more ornate (e.g., stone, wrought iron, concrete).

PICNIC TABLES

Providing picnic tables with benches at key rest areas and viewpoints encourages people of all ages to use the trail by ensuring that they have a place to rest along the way. Picnic areas encourage families and other groups to use the trail and promote positive interactions between users.

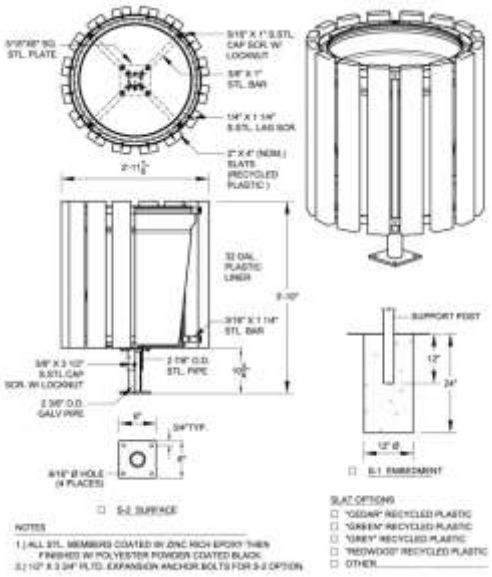
LANDSCAPING AND BIOSWALES

Landscape features, including street trees or trees along paths, can enhance the visual environment and improve the path user experience. Trees can also provide shade from heat and protection from rain.

Bioswales are natural landscape elements that manage water runoff from a paved surface, such as a trail. Plants in the swale trap pollutants and silt from entering a river system.

DOG BAG STATIONS

At parks and popular dog-walking areas, dog bag stations can be provided to encourage users to pick up after their dogs. Such a station can include bags only, or offer a trash receptacle, and signage.



TRASH CANS

Litter receptacles should be placed at access points such as trailheads. Litter should be picked up once a week and after any special events held on the trail, except where specially designed trash cans have been installed throughout Tigard.

If maintenance funds are not available to meet trash removal needs, it is best to remove trash receptacles. Neighborhood volunteers, friends groups, alternative community service crews, and inmate labor can be used in addition to maintenance staff.

ART INSTALLATIONS

Local artists can be commissioned to provide art for the trail system, making it uniquely distinct. Many trail art installations are functional as well as aesthetic, as they may provide places to sit and play on.

RESTROOMS

Restrooms benefit path users, especially in more remote areas where other facilities do not exist. Restrooms can be sited at major trailheads or at other strategic locations along the path system.

EMERGENCY CALL BOXES

Call boxes can be provided to enable trail users to make emergency calls to 911. These stations can help provide fast notification and response to emergency situations on trails. Call boxes can act as a crime deterrent and alleviate personal safety concerns; however, call boxes can also increase fears by indicating such a measure is necessary. In addition, call boxes require either a land line or cell reception, which can be expensive.

Soft-Surface Trail Design Elements

Soft-surface trails accommodate walking and hiking in a variety of contexts and are generally defined by the presence of functional drainage, trail structures and bridges where required, but are generally an unmodified natural soil surface. Typical width varies from 12 inches to 36 inches and vegetation should be maintained clear on both sides of the trail tread for a minimum of 12 inches.

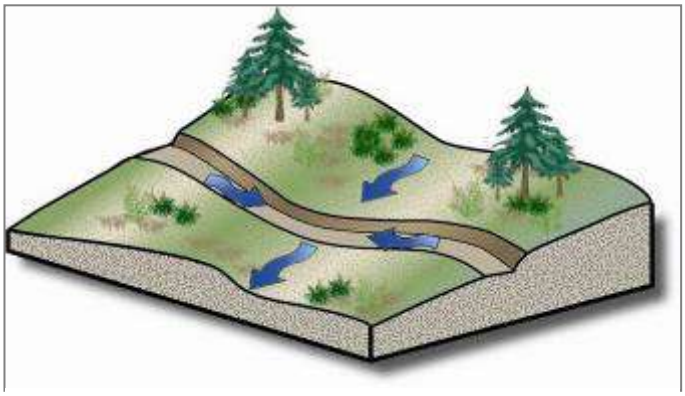


Exhibit 50 Rolling grade is the preferred design pattern for sustainable trails.

See Metro's *Green Trails* guide for specific recommendations about minimizing environmental impacts of soft surface trails.

CONTROLLING EROSION

Earthen trails must be sloped so that their surfaces shed water and the materials supporting the tread remain structurally sound. Favorable drainage gradients are achieved by out-sloping the trail tread and by means of rolling dips or drain knicks. It is essential to limit both slope length and gradient of trail runoff to control erosion. The following drainage practices are commonly prescribed and are essential to the long-term stability of earthen trails and protection of the resources where runoff is directed:

- Avoid trail grades in excess of 12 percent. It is very difficult to control drainage on steep grades, and erosion on steep grades is expensive to remediate.
- Maintain positive surface drainage by means of out-sloped, in-sloped, or crowned sections having cross slopes of 3 percent to 5 percent.
- Maintain only the width of tread necessary to support the designated uses.
- Roll grades or undulate the trail profile frequently to disperse water from the tread.
- Prevent erosion at outlets of rolling dips and culverts. Drainage outlets should be armored with rock to prevent erosion. Brush or native organic debris can be spread in lead-off ditches to slow the velocity of the runoff and facilitate the deposition of sediments. Even well-functioning rolling dips require maintenance.

- Under-drains (culverts) and associated ditches should be used only as a last resort as these facilities require regular inspection and maintenance, and severe damage can result from their failure.
- Avoid long sustained grades that concentrate flows. Install grade breaks to get stormwater off the trail and to allow trail users a rest.
- Avoid discharging trail runoff onto fill slopes and unprotected soils. Fill slopes should be armored where runoff is discharged onto them or the runoff should be conveyed in a down drain to a location where sediments can be deposited and the flow infiltrated.

Retaining Walls

Large rocks or boulders are recommended over wood for building retaining walls. Unlike wood, rock does not rot, and the weight of the rocks provides structural strength. Retaining walls are used to construct turning platforms for switchbacks, provide support for the outer edge of trail in rough areas, and to construct partial bench trails.

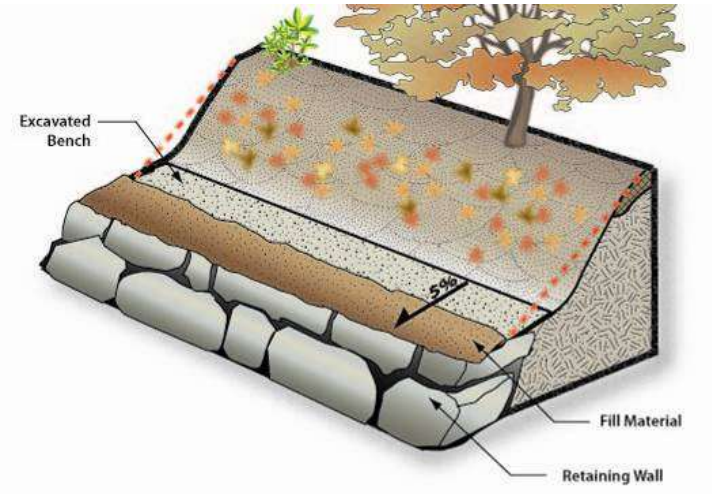


Exhibit 51 Retaining wall cross-section.

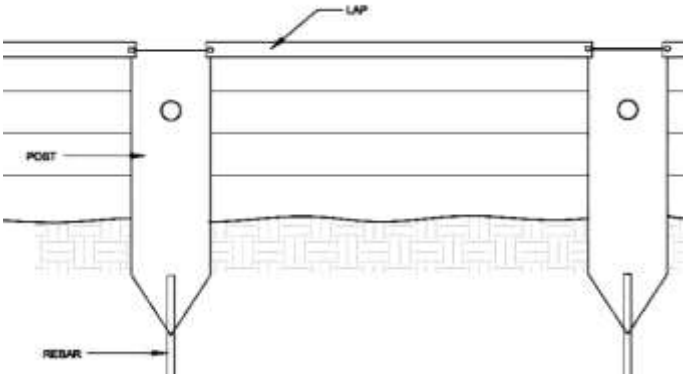


Exhibit 52 Retaining wall detail.

Switchback

Switchbacks provide a level turning platform for trail users. The turning platform should be crowned to provide good drainage. The upper leg of the switchback is in-sloped and the lower leg is out-sloped. Natural barriers (large boulders or trees) can be placed between the upper and lower leg of a switchback to discourage "shortcutting." When a series of switchbacks are needed, they should be staggered to prevent water accumulation.

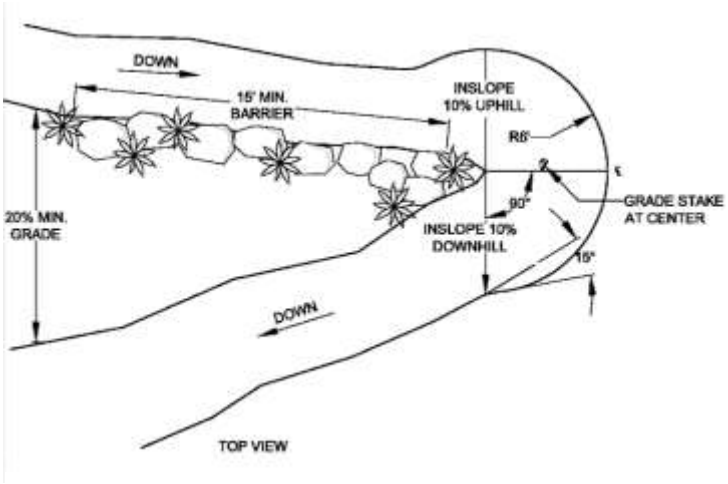


Exhibit 53 Recommended switchback configuration.

Armored Trail

In areas where the trail must pass through soggy or flat terrain where drain dips or rolling grade are not feasible, raising the tread can keep the trail surface drier. Organic soils are removed and a rock base is put in place to allow water to continue to flow between the rocks. Medium sized rocks lock the larger rock into place, and an aggregate topping creates a level tread surface. This approach can be labor intensive and costly, and is recommended in situations where an alternate route does not exist.

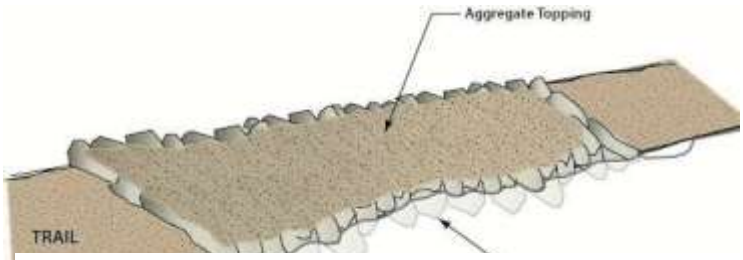


Exhibit 54 Armored trail detail.

Stairs

Stairs can help stabilize steep slopes and keep tread in place. Cribbed lumber stairs backfilled with crushed gravel are a cost-effective but durable solution. Trail users should not have to alter their stride to ascend.

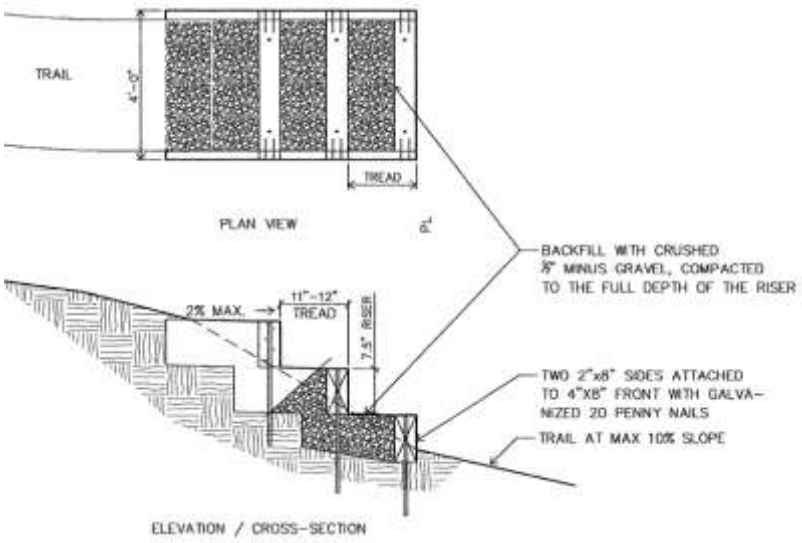


Exhibit 55 Soft-surface trail stair detail.

Opportunities for Trail Widening

Several existing trails, particularly the Fanno Creek Trail and Tualatin River Trail, are insufficiently wide for their respective designated trail classification. As regional trails, Fanno Creek and Tualatin River trails should be 10-12 feet in width along their entire lengths.

When trails are too narrow for their expected uses, conflicts can arise between trail users. On a narrow trail, bicyclists may not have sufficient space to comfortably pass pedestrians, particularly those with small children or pets. Groups of bicyclists and pedestrians tend to travel side-by-side, which may block other trail users from passing. This can also lead to conflicts at trail access points, particularly where bollards are used.

TRAIL WIDENING CONSTRAINTS

Existing trails can be widened by paving shoulder areas and using additional right-of-way. Several factors may complicate trail widening:

- Ditch or grade – if widening the trail requires significant infill or grading to achieve a reasonable or required slope, the cost could be higher than the demand.
- Adjacent railroad – trails frequently share right-of-way with railroads, and where trail widening would encroach on the 'setback' from the paved edge of the trail to the centerline of the closest railroad track, it could be prohibitively expensive. Setbacks can be as narrow as eight feet where separation is provided and an agreement is made with the railroad agency, while the agency can require 50 feet on private property, or not allow the trail at all.16
- Adjacent roadway – trails that are within roadway right-of-ways may be expensive or difficult to widen; it may be possible to provide a separate sidewalk or on-street option for bicyclists in these locations.
- Sensitive environment – if the trail is adjacent to or travels through sensitive wetland or other habitats, widening may have detrimental effect and should be avoided where possible.

[16] FHWA, *Rails-with-Trails: Lessons Learned*. (2002).

ALTERNATIVES TO WIDENING

Where widening the trail is challenging or impossible, other techniques can be used to manage multiple uses and reduce potential conflicts. Options include using differing surfaces or pavement markings to delineate space for different users, striping a trail centerline, or posting user guidelines.

Differing Surfaces

Differing surfaces suitable to each user group foster visual separation and clarity of where each user group should be. When trail corridors are constrained, the approach is often to locate the two different trail surfaces side by side with no separation.

Striping a Centerline

A common practice for delineating user space on a trail is to stripe a centerline. When many people are using a trail or at a busy area, trail users will tend to stay within their designated areas and provide space for others to pass them.

Exhibit 56 Centerline striping encourages trail users to leave space for passing.

Posting User Etiquette

Informing trail users of acceptable trail etiquette is a common issue when multiple user types are anticipated. Yielding the right-of-way is a courtesy and yet a necessary part of a safe trail experience involving multiple trail users. Trail right-of-way information should be posted at trail access points and along the trail. The message must be clear and easy to understand. Where appropriate, trail etiquette systems should instruct trail users to the yielding of cyclists to pedestrians and equestrians and the yielding of pedestrians to equestrians.

Exhibit 57User guidelines can be posted to instruct users about expected behavior.

Cost Estimates

This section presents unit prices used to develop planning level cost estimates for proposed trail improvement projects identified in this Plan. Cost estimates for specific improvements consider design needs that impact construction and maintenance costs such as teep slopes, poor soils, and the presence of wetland or water features require retaining walls, board walk, or drainage facilities. In addition, the unit price formula used to estimate costs for trail projects includes low (level ground), medium (some design features), and high ranges (many design features) when design features are required.

These cost estimates will require refinement after engineering analysis. Cost estimates are also exclusive of right-of-way acquisition and contingencies. Regardless of surface material, all trails will require site demolition, clearing and grading, and other construction requirements. The estimates in Table 8 and Table 9 include a reasonable estimate of these costs.

Table 8 Trail Surface Construction Raw Costs by Linear Feet (LF)[17]

Surface Type	SF	6' Trail	8' Trail	10' Trail	12' Trail	14' Trail	Annual Maintenance Estimate (SF)
Soft Surfaces							
Nike Grind	$31.00	$186.00	$248.00	$310.00	N/A	N/A	$3.00
Gravel	$3.00	$18.00	$24.00	$30.00	N/A	N/A	$0.50
Decomposed Granite	$3.00	$18.00	$24.00	$30.00	N/A	N/A	$0.50
Stabilized DG	$6.00	$36.00	$48.00	$60.00	N/A	N/A	$0.70
Crusher fines	$3.00	$18.00	$24.00	$30.00	N/A	N/A	$0.50
Filbert shells	$5.75	$34.50	$46.00	$57.50	N/A	N/A	$1.25
Native soil	$1.25	$7.50	$10.00	$12.50	N/A	N/A	$0.70
Nike Grind	$31.00	$186.00	$248.00	$310.00	N/A	N/A	$0.30
Hard Surfaces							
Concrete	$11.75	$70.50	$94.00	$117.50	$141.00	$164.50	$0.40
Permeable concrete	$115.00	N/A	$920.00	$1,150.00	$1,380.00	$1,610.00	$0.65
Asphalt	$6.00	N/A	$48.00	$60.00	$72.00	$84.00	$0.35
Permeable asphalt	$8.75	N/A	$70.00	$87.50	$105.00	$122.50	$0.75
Glassphalt	$7.50	N/A	$60.00	$75.00	$90.00	$105.00	$0.40
Other							
Wood decking	$32.00	$192.00	$256.00	$320.00	$384.00	$448.00	$3.00

[17] Costs are unburdened; estimates will include engineering/construction management (20%), Mobilization (15%) and A & E fees (20%). Costs are based on recent trail projects in the region and indexed to inflation.

Table 9 Design Element Raw Costs[18]

Design Element	Cost	Unit	Description
Retaining wall	$235.00	LF	Cast-in-place, 6’
Bridge, precise concrete	$1,225.00	LF	14’ wide, 60’ span
Bridge, wood laminate	$980.00	LF	14’ wide, 80’ span
Riprap (parallel to stream)	$99.90	LF	10' wide swath per linear foot of trail parallel to stream/river
Wetland mitigation	$262.50	LF	
Cast-in-place concrete stairs	$192.00	LF	
Crossing Elements			
Sign	$250.00	EA	
Bollard - fixed	$550.00	EA	
Bollard - removable	$750.00	EA	
Curb ramp	$1,000	EA	
Tactile warning strip	$250.00	EA	
Crosswalk	$7,465.00	EA	High-visibility
Signal	$49,000.00	EA	
Pavement markings, acrylic waterborne	$0.34	LF	white 4” wide
Pavement markings, thermoplastic	$1.13	LF	white 4” wide
Lighting			
Light fixture, standard	$2,500-$7,500	EA	
Solar light fixture	$3,500	EA	
Bicycle Parking			
Staple rack	$100.00	EA	Does not include installation
Soft Surface Trail Design Elements			
Rock wall stairs	$26.67	LF	
Retaining wall	$80.00	LF	
Switchback	$2,700.00	EA	
Armored trail	$11.67	LF	

Trade-offs

The level of design treatments appropriate or necessary for a particular trail or trail segment depend on terrain and soil conditions, presence of wetlands or steep slopes, proximity of neighbors, street and creek crossings, as well as anticipated and desired use. The Tigard Greenway Trails

[18] Costs are unburdened; estimates will include engineering/construction management (20%), Mobilization (15%) and A & E fees (20%).

Master Plan will identify appropriate design treatments and options for specific trail sections in subsequent tasks; this section takes a more general approach to trade-offs between design elements.

PATH SURFACING OPTIONS ANALYSIS

The surfacing material of a path contributes to the overall feel of the trail and can affect which users can comfortably utilize the trail. Whether or not a trail is paved can encourage or deter neighborhood support for the trail, if they consider a paved trail to be an invitation for outsiders to pass through their community, or if they have safety or aesthetic concerns about an unpaved trail. The selection of trail surface treatments should take into consideration that some patterns and joints may cause vibrations that are uncomfortable for wheelchair users. It also is desirable that the surface be stable, firm and slip resistant.

In arriving at a recommended trail surface, several key criteria should be considered, including:

- Initial Capital Cost – Trail surface costs vary dramatically and dollars to build trails are scarce. Construction costs include excavation, subbase preparation, aggregate base placement, and application of the selected trail surface.
- Maintenance and Long Term Durability – The anticipated life of a trail surface can vary from a single year (bark surface in a moist climate) to 25+ years (concrete). In addition, each trail surface has varying maintenance needs that will require regular to sporadic inspections and follow up depending on the material selected. Some surface repairs can be made with volunteer effort such as on a bark surface trail, while other such as a concrete surface will require skilled craftsmen to perform the repair.
- Existing Soil and Environmental Conditions – Soil conditions are predetermined and play a critical role in surfacing selection. In addition, when considering the use of a permeable concrete or asphalt surface, the success rate of these surfaces is directly correlated to the permeability of the soil and climatic conditions. The lower the permeability and moisture, the greater risk of failure. Importantly, much of Tigard has poorly-drained clay soils.
- Anticipated Use/Functionality – Who are the anticipated users of the trail? Will the trail surface need to accommodate equestrians, wheelchairs, maintenance vehicles, bicycles, etc.? Does the trail provide critical access to a popular destination for many users or is it a local access route to a community park? Multiple use trails attempt to meet the needs

of all anticipated trail users. This may not be feasible with a single trail surface. Considering the shoulder area as a usable surface, it is possible to provide enough width to accommodate use by those preferring a softer material. Each surface also has varying degrees of roughness and therefore accommodates varying users. In-line skates, for example, cannot be used on a chip seal surface or most permeable concrete surfaces due to the coarseness of the finished surface.

- Funding Source – The funding source for the trail may dictate the trail surface characteristics. If the trail has federal funds and is being administered through ODOT, funding agency will need to review and approve the selected trail surface.
- Susceptibility to Vandalism – Trail surfaces are not usually thought of as being susceptible to vandalism, but the characteristics of the varying surfaces do lend themselves to a variety of vandalism including movement of materials such as gravel or bark, graffiti on hard surfaces, arson (wood and rubber surfaces), and deformation.
- Aesthetics – Each trail surface has varying aesthetic characteristics that should fit with the overall design concept desired for the project and for the neighborhood in which the trail is located.

Table 10 provides an analysis of path surfacing options. The ranking of each surface option is as follows:

- ○ - Option does not meet criteria
- ◑ - Option has neutral or moderate positive impact to criteria
- ● - Best solution to satisfy criteria

Table 10 Alternatives Analysis for Trail Surface Options

Alternative	Safety	User Experience	Cost	Maintenance	Improves Drainage	Durability	Texture (smoothness)	Year-Round Use	ADA Accessible
Soft Surface Options									
Nike Grind	◑	◑	◑	○	●	○	●	○	○
Gravel	●	●	◑	◑	◑	●	●	◑	●
Crusher Fines	●	●	◑	○	●	◑	●	○	◑
Wood Mulch	●	●	●	○	●	○	●	◑	○
Filbert Shells	◑	◑	●	○	●	◑	○	◑	○
Native Soil	●	●	●	○	●	○	●	○	○
Hard Surface Options									
Concrete	●	○	○	●	○	●	○	●	●
Permeable Concrete	●	◑	◑	◑	●	●	◑	●	●
Asphalt	●	○	○	●	○	●	○	●	●
Permeable Asphalt	●	◑	●	◑	●	●	◑	●	●

DESIGN ELEMENT OPTIONS ANALYSIS

All cost estimates will account for necessary design treatments, such as the need for boardwalks in wetlands or retaining walls or stairs in areas with steep slopes. The minimum (low) cost estimate will therefore include necessary design treatments. Where possible or appropriate, the low cost will assume an unpaved trail surface, as well as no crossing elements, signing, lighting, or other amenities. A high level of treatment, depending on the location, may consider a 12 -foot trail paved with permeable asphalt, which would have wayfinding signage, lighting, and bicycle parking.

Factors to consider when determining the high, medium, and low design elements include:

- Is the design appropriate to the expected or desired use of the trail? For example, if the trail provides access to a park with walking trails, ADA accessibility may be desired.
- Does the design enhance users' experience of the trail? For example, trail lighting may be appropriate along a commute route, but not necessary or desirable along a more residential corridor.
- Does the design minimize negative impacts to wildlife resources, including habitats and wetland areas?
- Does the design minimize negative impacts to neighbors?
- Is the design consistent with agency permitting requirements? Is the design easy to maintain?

As the specific trails or trail segments are developed, these considerations will be used to determine appropriate design features and to develop cost estimates.

DESIGN ELEMENT BY TRAIL CLASSIFICATION

Chapter 3 recommends a hierarchical trail classification system for the Tigard Greenways. This system defines regional, community, and neighborhood trails based on expected use and user types, and can be used to generally determine appropriate surface and design features. In some cases, trails will not conform to specific design types (e.g., a regional trail through a sensitive environmental area may be unpaved with fewer amenities than a standard regional trail), but these guidelines represent design of typical trails.

Table 11 provides an overview of typical design for trails by classification. Specific design and type of elements depends on the local context of the trail and City staff judgment; the recommendations

in the table outline typical design elements. In subsequent tasks, each proposed trail or trail section will be classified according to this system, and cost estimates will be developed that correspond to these guidelines.

Table 11 Trail Design Types and Recommended Guidelines

	Regional Trail	Community Trail	Neighborhood Trail	
			Urban Trail	Natural Trail
Facility Type	Shared-use path	Shared-use path	Shared-use path/sidewalk	Soft surface trail
Users	• bicyclists • pedestrians • wheelchairs • baby strollers • skaters	• bicyclists • pedestrians • wheelchairs • baby strollers • skaters[19]	• bicyclists • pedestrians • wheelchairs[20] • baby strollers • skaters*	• pedestrians
Width[21]	Approx. 10-14 ft 2 ft gravel shoulders Or 10' bike path with 4' soft-surface pedestrian path	Approx. 8-10 ft 1–2 ft gravel shoulders	3-8 ft 1–2 ft gravel shoulders (optional)	3–8 ft 1–2 ft clear shoulders (optional)
Surface	Paved or other smooth-rolling surface to accommodate all trail users: • Concrete/ permeable concrete • Asphalt/ permeable asphalt/ glassphalt	Paved or other smooth-rolling surface to accommodate all trail users: • Concrete/ permeable concrete • Asphalt/ permeable asphalt/ glassphalt • Nike Grind • Gravel/crusher fines	Paved or other smooth-rolling surface to accommodate all trail users: • Concrete/permeable concrete • Asphalt/permeable asphalt/glassphalt • Nike Grind • Gravel/crusher fines	Earth, gravel, wood chips, or other soft surface material: • Gravel/crusher fines • Bark chip • Filbert shells • Native soil
Intersection Treatments[22]	• Bollards • Curb ramps • Marked crosswalks • Signalized crossings	• Bollards • Curb ramps • Marked crosswalks • Signalized crossings	• Bollards • Curb ramps • Marked crosswalks	• Bollards • Curb ramps
Signing	• Mileage markers • Directional signs • Trail etiquette signs • Informational kiosks	• Mileage markers • Directional signs • Trail etiquette signs • Informational kiosks	• Directional signs • Informational kiosks	• Directional signs
Other Features[23]	• Bicycle parking • Trail centerline	• Bicycle parking • Trail centerline		

[19] Depends upon chosen trail surface

[20] Paved park trails may still be too steep to safely accommodate wheelchair and other disabled users.

[21] Width varies from recommendations for regional trails used in Metro documents (10-12') due to anticipated use and desire to appeal to a variety of users over a long term planning horizon. Widths are recommendations only; constraints may require narrower trail widths.

[22] Intersection treatments depend on roadway characteristics and engineering judgment.

[23] All trail classifications may require bridges, boardwalk, or retaining walls.

6. EVALUATION PROCESS

This chapter describes the process used to evaluate and prioritize potential greenway trail alignments and improvements to existing greenway trails. The potential projects evaluated in this Plan are currently unfunded. Trail projects that are currently partially or completely funded, such as the Woodard Park/Grant Avenue and the Grant Avenue/Main Street segments of the Fanno Creek Trail are not addressed in this Plan. The planned Westside Trail, a Metro regional trail which will pass through Tigard, is subject to a separate ODOT-funded planning process and also is not addressed in this Plan; however, potential for connections to this and other regional trails was considered when evaluating trail projects.

The initial list of potential greenway trail alignments was identified and refined by the City of Tigard, the Stakeholder Advisory Committee (SAC), and Tigard residents through two public open houses and a project website. All parties assessed each potential greenway trail or on-street alternative alignment using evaluation criteria identified by the SAC and project team. These criteria consider: network connectivity; safety and security; user experience; topography; environmental impacts; cost; right-of-way availability; and public input. The assessment rates each alignment as to whether it "satisfies", "somewhat satisfies", or "does not satisfy" each evaluation criteria. The project team then assigned an overall High, Medium, Low, or Not Recommended priority ranking based on the individual evaluation criteria and a qualitative assessment of potential benefits and challenges associated with the project location. The remainder of this chapter describes the evaluation criteria, methodology, and prioritization results.

Multiple alternative alignments were evaluated for the majority of the potential greenway trail segments addressed in this Plan. Where feasible, both greenway and upland or on-street alternative alignments were considered. Table 12 describes the primary criteria taken into account to evaluate and prioritize alignment options. For the evaluation, each potential alignment was ranked based on whether it fully satisfies the criteria (Tier 1), somewhat satisfied the criteria (Tier 2), or does not meet the criteria (Tier 3). Most of the evaluation criteria are based on qualitative assessments conducted during site visits and feedback obtained from stakeholders. Many of these criteria do not use a quantitative scoring or weighting systems; however, where possible, Geographic Information Systems (GIS) and other readily obtainable information were used to inform the evaluation for each criteria.

Appendix B includes the Technical Memorandums, which present the detailed feasibility assessments of all potential trail alignments evaluated throughout the planning process. Appendix C includes the Environmental Report, which presents a high-level evaluation of the environmental impacts of potential trail alignments. Appendix D provides a matrix summary of the evaluation and prioritization results for each greenway trail.

Table 12 Evaluation Criteria

Criteria	Definition	Data Source	● Tier 1	◑ Tier 2	○ Tier 3
Connectivity	The number/quality of connections to existing trails, sidewalks, or bike lanes and access to residential, commercial, or employment areas and schools.	GIS – parks, schools, open space, trails, and transit layers; field visit	Alignment provides the most direct access to destinations, such as major employers and commercial centers and minimizes out of direction travel.	Alignment provides connections to existing trails, sidewalks, or destinations, but may require out of direction travel.	Alignment does not provide connections to existing trails, sidewalks, or destinations.
Safety and Security	Addresses the safety concerns of trail users traveling along the trail. The better the sightlines, the higher the score.	Field visit, public input	Area surrounding alignment is open and visible from all angles. Trail users have good lines of sight along the trail and immediate adjacent surrounding areas. No buildings or large structures obscure views of the trail.	Portions of the alignment have poor sight lines or obscured views.	Majority of the alignment has poor sight lines or obscured views.
User Experience	The quality of the users' experience on the trail. Considers potential views, aesthetics, comfort, and characteristics such as noise and air quality. For this criterion, priority is given to off-street, greenway alignments.	Field visit, aerial maps	Alignment minimizes noise levels from surrounding land uses (e.g., roads/railroads), limits views of industrial/ commercial activity, and has potential to include amenities (e.g., directional signage).	Portions of alignment are impacted by noise, undesirable views, or other characteristics of surrounding land uses.	Majority of alignment is impacted by noise, undesirable views, or other characteristics of surrounding land uses.
Topographical Constraints	The ease of constructing a trail and providing for ADA accessibility in an area, given existing slopes.	GIS – slope layer; field verification	Alignment does not include slopes greater than 15%. Ample room is available to grade trail to meet ADA accessibility.	Alignment may include a slope greater than 15%, but earth moving and ramp lengths are minimized.	Alignment includes slopes greater than 15%. Earth moving, retaining walls and long ramps are needed.
Environmental Impacts	The impact of a trail alignment on environmental resources (e.g., floodplains, wetlands, Clean Water Services designated Sensitive Areas, and Goal 5 habitat).	GIS – floodplain, wetlands, significant habitat; field verification; Environmental Report conducted by MBG	Alignment is not located within floodplain, wetlands, or sensitive areas. Alignment is environmentally-preferred option identified in the Environmental Report.	Portions of alignment are located in floodplain or wetlands.	Majority of alignment is located in wetlands or sensitive areas.
Cost	The cost of design, engineering, and/or construction of a trail alignment, based on the minimum (low design option) cost estimates.	GIS – length of trail, design costs outlined in Technical Memo #2	Alignment minimizes cost of easements, acquisition, design, engineering, construction, and maintenance.	Alignment involves some additional costs related to acquisition, design, engineering, construction, and/or maintenance.	Alignment involves significant additional costs related to acquisition, design, engineering, construction, and/or maintenance.
Right-of-Way	The number of property owners that the City will need to work with to construct a trail alignment.	GIS – land ownership, RLIS tax lots; aerial maps; field verification	Alignment is on land owned by the City of Tigard, Metro, or another public body.	Alignment is not entirely on land that is owned by a public body, but minimizes impacts on private property.	The majority of the alignment is on private property.
Public Input	Public support for a trail alignment, particularly among residents in the immediate area served by the trail.	Feedback received through open houses, project website, neighborhood surveys, SAC, and other communications.	Majority of public feedback received is supportive of trail alignment.	Public feedback received does not show clear support for or against a trail alignment. or No feedback received on alignment.	Majority of public feedback received is not supportive of trail alignment.

7. RECOMMENDED GREENWAY TRAILS

The project team evaluated each potential alignment using the criteria described above and assigned a High, Medium, or Low priority ranking based on overall satisfaction of evaluation criteria. This evaluation resulted in 16 recommended projects that are feasible and would provide benefits (e.g., transportation, nature education, safe routes to school) to Tigard residents.

The priority ranking of each recommended project was further informed by a qualitative assessment of potential benefits and challenges associated with the project location and information obtained from field work, City of Tigard staff, the Stakeholder Advisory Committee, and the public. Through this process, the project team grouped the 16 recommended projects into four categories:

- **High-priority projects** – have a significant amount of demand or public support, provide public benefits, have limited challenges, and are the most feasible projects for construction in the short term (one to ten years). High-priority projects are recommended for inclusion in the 2012-2017 City Capital Improvement Plan (CIP) update.[24]
- **Medium-priority projects** – are good candidates for filling gaps in the trail network or providing connections to destinations in the medium term (five to 15 years), but do not have as much demand, face additional hurdles, and/or would be more difficult to construct than the high priority projects.
- **Low-priority projects** – are recommended projects that fill gaps in the trail network, provide connections to destinations, and/or contribute to regional trail connectivity, but may be more difficult to construct due to right-of-way, slopes, environmental considerations, or community support. These projects are feasible for construction in the long term (10 or more years).
- **Key on-street connections** – are small, feasible projects that primarily involve bicycle boulevard treatments, sidewalk infill, or crossing improvements. They provide bicycle and pedestrian friendly on-street connections where a greenway trail alignment is not feasible or is not a short-term priority. These small projects do not meet the $50,000

[24] The City of Tigard defines a CIP project as "any public facility project that improves or adds value to Tigard's infrastructure, costs $50,000 or more, and has a useful life or extends the useful life of a facility for five years or more."

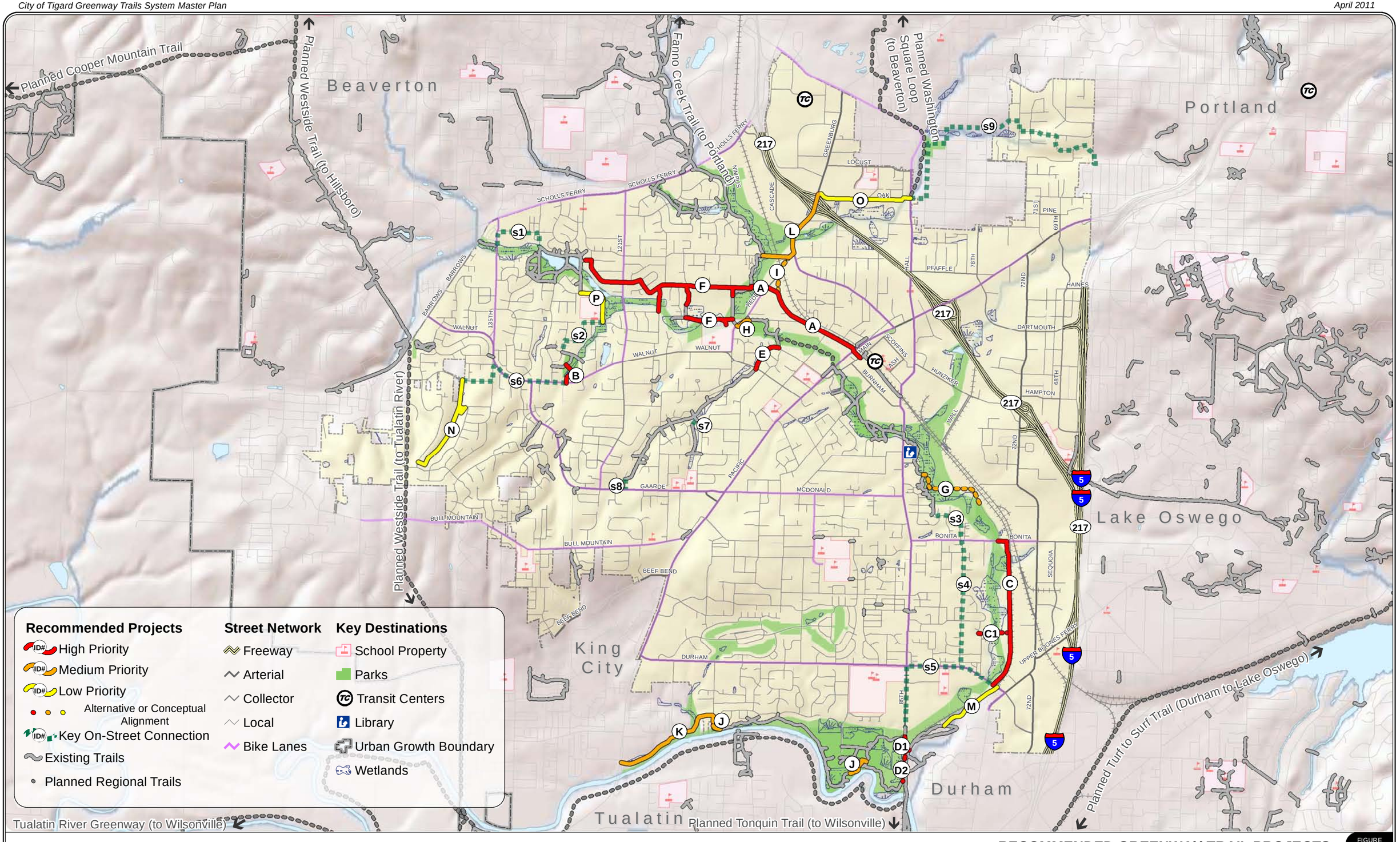
minimum cost threshold for inclusion in the CIP, but they could be funded individually in the short term (one to five years) as funding becomes available or grouped together and included in the CIP as a larger "Tigard Bicycle and Pedestrian Improvements" project.

Several projects were not prioritized due to existing constraints or because they fell outside the scope of the current planning effort, but should not be removed from consideration in future planning efforts. These projects are described at the end of this chapter.

Note that the priority ranking of projects are subject to change based on available funding; changing priorities; public support; opportunities to develop trails coincidental with new development/redevelopment, roadway or other infrastructure improvements; and other factors. The purpose of this prioritization exercise is to assist the City of Tigard in apportioning available funding to the highest priority greenway trail projects and to inform the City of other priority projects that may be positioned for future funding as it becomes available. Project identification (ID) numbers shown do not indicate the relative rank or importance of individual projects within their priority category.

Project List

Figure 5 shows the locations of all recommended trail alignments and trail alignments that were evaluated, but not recommended. Table 13 shows the summary results of the project evaluation and prioritization process. Note, the project list shown below is intended to address only projects related to the eight greenway trails identified in the 1999 Tigard Park System Master Plan which are the focus of the Greenway Trails Master Plan. This list does not preclude other trail projects from consideration for funding.



RECOMMENDED GREENWAY TRAIL PROJECTS
TIGARD, OR.

FIGURE
5

H:\profile\10622\GIS\Tech\Memo_Maps\Figure1Existing

Table 13 Prioritized Project List

ID	Trail Name	Description	Alignments[1]	Cost Opinion ($1,000)	Priority
N/A	*Fanno Creek*	*Woodard Park to Grant (partially funded)*		*$670*	*High*
N/A	*Fanno Creek*	*Grant to Main (partially funded)*		*$300*	*High*
N/A	*Westside Trail*	*Planned Beaverton to Tualatin Expansion (currently being planned as part of a separate ODOT funded project)*		*N/A*	*High*
A	Tigard Street	Fanno Creek/Tigard Street to Tigard Transit Center	1B, 2A	$498 - $770	High
B	Krueger Creek	Walnut Street to Jack Park	N/A	$111 - $209	High
C & C1	Fanno Creek	74th Avenue Sidepath, Bonita Road to Durham Road	3E	$552 - $1,528	High
D1 & D2	Fanno Creek & Tualatin River	85th Avenue Trail to Durham City/Ki-A-Kuts	1C	$131 - $3,088	High
E	Pathfinder-Genesis	Fanno Creek to Pathfinder Court Trail	1B	$725	High
F	Summer Creek	Summer Crest Drive and Tigard Street Sidewalk and Bikeway Improvements, Fowler Nature Education Trail	2E, 3C, 4C	$516 - $969	High
G	Fanno Creek	Tigard Public Library to Milton Court/Bonita Road	N/A	TBD	Medium
H	Fanno Creek	Tiedeman Avenue Crossing Realignment	5B	$139 - $274	Medium
I	Tigard Street	Fanno Creek/North Dakota Street to Tiedeman Street	1B	TBD[2]	Medium
J	Tualatin River	108th Avenue Grading and Existing Trail Improvements	2	$26 - $254	Medium
K	Tualatin River	108th Avenue to Pacific Highway Extension	3A	$1,746 - $2,345	Medium
L	Washington Square Loop	Fanno Creek to Highway 217 Sidewalk and Bikeway Improvements	1B	$183	Medium
M	Fanno Creek	Durham Road to Tualatin River Trail	4D	$1,320 - $1,943	Low
N	Ascension	Ascension Trail Improvements	4	$332 - $590	Low
O	Washington Square Loop	Highway 217 to Hall Boulevard Sidewalk and Bikeway Improvements	2B	$666	Low
P	Krueger Creek & Summer Creek	Summer Creek Trail to Mary Woodard School	2B	$473 - $518	Low

[1] Alternative alignments were identified and evaluated in Appendix B: Special Issues Reports 1 and 2.

[2] Cost opinion is dependent upon the final configuration of the Tiedeman/North Dakota realignment project. The initial cost opinion for a railside alignment from Tiedeman to North Dakota Street (given current street alignments) was $278,000.

Recommended Project Details

The following individual project sheets highlight the key benefits and issues of each recommended trail project. A design option and preliminary planning-level cost estimates are included for each of these trails. Potential funding sources for each project are identified in the Implementation chapter. For additional information on design concepts and elements recommended for greenway trail projects (e.g. typical cross section drawings, photos of trail amenities), please see the design guidelines chapter of this Plan.

KEY ON-STREET CONNECTIONS

The following projects are on-street links that are identified in the TSP as bike routes but serve as alternatives or interim links in the greenway trail network. They can provide continuity where a greenway trail alignment is desired, but property ownership, environmental resources, or cost render the project a long-term goal.

- **S1 - Summer Creek Trail – Hawks Beard Bicycle Boulevard (Alignment 1B):** This segment would connect an existing trail between SW 135th Avenue and Barrows Road with the Summerlake Park Trails. Improvements would include bicycle boulevard treatments on Hawks Beard Street and SW 130th Avenue. (Planning-level cost: $6,000)
- **S2 - Krueger Creek Trail – Katherine Street to Jack Park Sidewalk and Bikeway Improvements (Alignment 1B):** This segment would provide an on-street bicycle connection from Mary Woodard Elementary to Jack Park along SW 125th Avenue, SW Karen Street, and SW 127th Avenue. (Planning-level cost: $6,000)
- **S3 - Fanno Creek Trail - Fanno Creek Drive Bikeway Improvements (Alignment 2D):** This segment would provide an on-street connection between Fanno Creek Drive and Bonita Road. Improvements would consist of bicycle boulevard markings on the low-speed, low-volume Fanno Creek Drive. (Planning-level cost: $4,600)
- **S4 - Fanno Creek Trail – Bonita/Durham Road Bicycle Boulevard (Alignment 3D):** This segment would respond to resident requests for additional bicycle friendly connections between Bonita and Durham Road, providing bicycle boulevard improvements such as shared lane markings and wayfinding signage. (Planning-level cost: $16,000)
- **S5 - Fanno Creek Trail – Durham Road to 85th Avenue Bikeway Improvements (Alignment 4C):** This segment would connect high-priority expansions of the Fanno Creek Trail to the 85th Avenue and Tualatin Trail. This on-street alignment would make

use of existing bike lanes on Durham Road and include bicycle boulevard treatments on SW 85th Avenue. (Planning-level cost: $6,500)

- **S6 - Krueger Creek Trail – Walnut Street to Ascension Trail Sidewalk and Bikeway Improvements (Alignments 2B and 3B):** This segment provides a bicycle/pedestrian friendly connection between Walnut Street and the existing Ascension Trail at SW Fern Street.[25] (Planning-level cost: $5,000)
- **S7 - Pathfinder-Genesis Trail – 107th Court to 115th Avenue:** This short connection provides a direct sidewalk and on-street link from the southern "Y" of the Pathfinder-Genesis to an existing trail segment. This project would include minor improvements such as signage to improve ease of navigation between existing trail segments. (Planning-level cost: $1,000)
- **S8 - Pathfinder-Genesis Trail – 115th Avenue to Gaarde Street:** This short connection provides a direct sidewalk and on-street link from the 118th Court trail entrance to Gaarde Street. This project would include minor improvements such as signage to improve ease of navigation between existing trail segments. (Planning-level cost: $1,000)
- **S9 – Washington Square Loop Trail – Hall Boulevard to Portland Urban Trail Number 5:** This segment would connect the existing Hall Boulevard bike lanes and proposed on-street segments of the Washington Square Loop Trail to Metzger Park and the Portland Urban Trail Number 5, which ends at SW Dickinson and SW 65th. This project would include improvements such as shared lane markings, wayfinding signage, and several short "neighborhood trail" connections where direct street connections are not available. (Planning-level cost: TBD).

[25] Parts of this segment exist as a pedestrian corridor. The route follows a driveway easement from SW Rockingham Drive, continues up several staircases and paved trail segments behind houses, then connects to SW Broadmoor Place via another driveway easement.

Short-Term Recommended Project Details

TIGARD STREET TRAIL- FANNO CREEK/TIGARD STREET TO TIGARD TRANSIT CENTER (ALIGNMENT 1B & ALIGNMENT 2)	**A**

Summary	Cost Opinion
This segment follows the inactive rail corridor along Tigard Street from Tiedeman Avenue to Main Street. Tigard Street currently has no sidewalks or pedestrian amenities. The corridor is currently a 16-foot gravel path that could be developed to accommodate a variety of mixed use trail sections, depending on projected usage. The trail's existing gravel (rail bed rock) surface is very rough and not comfortable for walking The corridor may extend under the Pacific Highway bridge to provide an entryway plaza treatment along Main Street; however, due to ODOT restrictions on pedestrian crossings within 250 feet of a rail crossing, trail users will be diverted to the existing crossing of Main Street at Tigard Street to access the Tigard Transit Center. The alignment would make use of existing sidewalks and a bicycle/pedestrian bridge on Tigard Street to connect to the Fanno Creek Trail and a proposed on-street connection to the Summer Creek Trail. Improvements would include a sidepath on Tigard Street.	Length: 3,296' (686' new sidewalk) Medium Design Option: • Design: 12' asphalt with pavement markings (Main Street to Tiedeman), 10' asphalt side path (Tiedeman to Fanno Creek), crosswalk and signage, lane markings • Planning-level cost: $770,000 Low Design Option: • Design: 8' asphalt side path (with 4' bark chip running path from Main Street to Tiedeman), sidewalk (Tiedeman to Fanno Creek), crosswalk and signage • Planning-level cost: $498,000

Opportunities	Constraints
• Connects to Fanno Creek Park • Connects to proposed on-street connection to Summer Creek Park • Connects to an existing bike/pedestrian bridge • Connects to a regional transit center • Provides pedestrian amenities in a corridor with no sidewalks • Existing right-of-way can accommodate multiple users and regional trail guidelines	• May require long-term widening of Tigard Street pedestrian bridge to accommodate user volumes. • Minor out of direction travel required to cross Main Street

TIGARD STREET TRAIL- FANNO CREEK/TIGARD STREET TO TIGARD TRANSIT CENTER (ALIGNMENT 1B & ALIGNMENT 2)

A

KRUEGER CREEK TRAIL – WALNUT STREET TO JACK PARK

B

Summary

The City has previously planned this trail that connects the existing Jack Park trails to the fire station parking lot and Walnut Street. In addition to completing a link in the Krueger Creek Trail, this trail would provide a new creek crossing and connect Jack Park to additional parking near the fire station.

Opportunities

- Provides a connection between an existing park and the fire station parking lot
- Narrow crossing of Krueger Creek could allow for a bridge outside of wetland

Constraints

- Existing wetland mitigation near project site

Cost Opinion

Length: 487

High Design Option:

- Design: 12′ permeable asphalt trail, concrete bridge
- Planning-level cost: $209,000

Medium Design Option:

- Design: 10′ asphalt trail, wood bridge
- Planning-level cost: $147,000

Low Design Option:

- Design: 6′ gravel trail, wood bridge
- Planning-level cost: $111,000

FANNO CREEK TRAIL – 74TH AVENUE SIDEPATH, BONITA ROAD TO DURHAM ROAD (ALIGNMENT 3E)

C

Summary

This segment connects Bonita Road to Durham Road via a sidepath along the west side of SW 74th Avenue. This alignment would provide additional protection from traffic and respond to resident requests for a direct pedestrian-friendly route from Bonita Road to Durham Elementary, but would not require wetland mitigation or bridges.

While an east side alignment would minimize conflicts at driveways, the railroad is double-track to accommodate WES vehicles. As a result, there is insufficient separation between the potential location of a side path on the east side of 74th and the railroad.

Opportunities

- Provides a connection extending Fanno Creek Trail south.
- Relatively inexpensive compared to options along the creek

Constraints

- Environment less appealing than a streamside alignment
- More expensive than on-street alternative
- ODOT railroad crossing permit required to develop pedestrian crossing within 250′ of tracks
- Right-of-way acquisition; alignment crosses 16 privately-owned properties.

Cost Opinion

Length:

- 4,923′
- Includes crossing treatments on Bonita and Durham Roads

High Design Option:

- Design: 12′ permeable asphalt, RRFB signal /refuge island
- Planning-level cost: $1,008 ,000

Medium Design Option:

- Design: 10′ asphalt, crosswalk and refuge island
- Planning-level cost: $595 ,000

Low Design Option:

- Design: 10′ asphalt, crosswalk
- Planning-level cost: $552 ,000

Neighborhood connector (Alignment C1):

- Design: 6′ gravel, boardwalk, wood bridge
- Planning-level cost: $520,000

FANNO CREEK TRAIL – 74TH AVENUE SIDEPATH, BONITA ROAD TO DURHAM ROAD (ALIGNMENT 3E)

C

FANNO CREEK TRAIL – 85TH AVENUE TRAIL TO DURHAM CITY/KI-A-KUTS

D

Summary

This trail section provides a key connection to the Tualatin River Trail, Durham, and the Ki-A-Kuts Bridge. This section would bypass the Cook Park access trail that currently requires out-of-direction travel and creates user conflicts. This alignment would leverage the City's investment in bike lanes on Hall Boulevard by completing a direct north-south route through Tigard from Portland to Durham/Tualatin. This direct, primarily on-street route will provide an alternative to the off-street Fanno Creek Trail alignment (proposed in projects G, C, and M) for commuters, thus reducing conflicts between multiple trail user groups on these segments of the Fanno Creek and Tualatin River Trails.

Alignment option D1 would create a new underpass under the raised railroad, avoiding Clean Water Services' Oak Savannah Restoration area. . In accordance with Union Pacific standards, a culvert tunnel would be required to cross under the railroad tracks with a minimum of 8 feet separation between the top of the culvert tunnel and the track bed, as well as 100 feet of fence running parallel to the railroad tracks in either direction at the entrances to the tunnel to prevent unlawful access to the tracks. The recommended height of the tunnel is 12 feet, with 10 feet the minimum height. The approximate distance required for the tunnel is 50 feet, based on field measurements of the existing ballast and track dimensions. At this length, it is recommended that the tunnel be lighted to increase safety for trail users.

Option D2 would travel south along a former maintenance road on the edge of the restoration area and the railroad to an existing underpass.

Cost Opinion

Option D1

Length: 1,148'

High Design Option:

- Design: 12' permeable asphalt, fence, permitting, underpass, lighting, fencing
- Planning-level cost: $3,088,000

Medium Design Option:

- Design: 10' asphalt, fence, permitting, underpass, lighting, fencing
- Planning-level cost: $2,975,000

Low Design Option:

- Design: 6' gravel, fence, permitting, underpass, lighting, fencing
- Planning-level cost: $2,874,000

Option D2

Length: 1,407'

High Design Option:

- Design: 12' permeable asphalt, fence, permitting
- Planning-level cost: $393 ,000

Medium Design Option:

- Design: 10' asphalt, fence, permitting
- Planning-level cost: $255 ,000

Low Design Option:

- Design: 6' gravel, fence, permitting
- Planning-level cost: $131 ,000

Opportunities

- Connects to the Tualatin River Trail, bike lanes on Hall Boulevard, and Durham Road
- Does not require out of direction travel

Constraints

- Close proximity to railroad
- High cost of new railroad underpass (D1)
- Potential disturbance of CWS restoration area (D2)

FANNO CREEK TRAIL – 85TH AVENUE TRAIL TO DURHAM CITY/KI-A-KUTS

D

PATHFINDER-GENESIS TRAIL – FANNO CREEK TO 107TH COURT (ALIGNMENT 1B)

E

Summary

This segment would follow the greenway north of Walnut Street to provide a mixed streamside and on-street connection from the Pathfinder-Genesis to Fanno Creek Trail. This segment include crossing enhancements on Walnut Street and provide a direct and user friendly connection between the two trails. The majority of this segment is located in wetlands and private property. Portions of this trail could be constructed as boardwalk to lessen environmental impacts and reduce the impact of seasonal flooding.

Cost Opinion

Length:

- 1,609'(320' in wetland)

Medium Design Option:

- Design: 10' asphalt, signage, acquisition, permitting, curb ramps, crosswalk
- Planning-level cost: $725,465

Opportunities

- Closes a gap between two existing trails
- Connects to Woodard Park
- Creates a more pleasant user experience than on-street option

Constraints

- Portions of trail through wetlands
- 535 feet of alignment travels through one privately-owned residential parcel

SUMMER CREEK TRAIL – SUMMER CREST DRIVE AND TIGARD STREET SIDEWALK AND BIKEWAY IMPROVEMENTS (ALIGNMENTS 2E, 3C, AND 4C), FOWLER NATURE EDUCATION TRAIL

F

Summary

This segment would provide sidewalk and on-street bikeway improvements to connect the existing Summer Creek and Fanno Creek Trails. This alignment would respond to resident requests for improved pedestrian/bicycle connectivity and safe walking routes to school in an area where streamside routes are not currently feasible. The project would include spur connections at Gallo Avenue and 116th to link to an existing trail segment and connect residents south of Summer Creek to the trail network.

West of Gallo Avenue, improvements would include: wayfinding, "bicycle boulevard" treatments (e.g. sharrow pavement markings, route signage), sidewalk infill, and crossing improvements at 121st Avenue. East of Gallo Avenue, where traffic volumes are higher and on-street bicycle facilities would require roadway widening, a side path would provide access along the southern side of Tigard Street. As part of this project the existing nature education trail through the Fowler school property would be maintained as a soft-surface pedestrian nature trail and efforts would be made to eliminate usage of other demand trails in the area.

Cost Opinion

Medium Design Option:

- Length: 5,891'
- Design: 10' asphalt (1,801'), permitting, pavement markings (4,090'), sidewalks (1,255'), crosswalk, RRFB, wayfinding signs
- Planning-level cost: $709,000

Low Design Option:

- Length: 5,891'
- Design: 10' asphalt (1,801'), permitting, pavement markings (4,090'), crosswalk, wayfinding signs
- Planning-level cost: $256,000

Connections:

- Spur at 116th Avenue: (6' gravel/boardwalk, 330'): $224,000
- Spur at Fanno Creek Trail (10' asphalt, 264'): $36,000

Opportunities

- Provides bicycle and pedestrian friendly links to Summer Creek and Fanno Creek trails
- Enhances safe routes to schools opportunities
- Creates a new off-street path
- Provides nature education opportunities and provides an established alternative to multiple demand paths

Constraints

- All of Alignment 4C encroaches on the edge of 'strictly limit' habitat
- If the property south of Tigard Street is developed as a park by the City, the sidepath west of Gallo will be considered half street improvements, which will impact project costs.

SUMMER CREEK TRAIL – SUMMER CREST DRIVE AND TIGARD STREET SIDEWALK AND BIKEWAY IMPROVEMENTS (ALIGNMENTS 2E, 3C, AND 4C), FOWLER NATURE EDUCATION TRAIL

F

Medium-Term Recommended Project Details

FANNO CREEK TRAIL – TIGARD PUBLIC LIBRARY TO MILTON COURT/BONITA ROAD

G

Summary

This conceptual alignment would connect the Tigard Public Library to Bonita Park/Road, fulfilling frequent resident requests for a safe, established route for children and pedestrians between these two major destinations. In addition to providing a key link in the non-motorized transportation network, this link would serve as a community resource providing unique educational and recreational opportunities.

Because of uncertainty regarding the future development of properties in this area, any trail alignment in the vicinity of the creek will need to be developed and refined through extensive citizen and property owner engagement. Beyond the environs of the creek, the preferred alignment follows the existing upland demand trail located on the Metro-owned "Brown" property.

An aesthetically pleasing, artful trail design incorporating elements that reduce environmental impacts (e.g. boardwalks, suspension bridges with footings outside of wetlands and riparian areas) are highly recommended for this segment. Recommended trail amenities include lighting, fencing, and interpretive signage to increase security, improve user experience, and discourage users from straying from the established trail.

Opportunities

- Improves trail use and user comfort
- Potential to bring trail to regional standards
- Would provide an alternative route than existing library section of trail
- Uses existing demand trail alignment

Constraints

- Reduces neighborhood connections
- Requires one creek crossing
- Places trail through a wetland and floodplain

Cost Opinion

High, medium, and low design options will be developed after potential alignment options are defined.

FANNO CREEK TRAIL – TIGARD PUBLIC LIBRARY TO MILTON COURT/BONITA ROAD (ALIGNMENT 2A, 2B)

G

FANNO CREEK TRAIL – TIEDEMAN AVENUE CROSSING REALIGNMENT (ALIGNMENT 5B)

H

Summary

This alignment would improve the difficult Fanno Creek Trail crossing of Tiedeman Avenue. The City is constructing short-term improvements, including: signage, curb ramps, and high-visibility crossings.

This alignment would additionally eliminate the 90 degree turns currently required in this segment and cross Fanno Creek via a bridge near the existing road bridge. The trail would connect to the Fanno Creek Trail in Woodard City Park. The land this alignment crosses is currently owned by Metro under the terms of a life estate. Trail use is prohibited on the property until the life estate is relinquished and would be subject to Metro approval thereafter.

Opportunities

- Enhances safe routes to schools opportunities
- Improves safety and user comfort on a popular segment of a regional trail

Constraints

- Majority of trail in flood plain
- Crossing improvements on Tiedemann Avenue
- Requires bridge over Fanno Creek
- 105' in 'strictly limit' habitat area

Cost Opinion

Length: 450'

High Design Option: Alignment

- Design: 12' permeable asphalt, precast concrete bridge, fencing
- Planning-level cost: $274,000

Medium Design Option: Alignment

- Design: 10' asphalt, wood bridge,
  Planning-level cost: $173,000

Low Design Option: Length: Alignment

- Design: 6' gravel, wood bridge
- Planning-level cost: $139,000

FANNO CREEK TRAIL – TIEDEMAN AVENUE CROSSING REALIGNMENT (ALIGNMENT 5B)

H

TIGARD STREET TRAIL – FANNO CREEK/NORTH DAKOTA STREET TO TIEDEMAN STREET (ALIGNMENT 1B)

I

Summary

This segment would connect the Fanno Creek and Tigard Street Trails. Scheduled reconstruction of the North Dakota Street bridge (tentatively set for 2015) combined with the proposed closing of the Tiedeman railroad crossing and realignment of Tiedeman to connect to North Dakota Street presents an opportunity to add accommodations for cyclists and pedestrians and improve safety and user experience on this link to the Fanno Creek Trail.

The final alignment of this project will be dependent upon the final configuration of the Tiedeman/North Dakota realignment project. The future alignment could be a sidepath along Tiedeman Avenue or an off-street trail that follows the rail corridor from Tiedeman Avenue to North Dakota Street. An on-street or sidepath connection will be provided along North Dakota Street to the Fanno Creek Trail entrance.

This alignment may require coordination with the railroad to obtain additional easements and ODOT to obtain a pedestrian crossing permit near the railroad crossing at Tiedeman Ave.

Cost Opinion

Length: to be determined

High Design Option: Alignment A

- Design: 10′ asphalt/bike lanes, precast concrete bridge, crosswalk and signage, fencing
- Planning-level cost: to be determined

Opportunities

- Connects to Fanno Creek Trail
- Uses full length of inactive rail corridor

Constraints

- Proximity to multiple businesses, some using corridor for informal parking
- Requires additional rail corridor easements

TIGARD STREET TRAIL – FANNO CREEK/NORTH DAKOTA STREET TO TIEDEMAN STREET (ALIGNMENT 1B)

I

TUALATIN RIVER TRAIL – 108TH AVENUE GRADING AND EXISTING TRAIL IMPROVEMENTS (ALIGNMENT 2A)

J

Summary

In several areas the existing Tualatin River asphalt trail surface is degraded and there are abrupt changes in trail surface, width, direction, and slope. This segment currently ends at a 90 degree turn and steep slope (approximately 20 percent grade) at 108th Avenue.

Improvements for this segment would include: bringing the current alignment up to regional standards by repairing asphalt and adopting a uniform 10-foot section where possible, paving an existing soft surface trail segment in Cook Park to increase ADA and bicycle accessibility, and adding a stairway and/or obtaining an easement to straighten the curve and lessen the grade of the 108th Avenue trail entrance. Seasonal flooding in Cook Park and the environmental impacts of paved and unpaved trail surfaces in this area should be evaluated in more detail prior to implementation.

Cost Opinion

Length

- Spot improvements
- 250′ for 108th entrance redesign
- 800′ for Cook Park link

High Design Option:

- Design: signage, lighting, grading, 12′ permeable asphalt, acquisition, permitting
- Planning-level cost: $254,000

Medium Design Option:

- Design: signage, 10′ asphalt, acquisition, permitting
- Planning-level cost: $139,000

Low Design Option:

- Design: signage, 8′ asphalt patching
- Planning-level cost: $26,000

Opportunities

- Improves user experience and safety on an existing high use trail
- Enhances accessibility and connections to residential and recreational uses.

Constraints

- Potential high cost and property issues related to 108th Avenue entrance changes
- Trail widening/straightening may require removing several large trees.

TUALATIN RIVER TRAIL – 108TH AVENUE GRADING AND EXISTING TRAIL IMPROVEMENTS (ALIGNMENT 2A)

J

TUALATIN RIVER TRAIL – 108TH AVENUE TO PACIFIC HIGHWAY EXTENSION (ALIGNMENT 2A)

K

Summary

This segment would pass outside of Tigard city limits and intersect with Pacific Highway and the future Westside Trail extension. This alignment extends the existing trail from 108th Avenue through a wooded City-owned parcel. An on-street alternative to this trail is not available south of Durham Road, which is over 0.5 miles north of the Tualatin River at Pacific Highway.

Cost Opinion

Length

- 3,314'

High Design Option:

- Design: Alignment B, 12' permeable asphalt, precast concrete bridge, undercrossing, permitting, acquisition
- Planning-level cost: $2,354 ,000

Medium Design Option:

- Design: Alignment B, 10' asphalt, wood bridge, undercrossing, permitting, acquisition
- Planning-level cost: $1,746,000

Opportunities

- Connects two regional trails (Tualatin and proposed Westside)
- Provides a bicycle/pedestrian route where no on-street alternative is available
- Connects to bike lanes on Pacific Highway

Constraints

- Crosses 11 private properties
- Steep slopes require grading, bridging, and drainage
- Outside of city limits
- Requires stream crossing and Pacific Highway underpass

TUALATIN RIVER TRAIL – 108TH AVENUE TO PACIFIC HIGHWAY EXTENSION (ALIGNMENT 2A)

K

WASHINGTON SQUARE LOOP TRAIL – FANNO CREEK TO HIGHWAY 217 SIDEWALK AND BIKEWAY IMPROVEMENTS (ALIGNMENT 1B)

L

Summary

This segment provides an on-street connection from Fanno Creek Trail to Highway 217. An off-street greenway alignment is not currently feasible in this area due to environmental impacts, private property impacts, and the high cost of developing a bicycle/pedestrian bridge over Highway 217 to serve an off-road alignment. This on-street alignment would make use of existing sidewalks and bike lanes on Greenburg and bicycle/pedestrian improvements implemented in conjunction with the North Dakota Street bridge reconstruction (tentatively scheduled for 2015). Improvements would include: a southbound bike lane on Greenburg, crossing improvements on Greenburg and Tiedeman Avenue, additional signage, pavement markings, and safety improvements. Bike lanes and sidewalks should be incorporated as part of the scheduled rebuild of the North Dakota bridge. If the Greenburg/Highway 217 interchange is rebuit in conjunction with the planned widening of Highway 217, further bicycle and pedestrian improvements to this segment should be considered.

Cost Opinion

Length:

- 6,057'

Low Design Option: Alignment B

- Design: pavement markings, signs, crosswalks, sidewalk and bike lanes on North Dakota Street, southbound bike lane on Greenburg Road
- Planning-level cost: $183,000

Opportunities

Connects an existing trail to an existing bicycle route

Completes a link in a planned regional trail

Constraints

Less pleasant user experience

WASHINGTON SQUARE LOOP TRAIL – FANNO CREEK TO HIGHWAY 217 SIDEWALK AND BIKEWAY IMPROVEMENTS (ALIGNMENT 1B)

L

Long-Term Recommended Project Details

FANNO CREEK TRAIL – DURHAM ROAD TO TUALATIN RIVER TRAIL (ALIGNMENT 4D)	**M**

Summary	Cost Opinion
This segment would connect high-priority expansions of the Fanno Creek Trail to the existing Tualatin River Trail. This alignment would make use of existing upland demand trails between Durham Road and existing sections of the Tualatin River Trail east of the railroad tracks. The alignment is located primarily outside of the railroad right-of-way on three parcels held in a living trust and two parcels held by the same owner. This alignment would require a stream crossing parallel to the existing railroad bridge. Construction of this alignment would require coordination with private property owners, the railroad, and the City of Durham (the alignment is outside Tigard city limits and passes through a parcel owned by the City of Durham).	Length: 2,151′ High Design Option: • Design: 12′ permeable asphalt/boardwalk, precast concrete bridge, fencing, permitting, acquisition • Planning-level cost: $1,943,000 Medium Design Option: • Design: 10′ asphalt/boardwalk, wood bridge, fencing, permitting, acquisition • Planning-level cost: $1,797,000 Low Design Option: • Design: 6′ gravel/boardwalk, wood bridge, fencing, permitting, acquisition • Planning-level cost: $1,320,000
Opportunities	**Constraints**
• Connects to the Cook Park Access Trail	• Outside of Tigard city limits • Close proximity to railroad and crosses five private properties

FANNO CREEK TRAIL – DURHAM ROAD TO TUALATIN RIVER TRAIL (ALIGNMENT 4D)

M

ASCENSION TRAIL IMPROVEMENTS (ALIGNMENT 4) — N

Summary

The Ascension Trail is a soft surface trail though a gulley, leading from SW Fern Street to SW Mistletoe Drive. The trail includes stairs, wood retaining walls, and a bridge over the creek. Several accessways provide connections to adjacent properties. Improvements would include installing "cribbed" stairs (terraced earth stairs supported by logs or other materials), retaining walls, and "armored" trail sections where rock is used to harden the trail surface. Improvements to the switchbacks from SW Lauren Lane are also included

Opportunities

- Uses existing soft surface trail
- Trail context and presence of alternate routes makes this a scenic walking route

Constraints

- Narrow trail corridor
- Significant slopes would prohibit bicycle use
- Majority of trail through 'strictly limit' habitat area

Cost Opinion

High Design Option: Alignment

- Length: 3,718
- Design: 6' gravel trail, wood bridge, cribbed stairs, retaining wall, armored trail, improvements to Lauren Lane switchbacks
- Planning-level cost: $590,000

Medium Design Option: Alignment

- Length: 3,145'
- Design: 6' bark mulch trail, wood bridge, cribbed stairs, retaining wall, armored trail, improvements to Lauren Lane switchbacks
- Planning-level cost: $485,000

Low Design Option: Alignment

- Length: 3,145'
- 4' native surface trail, wood bridge, cribbed stairs, retaining wall, armored trail
- Planning-level cost: $332,000

ASCENSION TRAIL IMPROVEMENTS (ALIGNMENT 4) | N

WASHINGTON SQUARE LOOP – HIGHWAY 217 TO HALL BOULEVARD SIDEWALK AND BIKEWAY IMPROVEMENTS (ALIGNMENT 2B)

O

Summary

This segment would provide a bicycle/pedestrian friendly on-street connection between Highway 217 and Hall Boulevard. This project would continue previous on-street improvements on North Dakota Street and Greenburg Street from the Fanno Creek Trail to Highway 217.

Cost Opinion

Length: 2,946' (1,520' of sidewalk missing on the north side of Oak and 2,150' between 95th and Hall on the south side of Oak).

Low Design Option: Alignment B

- Design: shared lane markings, signs, sidewalk
- Planning-level cost: $666,000

Opportunities

- Provides a direct connection to Washington Square
- Connects to an existing bicycle route
- Completes a link in a planned regional trail

Constraints

- Less pleasant user experience

KRUEGER CREEK TRAIL – SUMMERLAKE PARK TRAILS TO KATHERINE STREET

P

Summary	Cost Opinion
This segment would improve safe routes to school by providing a connection between the existing paved trails in Summerlake Park and Mary Woodward Elementary School. The alignment would skirt the edge of the school property, connecting to an existing concrete sidewalk on the west side of the school property. An existing paved trail connects to the school fence and is subject to a public pedestrian and bicyclist easement. With the school's approval, the fence could be removed, opening a connection to Winterlake Drive.	Length: 1,063 Medium Design Option: • Design: 10' asphalt/boardwalk • Planning-level cost: $518,000 Low Design Option: • Design: 6' gravel/boardwalk • Planning-level cost: $473,000
Opportunities	**Constraints**
• Provides a safe routes to school connection between two parks	• Requires coordination with school • Partially through wetland

Other Project Details

Several projects were identified and/or evaluated during the development of the Tigard Greenway Trails System Master Plan that were not identified as current high, medium, or low priority projects due to existing constraints or because they fell outside the scope of the current planning effort. Although these projects have not currently been assigned a priority in this Plan, they should not be removed from consideration in future planning efforts.

- **Fanno Creek Trail – Library to Fanno Creek Drive Improvements**: The segment of the Fanno Creek Trail south of the library is characterized by many sharp twists and 90-degree turns. This project considers straightening several curves, grading and repaving the connection between Char Court and Fanno Creek Drive, and removing encroachments (e.g. fences, blackberries) on the existing trail. The final alignment and improvements will depend upon the results of the planning process for recommended project "G", detailed above. (Planning level cost: $485,000-$733,000)
- **Fanno Creek Trail – Scholls Ferry Road Underpass Improvements:** The Fanno Creek Trail undercrossing of Scholls Ferry Road experiences seasonal flooding which leaves the crossing temporarily unusable due to standing water and residual mud. Pavement on this section of the trail is also degraded. Improving this crossing is a priority, however, Washington County - not the city of Tigard - is responsible for maintenance of this segment of the Fanno Creek Trail. In addition, environmental conditions and regulations preclude a short-term, low cost "fix" to the flooding problem. The City of Tigard will continue to work with Washington County to identify potential improvements such as raising the trail or installing a wall along the creek. (Planning level cost: TBD)
- **Krueger Creek Trail – Summer Creek to Jack Park:** This greenway trail connection from the existing Summer Lake Park trails to Jack Park was identified as a potential trail in the 1999 Tigard Park System Plan. Although this alignment is not currently identified as a priority project due to environmental and property constraints, it should not be removed from consideration in future planning efforts, should conditions change or opportunities for trail development arise. (Planning level cost: $1.4 million)
- **Summer Creek Trail – Summer Lake Park to Gallo Avenue:** This greenway trail connection from the existing Summer Lake Park trails to the existing Gallo Avenue neighborhood trail was identified as a potential trail in the 1999 Tigard Park System Plan. Although this alignment is not currently identified as a priority project due to

environmental and property constraints and neighborhood resistance, it should not be removed from consideration in future planning efforts, should conditions change or opportunities for trail development arise. (Planning level cost: $4.5-$5.5 million)

- **Washington Square Loop Trail – Fanno Creek to 61st Avenue:** This greenway trail connection from the existing Fanno Creek Trail is identified as a potential regional trail in the 1999 Tigard Park System Plan and Metro Regional Trails Map. Although this alignment is not currently identified as a priority project due to the high cost of a bicycle/pedestrian bridge over Highway 217, environmental concerns, and property constraints, it should not be removed from consideration in future planning efforts, should conditions change or opportunities for trail development arise. (Planning level cost: $11 million - $16 million)
- **Fanno Creek Trail – Bonita Road to Durham Road Greenway:** This greenway connection from Bonita Road to Durham Road was identified as a potential alignment to fill a gap in the existing Fanno Creek trail in the 1999 Tigard Park System Plan and the Fanno Creek Trail Action Plan. The 74th Avenue sidepath has been identified as a short-term, high-priority alternative for this segment due to current environmental and property constraints associated with the greenway alignment, However, the greenway alignment should not be removed from consideration in future planning efforts, should conditions change or opportunities for trail development arise. (Planning level cost: $9.4 million - $4.6 million)
- **Race Walk Track:** The feasibility of a loop trail that could also serve as a competitive race walking track was considered during development of this Plan. Race walk tracks require a complete loop that is open and visible to an official standing in the middle of the course. No areas were identified that would be suitable for this type of facility and also serve an active transportation function. The Fanno and Tigard Street trails could be developed to form a loop, but development and vegetation would limit its visibility from a single point in the center.

8. IMPLEMENTATION PLAN

This chapter outlines measures to assist the City of Tigard in implementation of the recommended Tigard Greenway Trails Master Plan project list. The text has three parts:

- **Recommended Regulatory Amendments** outlining recommended amendments to existing regulations and policies that support the development of greenway trail projects in Tigard.
- A **Financial Strategy** identifying existing and available funding sources that represent funding opportunities for trail projects.
- An **Action Plan** for constructing the proposed trails, strategically implementing prioritized projects, acquiring right-of-way, and creating a long-term strategy for developing the recommended trail projects, as well as other future trail projects.

Regulatory Amendments

This section recommends specific policy and regulatory changes to the Tigard Comprehensive Plan, Transportation System Plan (TSP), Community Development Code, and public improvement design standards necessary to prioritize, program, fund, and construct projects on the recommended projects list in Chapter 7.

Existing regulatory language relevant to development of greenway trails in the City of Tigard was provided in Chapter 3. This chapter discusses recommended changes to the policies, which are provided in bold for additions, and strike-through for deletions.

CITY OF TIGARD COMPREHENSIVE PLAN (2009)

The *Tigard 2027: Comprehensive Plan* provides the policy basis of Tigard's land use planning program and guides the City's actions relating to the use of land in the City. Originally written in 1983, the 2009 update is the first complete update of the Plan. Chapter 8 of the Plan primarily discusses greenway trails in Tigard.

Chapter 8: Parks, Recreation, Trails, and Open Spaces

The overarching goal of the Parks, Trails, and Open Spaces element of the Comprehensive Plan (Goal 8) is, "to satisfy the recreational needs of the citizens of the state and visitors and, where appropriate, to provide for the siting of recreational facilities, including destination resorts." Greenway trails

provide recreational opportunities, as well as enabling non-motorized access to recreational opportunities, and are promoted through this Goal.

Goal 8.1 is to "provide a wide variety of high quality park and open spaces for all residents, including both (A) developed areas with facilities for active recreation; and (B) undeveloped areas for nature-oriented recreation and the protection and enhancement of valuable natural resources within the parks and open space system." Specific policies and actions relating to the proposed greenway trail system include:

- Policy 7: "The City shall ensure public safety is a consideration in the planning, design, and management of parks, open spaces, and trails."
- Policy 16: "The City shall continue to encourage and recognize the important role of volunteers and community groups in meeting City park, trail, open space, and recreation needs, and in building stewardship and promoting community pride."
- Policy 20: "The City shall continue to improve access to neighborhood parks and other facilities in order to serve all citizens, regardless of ability."
    - Action v. "Coordinate with and support Metro, Oregon State Parks, the National Park Service, and other agencies that provide parks, open spaces, *trails,* and recreational activities in or near Tigard."
    - Action xi. "Utilize alternative methods to acquire and develop open space, parks, and trails, including local improvement districts, purchase of easements and development rights, life estates, etc."
    - Action xii. "Work to increase grants and donations from new sources for operating and capital funding."
    - Action xix. "Make parks, trails, and open spaces universally accessible by as many people as possible **by adhering to the United States Access Board accessibility guidance and standards, AASHTO design guidance, and Metro trail standards, where possible.**"
    - Action xxi. "Continue to seek the assistance of volunteer groups to help in developing and maintaining parks, trails, and open spaces."

Another key goal for the development of greenway trails is Goal 8.2: "Create a Citywide network of interconnected on- and off-road pedestrian and bicycle trails." This goal addresses how the City should develop and maintain a complete trail system. Policies related to this goal that impact planning and development of greenway trails include:

- Policy 1: "The City shall create an interconnected regional and local system of on and off-road trails and paths that link together neighborhoods, parks, open spaces, major urban activity centers, and regional recreational opportunities utilizing both public property and easements on private property."
- Policy 2: "The City shall design and build greenway trails and paths to minimize their impact on the environment, including on wildlife corridors and on rare, and state or federally listed species."
  - Action i. "~~Complete a~~ **Update the** trail system master plan **every five years** to guide the development of the trail system and facilitate progress toward its completion."
  - Action ii. "Complete a Citywide inventory and prioritization of opportunities for short pathway connections that increase bicycle and pedestrian connectivity and complement the greenway and on street bicycle/pedestrian systems."
  - Action iii. "Develop trail standards for the many trail systems, sizes, and materials needed in different settings **as well as guidelines for trail/roadway crossing treatments.**"
  - Action v. "Coordinate trail development and maintenance activities with natural resource management objectives and activities."
  - Action vi. "Where appropriate, furnish trails with amenities, such as ~~interpretive and directional signage,~~ benches, drinking fountains, parking and staging areas, and other services."
  - Action vii. "Use automated systems to systematically map and document trail easements, right-of-way dedications, proposed alignments, and current trail locations."

- **Action viii. Provide distinctive wayfinding, street signs, and mileage markers along the trail system to increase the visibility, ease of navigation, and user-friendliness of Tigard's bicycle and pedestrian trail system.**

- **Action ix. Provide interpretive signage along greenway trails for its educational value and as a means of keeping trail users on the trail to reduce encroachment into greenway natural areas.**

The recommended amendment to Goal 8.2 clarifies that signs are not 'amenities' that enhance the trail experience, but are important elements of trail design for user comfort and safety.

CITY OF TIGARD TRANSPORTATION SYSTEM PLAN (2010)

The *2035 Tigard Transportation System Plan* (TSP) was adopted in late 2011. Goal 1 – Land Use and Transportation Coordination aims to, "Develop mutually supportive land use and transportation plans to enhance the livability of the community." A relevant policy reads,

- Policy 9. "The City shall coordinate with private and public developers to provide access **for all transportation modes** via a safe, efficient, and balanced transportation system."

Goal 3 focuses on the multi-modal transportation system. Relevant policies include:

- Policy 7. "The City shall require and/or facilitate the construction of off-street trails to develop pedestrian and bicycle connections that cannot be provided by a street."
- Policy 8. "The City shall r~~equire appropriate access to bicycle and pedestrian facilities for all~~ **provide bicycle and pedestrian routes to school and other destinations by requiring appropriate bicycle and pedestrian facilities such as sidewalks, trails, and on-street bicycle routes to** schools, parks, public facilities, and commercial areas."

Finally, Goal 4 addresses the desire for a safe transportation system:

- Policy 3. "The City shall coordinate with the appropriate agencies to provide safe, secure, connected, and desirable pedestrian, bicycle, and public transit facilities."

TIGARD COMMUNITY DEVELOPMENT CODE

Elements of Tigard's Community Development Code that are pertinent to the development and use of greenway trails include requirements for bicycle parking and conditions of development approval.

Bicycle Parking

Tigard's Community Development Code addresses bicycle parking standards in Section 18.765.50. Elements relating to potential for providing bicycle parking along a greenway trail corridor include:

- B. 1. "When possible, bicycle parking facilities should be provided under cover."
- D. "Outdoor bicycle parking facilities shall be surfaced with a hard surfaced material, i.e., pavers, asphalt, concrete, other pervious paving surfaces, or similar material. This surface must be designed and maintained to remain well-drained."

In addition, design requirements support the use of user-friendly and secure bicycle parking. Table 18.765.2 specifies quantities of bicycle parking required based on land uses. Community recreation uses require three bicycle parking spaces per 1,000 square feet, with a minimum of two spaces. The existing language supports providing bicycle parking at parks and trailheads.

Conditions of Development Approval

The Land Partitions Approval process requires consideration of dedicating land for greenways adjoining and within the floodplain where landfill and/or development is allowed within or adjacent to the one-hundred-year floodplain. The requirement specifies that, "the area shall include portions at a suitable elevation for the construction of a pedestrian/bicycle pathway within the floodplain in accordance with the adopted pedestrian/bicycle pathway plan."

Similarly, the Bikeways and Pedestrian Pathways section of the Street and Utility Improvement Standards (Section 18.810.110) requires that, "developments adjoining proposed bikeways identified on the City's adopted pedestrian/bikeway plan shall include provisions for the future extension of such bikeways through the dedication of easements or rights-of-way, provided such dedication is directly related to and roughly proportional to the impact of the development." This section also specifies that the minimum width of an off-road multi-use path should be ten feet. Eight feet is acceptable, given environmental or other constraints. For a natural neighborhood trail, the minimum width is five feet. These widths are sufficient, although the City should consider providing additional guidance for where a width greater than ten feet is desired, as proposed in the Public Improvement Design Standards section following (see Table 14).

PUBLIC IMPROVEMENT DESIGN STANDARDS

The Tigard *Public Improvement Design Standards* (1998) specify that bikeways should meet the requirements of the American Association of State Highway and Transportation Officials (AASHTO) *Guide for the Development of Bicycle Facilities* (1999; update pending). Additional guidance from the Public Design Standards is provided as follows:

"Bikeways not within a street shall be constructed upon compacted subgrade that has been sterilized. If it is an asphaltic concrete bikeway, it should be constructed to one of the following pavement section designs:

- 4 inches of asphalt concrete (full depth);
- 2-1/2 inches of asphalt concrete with 4 inches of ¾"- 0" rock base; or
- 4 inches of Portland cement concrete.

Design standards regarding horizontal alignment, grade, sight distance, intersections, signing, marking, structures, drainage and lighting shall conform to the AASHTO standards. When bikeways are integrated with a curb all inlet grates shall be designed to protect the bicyclist from the grate or opening."

The current AASHTO guidelines provide general guidance for minimum design of shared use paths or trails. However, the guidelines do not recommend specific widths and surface types above the minimums, based on anticipated uses. Tigard would benefit from guidelines that specify recommended design characteristics and amenities for different types of trails.

Table 1 provides a quick reference chart for the hierarchical trail typology and the guidelines developed for the Tigard Greenway Trails Master Plan in collaboration with City of Tigard staff, Metro, and the Stakeholder Advisory Committee (SAC). Recommended text to accompany the table is provided below.

The Tigard Greenways trail classification system defines regional, community, and neighborhood trails based on expected use and user types. This hierarchy can be used to generally determine appropriate surface and design features. In some cases, trails will not conform to specific design types (e.g., a regional trail through a physically constrained area may be narrower than recommended for a short distance), but these guidelines represent design of typical trails.

Table 14 provides an overview of typical design for trails by classification. Specific design and type of elements depends on the local context of the trail and City staff judgment; the recommendations in the table outline typical design elements.

Table 14 Trail Design Types and Recommended Guidelines

	Regional Trail	Community Trail	Neighborhood Trail	
			Urban Trail	Natural Trail
Facility Type	Shared-use path	Shared-use path	Shared-use path/sidewalk	Soft surface trail
Users	bicyclists pedestrians wheelchairs baby strollers skaters	bicyclists pedestrians wheelchairs baby strollers skaters26	bicyclists pedestrians wheelchairs*27 baby strollers skaters*	bicyclists pedestrians
Width	Approx. 10-14 ft 2 ft gravel shoulders Or 10' bike path with 4' soft-surface pedestrian path	Approx 8-10 ft 1–2 ft gravel shoulders	3-8 ft 1–2 ft gravel shoulders (optional)	3–8 ft 1–2 ft gravel shoulders (optional)
Surface	Paved or other smooth-rolling surface to accommodate all trail users	Paved or other smooth-rolling surface to accommodate all trail users	Paved or other smooth-rolling surface to accommodate all trail users	Earth, gravel, wood chips, or other soft surface material

Financial Strategy

Fully implementing the recommended greenway trail projects will require a well-planned funding strategy. This section identifies existing, potential, and anticipated sources of funding to guide project programming.

A variety of potential funding sources are available to help pay for future trails, including Federal, State, regional, local, and private sector programs. Most of these programs are competitive and involve the completion of extensive applications with clear documentation of project need, costs, and benefits. Several of these sources are currently being utilized in Tigard, while others present new opportunities for the City to fund greenway trail projects.

EXISTING FUNDING SOURCES

The City of Tigard has historically pursued a variety of strategies to implement greenway trails. In particular, a Parks Bond - approved by voters in 2010 (Measure 34-181) - is a general obligation bond of $17 million to acquire, preserve and protect open spaces, water quality, habitat, and parkland,. Eighty percent of these funds are reserved for land acquisitions, such as the City's

[26] Depends upon chosen trail surface – inline skates and skateboards will not roll well on surfaces other than asphalt or concrete.

[27] Paved park trails may still be too steep to safely accommodate wheelchair and other disabled users.

acquisition of the "Fowler property" near Fowler Middle School. The fund dedicates most of the remaining 20 percent for improvements and development on parkland, including trail development.

In addition, in the FY 2010-2015 Capital Improvement Plan (CIP), $25,000 of Park System Development Charges was allocated to the development of the Fanno Creek Trail from Main Street to Grant Street. The CIP also allocated $141,000 annually for "citywide sidewalk and pedestrian improvements," which includes short trail connections to fill existing gaps in the pedestrian system.

POTENTIAL AND ANTICIPATED FUNDING SOURCES

Federal Funding Sources

Federal funding is primarily distributed through a number of programs established by Congress. The latest surface transportation authorization, the Safe, Accountable, Flexible, Efficient Transportation Equity Act – a Legacy for Users (SAFETEA-LU), was enacted in August 2005 as Public Law 109-59.

SAFETEA-LU authorized the federal surface transportation programs for highways, highway safety, and transit for the 5-year period 2005-2009. SAFETEA-LU legislation expired on September 30, 2009, but at the time of writing had been extended for a fifth time to September 30, 2011. It is expected that Congress will adopt a new multiyear surface transportation authorization bill by this date. Therefore, the continued availability of any listed SAFETEA-LU programs is not guaranteed, nor is it possible to predict their future funding levels or policy guidance. There is a high probability that earmark-based funding programs will not be included in the next reauthorization. Nevertheless, many of these programs have been authorized in some form in repeated federal transportation reauthorization acts, and thus may continue to provide capital for improvements.

In Oregon, federal monies are administered through the Oregon Department of Transportation (ODOT) and regional planning agencies. Most, but not all, of these programs are oriented toward transportation versus recreation, with an emphasis on reducing auto trips and providing inter-modal connections. Federal funding is intended for capital improvements and safety and education programs, and projects must relate to the surface transportation system.

There are a number of programs identified within SAFETEA-LU that are applicable to bicycle and pedestrian projects. These programs are discussed below.

- More information: http://www.fhwa.dot.gov/safetealu/index.htm

Transportation Enhancements

A federal program administered by the Oregon Departments of Transportation, the Transportation Enhancements (TE) program is funded by a set-aside of Surface Transportation Program (STP) monies. Ten percent of STP funds are designated for TE activities, which include the "provision of facilities for pedestrians and bicycles, provision of safety and educational activities for pedestrians and bicyclists," and the "preservation of abandoned railway corridors (including the conversion and use thereof for pedestrian and bicycle trails)" *23 USC Section 190 (a)(35).* Other TE categories are Historic Preservation; Landscaping and Scenic Beautification; and Environmental Mitigation. Projects must serve a transportation need. TE grants can be used to build a variety of pedestrian, bicycle, streetscape, and other improvements that enhance the cultural, aesthetic, or environmental value of transportation systems. The statewide grant process is competitive.

- More information: http://www.oregon.gov/ODOT/HWY/LGS/enhancement.shtml

Recreational Trails Program

The Recreational Trails Program (RTP) of the federal transportation bill provides funding to states to develop and maintain recreational trails and trail-related facilities for both nonmotorized and motorized recreational trail uses. Examples of trail uses include hiking, bicycling, in-line skating, and equestrian use. These monies are available for both paved and unpaved trails, but may not be used to improve roads for general passenger vehicle use or to provide shoulders or sidewalks along roads.

Recreational Trails Program funds may be used for:

- Maintenance and restoration of existing trails
- Purchase and lease of trail construction and maintenance equipment
- Construction of new trails, including unpaved trails
- Acquisition or easements of property for trails
- State administrative costs related to this program (limited to seven percent of a state's RTP dollars)
- Operation of educational programs to promote safety and environmental protection related to trails (limited to five percent of a state's RTP dollars)

In Oregon, Oregon Parks and Recreation Department (OPRD) administers the Recreational Trails Program as a grant program. This grant is specifically designed to pay for recreational trail projects rather than transportation-specific projects.

- More information: http://www.oregon.gov/OPRD/GRANTS/trails.shtml

Transportation, Community, and System Preservation Program

The Transportation, Community, and System Preservation (TCSP) Program provides federal funding for transit-oriented development, traffic calming, and other projects that improve the efficiency of the transportation system, reduce environmental impacts, and provide efficient access to jobs, services, and trade centers. The program is intended to provide communities with the resources to explore the integration of their transportation system with community preservation and environmental activities. The TCSP Program funds require a 20 percent match.

Because TCSP program is one of many programs authorized under SAFETEA-LU, current funding has only been extended through September 30, 2011, and program officials are not currently accepting applications for 2011. In most years, Congress has identified projects to be selected for funding through the TCSP program. Relatively few Oregon communities have received monies from this program since 1999, and a majority of projects are highway-related efforts.

- More information: http://www.fhwa.dot.gov/tcsp/

Land and Water Conservation Fund

The Land and Water Conservation Fund (LWCF) provides grants for planning and acquiring outdoor recreation areas and facilities, including trails. Funds can be used for right-of-way acquisition and construction. The program is administered by the Oregon Parks and Recreation Department as a grant program.

Any Tigard Greenway Trails Master Plan projects located in future parks could benefit from planning and land acquisition funding through the LWCF. Trail corridor acquisition can be funded with LWCF grants as well, but historically few trails have been proposed compared to parks.

- More info: http://www.oregon.gov/OPRD/GRANTS/lwcf.shtml

State Funding Sources

Bicycle and Pedestrian Program Grants

The Pedestrian and Bicycle Grant Program is a competitive grant program providing approximately $5 million every two years to Oregon cities, counties and ODOT regional and district offices for design and construction of pedestrian and bicycle facilities. Proposed facilities must be within public rights-of-way. Grants applications are reviewed and prioritized by the Oregon Bicycle and Pedestrian Advisory Committee.

Tigard has received $389,366 for four projects, the most recent of which was in 2009.

- More information: http://www.oregon.gov/ODOT/HWY/BIKEPED/grants1.shtml

Oregon Parks and Recreation Local Government Grants

The Oregon Parks and Recreation Department (OPRD) administers a Local Government Grants program using Oregon Lottery revenues. The grants may pay for acquisition, development, and major rehabilitation projects for public outdoor park and recreation areas and facilities. The amount of money available for grants varies depending on the approved OPRD budget. Grants are available for three categories of projects: small projects (maximum $50,000 request), large projects (maximum $750,000 request, or $1,000,000 for land acquisition), and small community planning projects (maximum $25,000 request).

- More information: http://www.oregon.gov/OPRD/GRANTS/local.shtml

Statewide Transportation Improvement Program

The Statewide Transportation Improvement Program (STIP) is ODOT's short-term capital improvement program, providing project funding and scheduling information for the department and Metro. STIP project lists are updated every two years, with four-year project lists. The current cycle covers projects from 2010-2013, and the 2012-2015 STIP is under development. Project lists are developed through the coordinated efforts of ODOT, federal and local governments, Area Commissions on Transportation, tribal governments, and the public.

In developing this program, ODOT must verify that the identified projects comply with the Oregon Transportation Plan, ODOT Modal Plans, Corridor Plans, local comprehensive plans, and SAFETEA-LU planning requirements. Projects are not required to be located on the state highway system to be eligible for this fund. Stand-alone bicycle/pedestrian projects are an eligible funding category, and multi-modal roadway projects that contain a planned pedestrian or bicycle improvement can also be funded. Oregon STIP funds currently have paid for or will pay for numerous stand-alone bicycle/pedestrian projects and programs, including infrastructure improvements, preliminary engineering, construction, and rehabilitation of numerous trail segments and transportation demand management programs.

- More information: http://www.oregon.gov/ODOT/HWY/STIP/

Urban Trails Fund

The Urban Trails Fund (UTF) was created in 2009 by the Oregon Legislature, as part of HB 2001 (the Jobs and Transportation Act). The purpose of the Urban Trails Fund was to develop shared-use paths

for non-motorized vehicles and pedestrians, within urban growth boundaries, to provide or improve links to roads and highways, footpaths, bike trails, and public transit. The UTF was specifically created in response to a gap in the current funding stream for projects outside of the public right-of-way that provide non-motorized transportation links.

The Urban Trails Fund was initially created by a one-time appropriation of $1.0 million, and was managed as a competitive grant program by ODOT. The Oregon Bicycle and Pedestrian Advisory Committee was the public advisory committee overseeing the Urban Trails Fund. The intention of the first round of funding was to demonstrate the value of the program with the hope that the Oregon Legislature will authorize additional program dollars in the future.

- More information: None available online; ODOT contact is Pat Rogers Fisher (patricia.r.fisher@odot.state.or.us)

Oregon Revised Statute 366.514

Often referred to as the "Oregon Bicycle Bill," this law applies equally to bicycle and pedestrian facilities. The statute's intent is to ensure that future roads be built to accommodate bicycle and pedestrian travel. The statute requires the provision of bicycle and pedestrian facilities on all Major Arterial and Collector roadway construction, reconstruction, or relocation projects where conditions permit. The statute also requires that in any fiscal year, at least one percent of highway funds allocated to a jurisdiction must be used for bicycle/pedestrian projects. This amount could increase to 1.5 percent or higher in the future and could, therefore, present a greater opportunity for funding bicycle and pedestrian facilities.

- More information: http://www.oregon.gov/ODOT/HWY/BIKEPED/bike_bill.shtml

Metro Transportation Improvement Program Funding (MTIP)

The MTIP comprises federal transportation funds coordinated by Metro. Funds can be used for Preliminary Engineering, ROW acquisition, and construction. The MTIP Program document includes projects selected by Metro to receive regional flexible funds. It is updated every two years and incorporated into the State TIP. The top funding priority of the most recent (2010-13) MTIP is to "complete gaps in roads, trails, streets or transit routes to improve circulation within regional centers and town centers." Another key priority is to "complete gaps in transit service, automobile, pedestrians, and bike routes between employers and potential employees, and between businesses and potential customers."

Regional flexible funds come from the Surface Transportation Program (STP) and the Congestion Mitigation/Air Quality (CMAQ) Program. The Joint Policy Advisory Committee on Transportation

(JPACT) selects transportation programs and projects to be funded. JPACT has $24 million to allocate, and will be developing a project list in spring 2011.

- More information: http://www.metro-region.org/index.cfm/go/by.web/id=19681

Regional Funding Sources

Natural Areas Bond Measure

Approved by voters in 2006, the Natural Areas Bond Measure provides $227.4 million regionally for protection of natural areas and lands near rivers and streams. The bond measure has three distinct funding programs: Regional Share, Local Share, and Capital Grants.

Twenty-seven regional target areas are identified for regional natural area bond funding. Metro Council approved acquisition plans for these projects in 2007. The Fanno Creek Linkages and Trail are an identified priority, with the project's goal of completing "a continuous greenway trail from the Tualatin River into a highly urbanized,'walker-challenged' area of Portland, and further protect water quality along Fanno Creek and its tributaries." A Tier I Objective is to connect the mainstem of Fanno Creek between Cook Park and Woodard Park in Tigard. The Westside Trail is another priority that will provide a continuous trail corridor from the Tualatin River through Tigard to the Willamette River Greenway

The local share includes $44 million in bond funds for protecting water quality, improving parks and natural areas, preserving wildlife habitat, and providing greater access to nature for people all over the region. Tigard used the local funding to purchase a 1.1-acre property on Fanno Creek between Hall Boulevard and Main Street adjacent to Fanno Creek Park.

The Nature in Neighborhoods grant program has $15 million to fund "projects that preserve or enhance natural features and their ecological functions on public lands in neighborhoods, and help ensure that every community enjoys clean water and nature as an element of its character and livability." Neighborhoods, community groups, nonprofit organizations, schools, cities, counties and public park providers are eligible to apply for funding,

- More information: http://www.oregonmetro.gov/index.cfm/go/by.web/id=16894

Regional Travel Options Grants

The Regional Travel Options gratnts are available to reduce the number of people driving alone, improve air quality, and address community health issues. In the 2011-2013 funding cycle, $533,000 was available. The City of Tigard received $25,000 to develop a walking map and wayfinding system for Downtown Tigard.

- More information: http://www.oregonmetro.gov/index.cfm/go/by.web/id=21470

Non-Traditional Grant Funding Sources

Kodak American Greenways Program Grants

Administered by The Conservation Fund and the National Geographic Society, the American Greenways Program provides 'seed' funding for the planning and design of small greenways projects. In 2010, the program awarded half of the grants to greenways projects that involve natural, cultural, and/or socio-political historical themes.

Applications for funds can be made by local regional or state-wide non-profit organizations and public agencies. The maximum award is $2,500, but most range from $500 to $1,500. Kodak American Greenways Program monies may be used to fund unpaved trail development. In Oregon, the Conservation Fund assisted the Oregon Board and Department of Forestry's acquisition of 25,000 acres adjacent to Gilchist State Forest. The fund assisted with development of a rail-to-trail along the historic Mission Zanja irrigation canal in Los Angeles, California.

- More information: http://www.conservationfund.org/kodak_awards

Bikes Belong Grant Program

The Bikes Belong Coalition of bicycle suppliers and retailers has awarded $1.7 million and leveraged an additional $650 million since its inception in 1999. The program funds corridor improvements, mountain bike trails, BMX parks, trails, and park access. It is funded by the Bikes Belong Employee Pro Purchase Program.

In Oregon, the Bikes Belong Grant Program provided $7,500 to the City of Gresham for the Gresham-Fairview Trail in 2006, and $10,000 to the Bicycle Transportation Alliance of Portland for the Springwater Connector Trail in 2011.

- More information: http://www.bikesbelong.org/grants/

Active Living by Design Grants

The Robert Wood Johnson (RWJ) Foundation established the Active Living by Design (ALbD) Grant Program in 2001. Grants are awarded to promote healthy communities and lifestyles. The grant program funded and provided technical assistance to 25 community partnerships that developed and implemented local projects to support physical activity and active living, including development of parks, trails, and other bicycle commuting opportunities. The grant provided $200,000 over five years to each site, as well as providing technical assistance. While this program has not been funded

since, it is a good example of community health partnership grants that may become available in the future.

- More information: http://activelivingbydesign.org/what-we-do/albd-grant-program

Local Funding Sources

General Obligation Bonds (Parks Bond)

Local bond measures, or levies, are usually initiated by voter-approved general obligation bonds for specific projects. Bond measures are typically limited by time, based on the debt load of the local government or the project under focus. Funding from bond measures can be used for right-of-way acquisition, engineering, design, and construction of pedestrian and bicycle facilities. While bond measures are often used by cities for local match in grant applications, Transportation-specific bond measures featuring a significant bicycle/pedestrian facility element have passed in other communities, such as Seattle's "Closing the Gap" measure.

As previously mentioned, Tigard voters approved a general obligation bond for parks acquisition and development in 2010. Twenty percent, or up to $3.4 million of the $17 million bond can be used for improvements to existing parks, including trail development. The remainder of the money is set-aside for acquisition of park land, which would aid the development of the recommended greenway trails projects.

- More information: http://www.tigard-or.gov/community/parks/parks_bond_faq.asp

Private Sector Funding Opportunities

Residents and other community members are excellent resources for garnering support and enthusiasm for bicycle and pedestrian facility improvements. The City of Tigard should work with volunteers to substantially reduce implementation and maintenance costs. Local schools, community groups, or a dedicated neighbors group may help sponsor projects, possibly by working with a local designer or engineer. Work parties can be formed to help clear right-of-way where needed. Local construction companies can donate or discount services. The City should look to its residents for additional funding ideas to expedite the completion of the bicycle and pedestrian system.

Volunteer Services

Local businesses can help defray some of the costs associated with trail and greenway development. Some examples include:

- Donations of services, equipment, and labor
- Contribution of employee volunteer time

- Cash donations
- Discounted materials
- Adopt- a- trail (for on-going maintenance assistance)

Neighborhood and other community groups including Eagle Scouts for a community-service project can develop some of the natural surface trails, particularly those that are on City-owned land. A City coordinator currently manages a volunteer planting program along streams, which could assist with natural surface trail landscaping.The City could develop a booklet of trails that would be appropriate for volunteer efforts.

A good local example of this type of volunteerism is the SW Trails Group, a neighborhood group that has built several neighborhood trails in SW Portland.[29] Volunteer work parties have built stairs, wooden bridges, and have organized an experiment to gravel a trail – by providing a pile of gravel at the trailhead and asking walkers to fill a bucket and help spread the gravel on the trail. The group also has assisted the City in the development of a trail map and lead regular group walks around the neighborhood.

Foundations

Some trail elements, particularly if they are related to educational, civic, or environmental goals or projects, can be funded through private foundations. Funding opportunities through local foundations have a higher probability of success and should be approached before pursuing national foundation funds. Some local foundations include the Ford Family Foundation and the Meyer Memorial Trust.

Land Trusts

Land Trusts are local, regional, or statewide nonprofit conservation organizations directly involved in helping protect natural, scenic, recreational, agricultural, historic, or cultural property. Land trusts work to preserve open land that is important to the communities and regions where they operate.

The Trust for Public Land (TPL) has assisted the City of Tigard with natural area acquisitions in the past and will continue to be a good resource for land acquisition.

[29] http://explorepdx.com/swtrails.html

Service Clubs

Community organizations have been very successful holding fundraisers and providing volunteer labor for trail building and maintenance activities. Local examples include 4-H, Boy Scouts of America, Rotary Club, Portland Community College service clubs, and others.

Individual Sponsors

Individuals, businesses, or corporations can contribute donations to sponsor sections of trail or project elements. The City of Tigard has previously obtained grants and donations from private parties to assist in developing other types of park and recreation facilities. Plaques or other forms of recognition are typically placed on constructed pieces in the trail corridor or at a prominent entry point. Sponsorship is a good way to fund trail elements such as benches, trash receptacles, and interpretive areas.

Sections of trail can also be sponsored through a "Buy a Foot" program. Community members can purchase a section of trail at a fixed cost per linear foot and have their names (or dedication) inscribed along the facility (e.g. in concrete or on a boardwalk).

Action Plan

The action plan recommends a strategy for the City of Tigard to select, design, and construct priority greenway trail projects and to periodically update the Tigard Greenway Trails Master Plan project list. The action plan considers interim actions and improvements that are needed to coordinate the completion of the greenway trail system.

The Action Plan has two parts:

- **Land Acquisition** provides a summary of how the City can expand the greenway trail system by taking advantage of opportunities to acquire land for trails through acquisition, easements and right-of-way vacations.
- **Implementation Strategies** link specific funding opportunities with recommended projects to implement the recommended greenway trails and outlines a proposed implementation strategy for acquiring the resources to fund the recommended greenway trails.

LAND ACQUISITION

Future opportunities to implement greenway trails may occur as land changes ownership or as landowners become more receptive to allowing a trail through their property. Greenway trails should

be developed cooperatively alongside adjacent private construction and can be incorporated into adjacent roadway improvements.

The relationship of the parties in a shared-use corridor will be driven to a great extent by which entity holds the dominant property interest. The type of property control influences both the ease of implementing the project and the liability burden. There are three types of property arrangement: purchases, easements, and licenses.

Purchases

Where a property owner may have concerns about allowing an easement for a trail through a property, the City of Tigard or Metro could consider purchasing the corridor. Metro has acquired several parcels along proposed greenway trail alignments, and Metro and the City of Tigard are currently in negotiations about the use of Metro-acquired trail easements. Local management and use of land purchased outright by Metro is subject to Metro Council approval of a Management Plan prepared by the local jurisdiction. To date, the City has prepared Metro-approved Management Plans for two Metro-acquired sites. Future easements should be established through an Intergovernmental Agreement (IGA) that determines whether Metro will give the parcels to Tigard, or whether Tigard will maintain and manage the trails on Metro land.

Public ownership of the trail corridor internalizes liability and coordination efforts. The City is treated differently from other property owners due to its unique status as a sovereign entity. This option transfers basic liability to the City of Tigard and would give the City the authority to locate a trail in the corridor.

Property acquisition procedures in Tigard are laid out in great detail in the *Property Acquisition Procedures* workbook (updated 2007) developed by the Tigard attorney's office based on state and federal property laws. Some of the sections most pertinent to trails include the following:

- "The City has the power to acquire property, both within and outside its corporate limits, for a wide variety of purposes. Cities may acquire a variety of property interests, including fee title, easements, and leasehold interests. Fee title or easements may be acquired through dedication, negotiated purchase, or condemnation. Leasehold interest will be acquired either through a direct lease of property from the owner, or by a sublease or "assignment" of these rights of a current tenant. With rare exception, subleases or assignments of lease rights require the consent of the owner of the property in question…"

- "Regardless of the form of interest to be acquired, or the technique used for acquisition, certain investigations must be undertaken before acquisition of any real property interest. These investigations are commonly lumped together under the term "due diligence". An early and thorough due diligence study of the desired property is essential for protection of the City and the public. . . ."
- "As soon as a property has been identified for acquisition, and even before the owner is contacted, investigation into suitability of the property for its intended purpose can begin. The first step in this process is to determine the form of property interest the City needs. For some acquisitions (trails, [et al]), easement interests may suffice. . . . "
- "For properties less than $20,000 in value, an administrative determination of market value, based on review of the value of other properties in the area, may be used instead of a formal appraisal. Such a determination is more appropriately used where the property to be acquired consists of narrow right-of-way strips, . . . In such cases the cost of a formal appraisal is probably not justified. . . . "
- "The City's approved form of purchase and sale agreement contains a period of time . . . during which the City can conduct any and all tests, studies and investigations of the property it deems appropriate. . . . "
- "In this era of heightened awareness of possible environmental problems, and in light of the comprehensive federal and state statutory scheme imposing liability on owners of property for environmental hazards, the City Attorney strongly recommends an environmental site assessment by performed with regard to every property the City intends to acquire. . . ."

Acquiring land for greenway trails is expensive and the timing can be difficult for the City to acquire land while houses are for sale. The Parks Bond and resources from Metro aid the City in purchasing land for a greenway trail.

Easements

Full public ownership of a parcel is not always necessary for trail development and is not an option in many cases. Typically, easements are acquired when the landowner is willing to forego use of the property and development rights for an extended period. The landowner retains the title to the land while relinquishing most of the day-to-day management of the property. The easement is attached to the property title, so the easement survives property transfer. A model easement agreement should:

- Guarantee exclusive use or uses compatible

- Be granted in perpetuity
- Include air rights if there is any possible need for a structure
- Broadly define purpose of the easement and identify all conceivable activities, uses, invitees, and vehicular types allowed to avoid any need to renegotiate with fee interest owner in future
- State that all structures and fixtures installed as part of a trail are property of grantee
- Include subsurface rights for use by utility franchises

Major landowners will likely desire an easement agreement to address potential issues. Through cooperative negotiation, the following issues should be addressed in an easement agreement:

- Access needs related to maintenance, etc.
- Trail management plan
- Future improvements or modifications to the trail

Trail Use of Utility Easements

Trail access can be negotiated as part of any sewer, storm-drain, and water line easements the City negotiates. Other utilities, such as gas or electricity, normally are extended within public rights-of-way or blanket utility easements, as opposed to stand alone easements. Every time the City initiates a sewer capital project, it could seek authority for a trail.

In the case of sewer lines in new developments, this authority may not be needed, because bicycle and pedestrian connectivity to a street or greenway trail is required by code every 330 feet. The proposed new authority would not add new requirements above the existing ones.

Sewer funds cannot be used for any other use than sewer-related improvements. In the case of sewer lines in older areas, negotiation and legal fees associated with a trail provision in a sewer agreement would need to come from a source other than sewer funds. In addition, private owners may be amenable to providing a utility easement but not to providing access for a trail.

Licenses

A license is usually a fixed-term agreement that provides limited rights to the licensee for use of the property. Typically, these are employed in situations when the property cannot be sold (e.g. a publicly-owned, active electrical utility corridor), or the owner wants to retain use of and everyday control over the property. The trail management authority obtains permission to build and operate a

trail. But it will have little control over the property, and may be subject to some stringent requirements that complicate trail development and operation.

A model license agreement should:

- Provide an acceptable term length with an option to renew
- Identify all conceivable activities, uses, invitees, and vehicular types
- Provide clarity on maintenance responsibilities
- Specify limits on other uses of license property

As with easement agreements, property owners would want a license agreement to address issues of concern to them. Through cooperative negotiation, the following issues should be addressed in a license agreement:

- Access needs related to maintenance, etc.
- Trail management plan
- Future improvements or modifications to the trail

IMPLEMENTATION STRATEGIES

Chapter 7 recommends a list of priority trail projects, based on evaluation criteria and input from the City of Tigard, the Stakeholder Advisory Committee (SAC), and Tigard residents through two public open houses and a project website. This section presents the phased cost estimates and proposes an implementation strategy.

Phased Cost Estimates

Chapter 7 recommends that high-priority projects be included in the 2012-2017 Tigard Capital Improvement Plan (CIP) updates. Medium-priority projects fill gaps in the trail network or provide connections to destinations. Finally, low-priority projects are more difficult to construct due to right-of-way, slopes, environmental considerations, or community support and are recommended for construction in the long term.

Chapter 7 recommends almost 7.5 miles of greenway trails and bicycle/pedestrian improvements. The total costs for the projects will range from $10 to $18 million, while high-priority projects will cost between $3.5 and $8.2 million, as shown in Table 15 through Table 17.

Table 15 Short-Term Project Cost Estimates

ID	Trail Name	Description	Alignments[1]	Cost Opinion ($1,000)
N/A	*Fanno Creek*	*Woodard Park to Grant (currently funded)*		*$670*
N/A	*Fanno Creek*	*Grant to Main (currently funded)*		*$300*
N/A	*Westside Trail*	*Planned Beaverton to Tualatin Expansion (currently being planned as part of a separate ODOT funded project)*		*N/A*
A	Tigard Street	Fanno Creek/Tigard Street to Tigard Transit Center	1B, 2A	$498 - $770
B	Krueger Creek	Walnut Street to Jack Park	N/A	$111 - $209
C & C1	Fanno Creek	74th Avenue Sidepath, Bonita Road to Durham Road	3E	$552 - $1,528
D1 & D2	Fanno Creek & Tualatin River	85th Avenue Trail to Durham City/Ki-A-Kuts	1C	$131 - $3,088
E	Pathfinder-Genesis	Fanno Creek to Pathfinder Court Trail	1B	$715
F	Summer Creek	Summer Crest Drive and Tigard Street Sidewalk and Bikeway Improvements, Fowler Nature Education Trail	2E, 3C, 4C	$516 - $969
Total Short-Term Projects				$3,493 - $8,249

Table 16 Medium-Term Project Cost Estimates

ID	Trail Name	Description	Alignments[1]	Cost Opinion ($1,000)
G1 & G2	Fanno Creek	Tigard Public Library to Milton Court/Bonita Road	2A, 2B	$992 - $2,358
H	Fanno Creek	Tiedeman Avenue Crossing Realignment	5B	$139 - $274
I	Tigard Street	Fanno Creek/North Dakota Street to Tiedeman Street	1B	TBD[2]
J	Tualatin River	108th Avenue Grading and Existing Trail Improvements	2	$26 - $254
K	Tualatin River	108th Avenue to Pacific Highway Extension	3A	$1,746 - $2,345
L	Washington Square Loop	Fanno Creek to Highway 217 Sidewalk and Bikeway Improvements	1B	$183
Total Medium-Term Projects				$3,364 - $5,692

Table 17 Long-Term Project Cost Estimates

ID	Trail Name	Description	Alignments[1]	Cost Opinion ($1,000)
M	Fanno Creek	Durham Road to Tualatin River Trail	4D	$1,320 - $1,943
N	Ascension	Ascension Trail Improvements	4	$332 - $590
O	Washington Square Loop	Highway 217 to Hall Boulevard Sidewalk and Bikeway Improvements	2B	$666
P	Krueger Creek & Summer Creek	Summer Creek Trail to Mary Woodard School	2B	$473 - $518
Total Long-Term Projects				$2,791 - $3,717

Funding Strategy

Table 18 summarizes relevant details of funding sources that are the most likely for Tigard to use for implementing the recommended greenway trail segments.

Table 18 Recommended Funding Source Overview

Funding Source	Amount Available	Required Match	Funding/ Application Cycle	Eligible Project Types
Transportation Enhancements	$6.5 mill – competitive and $2 mill discretionary (2008-2011)	minimum 10.27%	Biennial, even years	Must serve a transportation need (i.e. travel reduction >¼ mile
Recreational Trails Program	$2.1 mill distributed to 32 projects in 2010	minimum 20%	Annual	Trails only, sidewalks only if completing a missing link
Land and Water Conservation Fund	$29.3 mil for 981 projects in OR	minimum 50%	Annual	Right-of-way acquisition and construction
Bicycle and Pedestrian Program Grants	$5 mill every two years	minimum 10% match	Biennial, even years	Within public rights-of-way only
Oregon Parks and Recreation Local Government Grants	$4 mill	minimum 50%	Annual	Park and recreation facilities; includes trails
Statewide Transportation Improvement Program	$83.2 mill (2011-2013 cycle)	None	Biennial, even years	All; must be on the STIP list
Metro Transportation Improvement Program Funding (MTIP)	$24 mill	None	Biennial, even years	All
Tigard Parks Bond Measure	$3.4 mill	N/A	N/A	Trails in existing parks
Kodak American Greenways Program Grants	$2,500 maximum	None	Annual	Greenways, paved or unpaved
Bikes Belong Grant	$10,000 maximum	minimum 50%	Three times per year	Bike paths, trails and bridges
Volunteer Services	N/A	N/A	N/A	Less expensive or unpaved projects (i.e. project cost estimate less than $5,000)

Based on this information, Table 19 links likely funding sources to the specific project recommendations. Funding availability is primarily dependent on whether the proposed alignment is on-street or if it is a trail. Additional considerations include whether the trail is located within a park and if the proposed alignment requires right-of-way acquisition.

Table 19 Recommended Funding Sources for Proposed Projects

		Funding Sources									
Project		Transportation Enhancements	Recreational Trails Program	Land and Water Conservation Fund	Bicycle/Pedestrian Program Grants	Parks $ Rec Local Gov't Grants	STIP	MTIP	Tigard Parks Bond Measure	American Greenways Grants	Bikes Belong Grant
Short-Term Projects											
A	Tigard Street Trail- Fanno Creek/Tigard Street to Tigard Transit Center (Alignments 1B and 2A)	x		x	x			x			x
B	Walnut Street to Jack Park	x	x		x	x			x		
C & C1	Fanno Creek Trail – 74th Avenue Sidepath, Bonita Road to Durham Road (Alignment 3E)	x		x	x			x			x
D1 & D2	85th Avenue Trail to Durham City/Ki-A-Kuts	x	x		x	x		x	x		x
E	Pathfinder Genesis Trail - Fanno Creek to Pathfinder Court Trail (Alignment 1B)	x			x		x	x			x
F	Summer Creek Trail – Summer Crest Drive and Tigard Street Sidewalk and Bikeway Improvements (Alignments 2E, 3C, and 4C)	x			x			x			x
Medium-Term Projects											
G1 & G2	Fanno Creek Trail – Tigard Public Library to Milton Court/Bonita Road (Alignment 2B)	x	x		x	x		x	x		x
H	Fanno Creek Trail – Tiedeman Avenue Crossing Realignment (Alignment 5B)	x	x		x	x			x		
I	Tigard Street Trail – Fanno Creek/North Dakota Street to Tiedeman Street (Alignment 1B)	x	x		x	x		x			x
J	Tualatin River Trail – 108th Avenue Grading and Existing Trail Improvements (Alignment 2A)							x	x		x
K	Tualatin River Trail – 108th Avenue to Pacific Highway Extension (Alignment 2A)	x	x		x	x		x			x
L	Washington Square Loop Trail – Fanno Creek to Highway 217 Sidewalk and Bikeway Improvements (Alignment 1B)	x			x			x			x
Long-Term Projects											
M	Fanno Creek Trail – Durham Road to Tualatin River Trail	x	x		x	x		x			x
N	Ascension Trail Improvements (Alignment 4)						x		x	x	x
O	Washington Square Loop – Highway 217 to Hall Boulevard Sidewalk and Bikeway Improvements (Alignment 2B)	x			x		x	x			x
P	Summer Creek Trail to Mary Woodard School	x	x		x	x		x			x

APPENDICES

- Public Feedback
- Greenway Trail Alignment Feasibility Assessment (Specific Issues/Tech Memos 1&2)
- Environmental Assessment
- Evaluation Matrix

APPENDIX A. PUBLIC INPUT

Tigard Greenways Trail System Master Plan

PUBLIC FEEDBACK – OPEN HOUSES #1 & #2

Date:	January 17, 2011	Project #: 10622.0
To:	Duane Roberts, Steve Martin, Seth Brumley SAC Members	
CC:	Mike Tresidder and Hannah Kapell, Alta	
From:	Brian Ray, Jamie Parks, Jessica Horning, and Erin Ferguson	
Project:	Tigard Greenway Trail System Master Plan	
Subject:	Public Feedback Received at Open Houses #1 & #2	

Date: January 12 & 13, 2011

Time: 6:30 p.m. to 8:00 p.m.

Location: Open House #1 – Tigard Public Library, Community Room

Open House #2 – Bonita Villa Apartments, Community Room

GENERAL COMMENT FORM RESPONSES:

- **Design Standards:**
  - "Curb ramps, information kiosks, and my favorite design was the decomposed granite"
  - "I like the native soil because it looks more natural."
  - "Need signs to lead people to the trails and help them find where they're going once they're on them. Need a warning sign to alert drivers to the large number of kids crossing Bonita to get to the park."
  - "I would like to see concrete or decomposed granite with a smooth surface."
  - "More lighting in the heavily treed areas."
- **Evaluation Criteria:**
  - "Safety & Security"

- "The connectivity will be my choice because I don't know how they will be able to connect everything together."
- "Will these places be lit at night? Wheelchair access?"
- "Observation of natural area for wildlife that in a narrow corridor will not be there and sensitive land will suffer."

- **Trail Locations:**
  - "I would like to see the Fanno Creek Trail expanded first, I am new to the area, but I think that all of these are wonderful ideas and would be important to the community."
  - "Fanno Creek will be my pick because it's where I live. Please do it first."
  - "We want to be able to walk to the library and Transit Center…and enjoy the walk! A safe, convenient link to the library and Transit Center (from Bonita) is most important. Also need a visible, 'concrete' safety net for pedestrians, including safe crosswalks to the Library and Bonita Park and pedestrian countdown lights. The bridges on Fanno Creek are a bit of a safety concern for unattended kids."
  - "Tualatin River Trail – great idea! Currently the walk from work (on SW Garden Pl & 99) is dangerous walking down Durham. This is a much safer route. I'm a new mom and looking to lose weight in the bad economy. This would be excellent to push a stroller."
  - "Summer Creek extension – Bad idea using option 3A. Annual flooding will continually destroy trail. Sensitive wildlife will be negatively impacted. Consider optional route using Summer Crest Dr. to Tigard Dr. to Tigard St. Need x-walk @ 121st and sidewalks on Summer Crest Dr."
  - "No trail on Summer Creek. This is a sensitive wetland that often floods. No bridges either!"
  - "There is a family of beavers that live just west of 121st in Summer Creek. Burrow is on south side of river. Boardwalk would significantly impact them if built along shore of creek in that area."
  - "Tigard Street would be good place to start just because I live around there and it would be nice to have a nice place to walk with my daughter and my husband because he need to lose weight!"
  - "Fanno Creek connecting Scholls Ferry to Hall Blvd and then Hall Blvd to Allen Blvd."
- **How would you prioritize trail investments in Tigard? Mark each trail with 1 for highest priority and 7 is lowest priority:**
  - Fanno Creek Trail
    - Average priority= 2 (Individual rankings: 3, 1, 1, 1, 4, 1)
  - Krueger Creek Trail

        - Average priority= 5 (Individual rankings: 3, 6, 6, 5, 6)
    - Pathfinder-Genesis Trail
        - Average priority= 4 (Individual rankings: 3, 4, 5, 6, 5)
    - Tualatin River Trail
        - Average priority= 5 (Individual rankings: 7, 5, 3, 2, 7)
    - Summer Creek Trail
        - Average priority= 6 (Individual rankings: 3, 7, 4, 7, 7, 7, 7, 2)
    - Tigard Street Trail
        - Average priority= 3 (Individual rankings: 7, 2, 2, 4, 1)
    - Washington Square Loop Trail
        - Average priority= 4 (Individual rankings: 5, 3, 7, 3, 3)
- **Other:**
    - "I really like this idea as long as it can be safe for the people."
    - "No bridge over Summer Creek for neighborhood connectivity due to impacts on wildlife corridor and creek hydraulics."
    - "I don't think that this will promote violence. I think it will improve our community."
    - "Thanks for cutting back the brush on the Hall to Allen section [Fanno Creek]. Good job!"

TRAIL ALIGNMENT MAP COMMENTS / MARK-UPS:

- **Summer Creek Trail**
    - Not great after the wildlife moves away [regarding user experience criteria for Alignment 3A]
    - Does not meet criteria [regarding environmental impacts criteria for Alignment 3A]
    - No [alignment 2A, east of Mary Woodard Elementary; and alignment 3A]
    - Bald Eagle nest [alignment 2A, just west of 121st]
    - Wetlands sensitive wildlife [alignment 3A]
    - No Bridge! [alignment 3A near 116th]
    - Heavy flooding all the way across multiple times per year [alignment 3A near 116th]
    - No [on "sidepath and sidewalk along Tigard Avenue" bubble, alignment 4C]
    - Improved crossing needed [alignment 3B/4D crossing of 115th]

- [Potential on street alignment highlighted by multiple people from existing Summer Creek Trail exit, along Summer Crest Drive and Tigard Street to Fanno Creek Trail]
- Crosswalk? [121st and Summer Crest/Tigard]
- Some sidewalk required [on Tigard St east of 115th]

- **Fanno Creek Trail**
  - Needs boardwalk [section of existing trail between Tigard St and Fowler Middle School highlighted]
  - Trail extension past library needed! [star on Fanno Creek Trail between Library and Char Ct]
  - [arrow to previous comment] There is already one! Which goes past the Fanno Pt Condos – so use that!
  - Brown area very secluded, need light along way.
  - Access to skate park [from Bonita Park and Library]
  - [Multiple links highlighted between Bonita Park, Library, skate park, and Transit Center]
  - We could walk to school and the trail. [Highlighted alignment B on Durham to Tualatin section]
- **Washington Square Loop Trail**
  - Safe bike route to W.S.! [Star at intersection of Fanno Creek and Washington Square trails]
- **Pathfinder-Genesis**
  - Alignment A from Pathfinder to Fanno Creek highlighted.

OTHER COMMENTS RECEIVED & PROJECT TEAM NOTES:

- **Design Features (e.g. lighting, signage)**
  - Desire for lighting, especially near the transit center
  - Lights will be important on the section of Fanno Creek just south of the library due to its secluded location
  - Desire for wayfinding signs
- **Key Destinations**
  - Some people already cut through the Brown and Fields properties to get to the library and WES stop. Several people were interested in having a trail option.
  - Could we consider the possibility of running the trail alongside the WES tracks? Comment that it would be much more convenient if there were additional WES stops so that they didn't have to travel so far to reach the existing stop. Desire to

have a direct connection to WES. [looking at the map that covered the area in the vicinity of the Bonita Apts.]

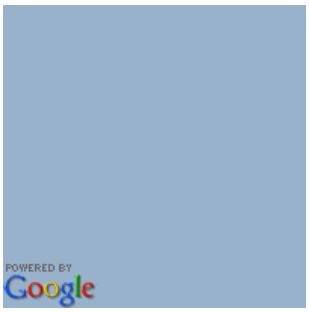
- Trail connections to both Tigard HS and Durham HS would be really beneficial to students, most of whom currently take the bus
- The library is a major community center. A Fanno Creek connection from the south to the library would help a lot of people
- The extension of the Tualatin River Trail to 99W would provide a good alternative to Durham, which lacks sidewalks in many places.
- A connection to Cook Park from neighborhoods to the north would be nice
- A connection to Summerlake Park from neighborhoods to the east. An on-street connection could still be really valuable here if it is well-signed, because the street network in the area is so disconnected.

- **Environmental Issues/Concerns**
  - The project team should prioritize upland and/or on-street options
  - Summer Creek is a unique habitat within the UGB, which would be harmed by a trail
  - Multiple citizens concerned with the environmental impact of a trail along the summer creek segment that goes behind the elementary school.
- **Other Issues/Comments**
  - Seasonal flooding of existing and potential trail segments is a major issue/concern.
  - The Tualatin River Trail extension alignment option A would have significant impacts to private property owners
  - Concerns about personal safety, potential gang activity
  - Concern that teens were hanging out on an old previously completed trail segments and creating a safety issue.
  - More trails would encourage more Tigard residents to exercise, particularly those with kids
  - From a cyclists viewpoint, more on road segments would be better from a transportation viewpoint. That could also be served by a bike boulevard treatment of some streets. Another thought, as it pertains to cycling, is to create wide enough trails that would encourage parents to take their children out on rides through our parks. So linking existing trails in parks would help create longer trails to safely ride. This could also help with any safe routes to school programs.

KITTELSON MAPS

COMMENTS FOR "TIGARD GREENWAYS TRAIL COMMENT FORM"

← Back to the map

1. 

Added January 10 2011

thanks

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2. 

Added January 09 2011

We do not want a trail behind our property because we value the natural area as it is complete with it's abundant wildlife. We also believe that a trail and/or boardwalk would be a continuous maintenance issue due to the flooding which completely covers the greenspace along the creek several times per year. Our privacy, security and property values are additional reasons for us to fight this proposal with everything we've got!

---

3. 

Added January 09 2011

We DO NOT want a trail behind our house. It will take away our privacy and lower the value of our house.

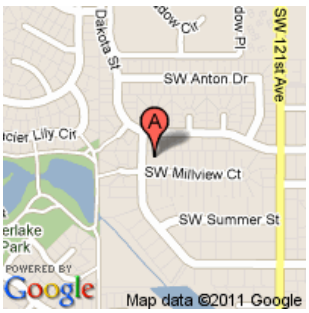
---

4. 

Added October 27 2010

Summer Creek runs behind our house as marked on the map. There is an existing path on the far side (South?) of the evergreen trees from our house. In the Tigard trails plan will a new path be put in along the edge of the water (north? of the trees? I have heard this was being considered in the past. I hope this is not part of the trails plan. We have complete privacy now and that is an assest to the value of our home. In addition, that area floods in the winter during heavy rains and would likely wash out a path. Another request is to put in more benches in Summer Lake Park by the lake. I am slightly disabled and like to walk in the park but need to sit and rest at intervals.

---

5. 

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---

6. 

Added August 23 2010

Why hasn't the City installed a cross walk in this area? Traffic is often heavy. Very few people obey the speed limit. Children use this crossing daily to get to Fowler Middle School.

City *of* Tigard
Memorandum

To: Greenway Trail System Master Plan Stakeholder Advisory Committee

From: Tim Lehrbach, Planning Assistant

Re: Greenway Trail System Neighborhood Surveys

Date: December 17, 2010

As a part of the development of the City of Tigard Greenway Trail System Master Plan, (Project Co-Manager) Duane Roberts and I conducted a survey to assess neighborhood reception to potential improvements, in-fills, and extensions of the Krueger Creek, Pathfinder-Genesis, and Summer Creek greenway trails. The methodology and results are detailed briefly here and will be presented at the Stakeholder Advisory Committee meeting on January 6, 2011. The three neighborhoods in question were selected for surveying because limited progress has been made in implementing the greenway trail extending through each; no improvement projects currently are in the pipeline for any of the three; and, lastly, relatively little is known about each neighborhood's attitudes and desires regarding the completion of their respective trail. I have attached the survey materials we distributed along with tables summarizing the returns and printouts of all comments received from the neighbors we surveyed.

Methodology

A total of 1,500 surveys were distributed, 500 each to neighbors of the Krueger Creek, Pathfinder-Genesis, and Summer Creek greenway trails. For each trail the study population was determined by using GIS to map each greenway, the area within a one-eighth (⅛) mile radius of the greenway, and the area within a one-quarter (¼) mile radius. Lists of the owners of all property within each area were generated, and from these lists random samples were selected to form a survey sample for each trail. Each sample was roughly equally distributed among the three mapped areas for that trail.

The surveys asked questions about the respondents' present and projected use of the subject trail and their level of support for potential improvements. Participants also were invited to provide comments on any aspect of the trail system. In order to permit anonymous comments, the surveys contained no mark or text to identify the recipients. At the same time participants were asked to mark the zone (along the trail greenway, within one-eighth mile, or within one-quarter mile) where her/his home is located. Participants also could provide their contact information if they wished their names to be added to an email list for on-going information about the trails study.

Results

Krueger Creek
Of 500 surveys sent to neighbors of the proposed Krueger Creek Trail, 99 completed surveys were returned. Of these, 18 were from households located along the greenway, 44 were from households located within one-eighth mile of the greenway, and 36 were from households located within one-quarter mile. One respondent did not report her or his location.

Overall support for completing the entire length of the trail was 62%. This included 50% of those located along the greenway, 61% in the one-eighth mile radius, and 66% in the one-quarter mile radius. Among respondents who did not support completing the entire trail, 19% said they were neutral, and 19% said they were opposed to completing the entire trail. Respondents who were opposed to completing the entire trail were asked if they supported installing one or more segments, and 37% said yes. Respondents who said they supported the installation of one or more segments of the trail were also asked if anyone in their family was likely to use the segment(s) they support. 92% answered yes, including 82% along the greenway and over 93% in the two radii around the greenway.

Twenty-nine of the 99 survey respondents provided written comments. Twenty comments expressed general support for the greenway trail system or touted the health, bike-friendly, and wildlife access benefits of the proposed trail. Six comments emphasized the importance of connectivity with other trails and transportation systems. Eighteen comments focused on impacts to neighborhood livability, including privacy concerns, crime and nuisances, trail maintenance, and trailhead parking. Twelve respondents were concerned about the cost of the project to the city, and seven were concerned that private property would be taken from owners. Four neighbors were worried about the impact to the floodplain and homes at risk from flooding. Seven comments referred to the intrusion on wildlife habitat or conditioned their approval of any project on protecting the city's natural and wildlife spaces.

Pathfinder-Genesis
Of 500 surveys sent to neighbors of the Pathfinder-Genesis Trail, 152 completed surveys were returned. Of these, 32 were from households located along the greenway, 63 were from households located within one-eighth mile of the greenway, and 56 were from households located within one-quarter mile. One respondent did not report her or his location.

Seventy-three percent of respondents said that a member of their household currently uses the existing Pathfinder-Genesis Trail. This included 84% of those located along the greenway, 76% in the one-eighth mile radius, and 63% in the one-quarter mile radius. Of those who reported that their household uses the trail, frequency of usage in the past month (May/June 2010) was distributed as follows: 56% said 0-5 times, 13% said 6-10 times, 14% said 11-20 times, and 17% said daily.

The neighbors surveyed were asked about their level of support for improvements to the existing segments of the Pathfinder-Genesis Trail and for potential extensions. Support for improving—defined as paving, repaving, widening, etc.—the existing trail segments was 64%, including 75% of respondents who live along the greenway. Extending the trail to connect with Gaarde Street was supported by 59% of all respondents, and extending the trail to connect with the Fanno Creek Trail was supported by 73% of all respondents. There was little variation among the three survey areas in level of support for these two trail extensions. Finally, 79% of respondents said their family was likely to use the trail if it is improved or extended.

Ninety-two of the 152 survey respondents provided written comments, including 59 identifying their highest priority for improving or extending the trail. Extending the trail to connect with Woodard Park and the Fanno Creek Trail was the most frequently named priority, receiving 24 mentions. Extending to Gaarde Street was identified by 11 respondents, while another six supported extensions generally. Maintaining the trail without improving or extending was favored by 12 respondents. Ten people chose paving or widening existing segments as the highest priority. Other priorities identified included patrolling the trail, installing wayfinding signs, lights, and handrails, improving the crossing between Woodard Park and Fowler Middle School at Tiedeman Avenue (a segment of the Fanno Creek Trail), and making the existing Pathfinder-Genesis Trail more bike-friendly.

Fourteen people wrote to express general support for the trails system. Eleven respondents said they were concerned about cost or felt the city should spend money on sidewalks first. Eighteen comments raised concerns about trail safety, including crime or nuisances, trail slope, slippery surfaces, and street crossings. Seven comments referred to the intrusion on wildlife habitat or conditioned their approval of any project on protecting the city's natural and wildlife spaces.

Summer Creek

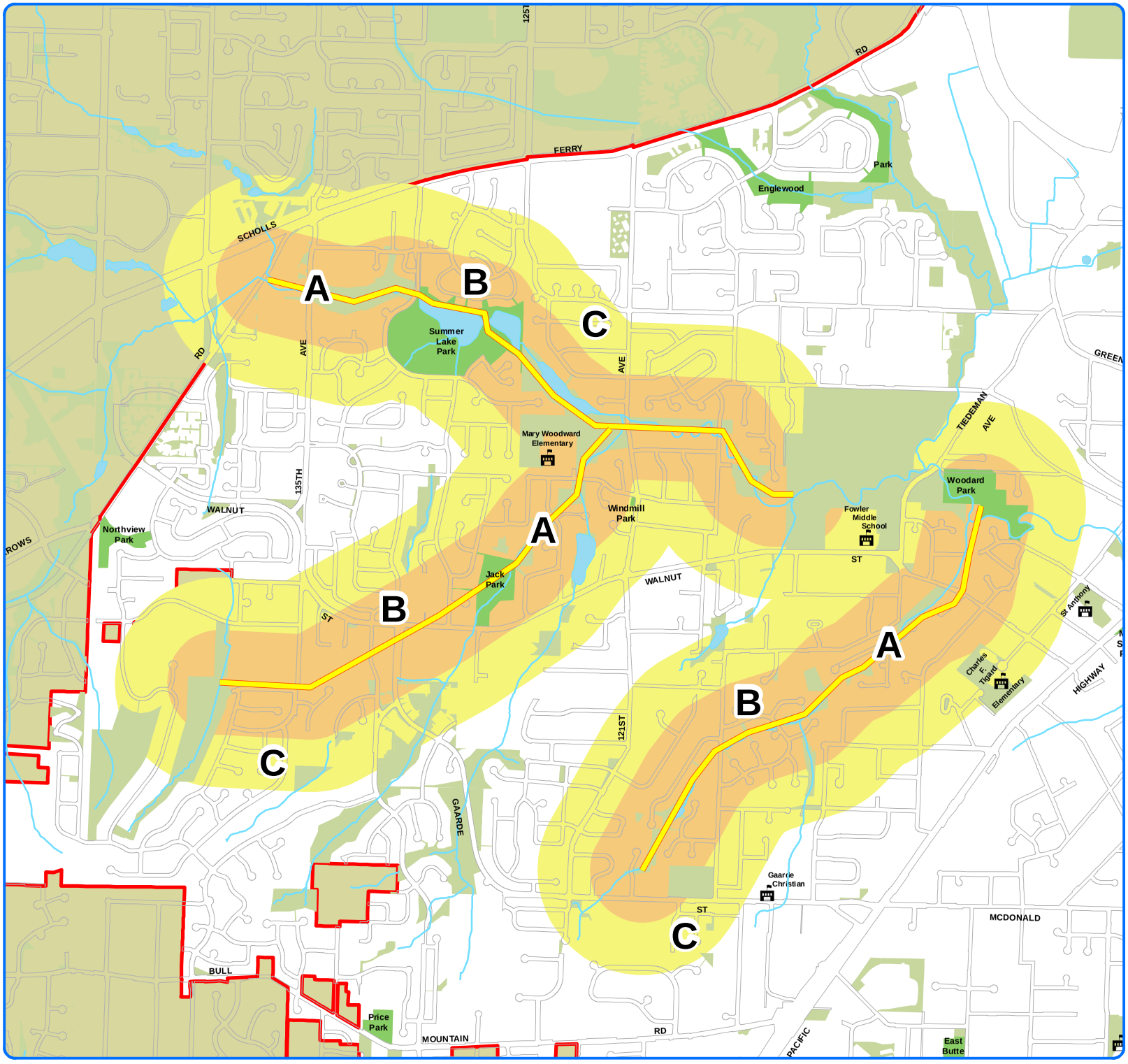
Of 500 surveys sent to neighbors of the Summer Creek Trail greenway, 107 completed surveys were returned. Of these, 30 were from households located along the proposed greenway, 34 were from households located within one-eighth mile of the greenway, and 42 were from households located within one-quarter mile. One respondent did not report her or his location.

Seventy-eight percent of respondents said that a member of their household currently uses the existing Summer Creek Trail. This includes 67% of those located along the greenway, 85% in the one-eighth mile radius, and 79% in the one-quarter mile radius. Of those who reported that their household uses the trail, frequency of usage in the past month (May/June 2010) was distributed as follows: 46% said 0-5 times, 22% said 6-10 times, 18% said 11-20 times, and 14% said daily.

The neighbors surveyed were asked about their level of support for improvements to the existing segments of the Summer Creek Trail, for filling gaps between the existing segments, and for an extension to connect with the Fanno Creek Trail. Support for improving—defined as paving, repaving, widening, etc.—the existing trail segments was 58%, including 37% of respondents who live along the greenway. Filling gaps in the existing trail was supported by 68% of all respondents, and extending the trail to connect with the Fanno Creek Trail was supported by 70% of all respondents. Support for all three projects was highest in the one-eighth mile radius area. Finally, 79% of respondents said their family was likely to use the trail if it is improved or extended.

Fifty-five of the 107 survey respondents provided written comments. Specifically, the recipients of this survey were asked to identify their highest priority for improving, infilling, or extending the trail. Thirteen stated that infilling or connecting gaps between trail segments was the highest priority for the Summer Creek Trail. Twelve respondents named the proposed extension to connect with the Fanno Creek Trail as the highest priority, and nine respondents mentioned extensions generally. Four people favored adding lighting, while various other improvements were proposed by ten people.

Five people in the Summer Creek survey area wrote to express general support for the trails system. Six respondents were concerned about the city spending money on trails over other priorities. Eight comments raised concerns about trail safety, including crime or nuisances and street crossings. Five comments referred to the intrusion on wildlife habitat, and another three to properly maintaining the floodplain.



Greenway Trail Survey

City of Tigard Oregon

- Greenway Trail
- 1/8 mile buffer
- 1/4 mile buffer
- School
- Park
- Greenspace
- Water
- Street ROW
- Tigard City Boundary

Miles
0 0.25 0.5

TIGARD MAPS
13125 SW Hall Blvd
Tigard, Oregon 97223
503 . 639 . 4171
www.tigard-or.gov

DATE CREATED: MAY 27, 2010

Krueger Creek Survey

Dear Neighborhood Resident or Business Owner:

You are receiving this letter because you live or own a business located within a quarter-mile of an official Tigard greenway trail route, specifically, the **Krueger Creek Trail** (see map on other side of this page). Your assistance is needed to gather vital information about the trail and any concerns or preferences you may have about it. Please read on and respond to the enclosed survey.

Tigard's official greenway trail system includes seven trails. At present, the biggest problem associated with the trail system is gaps between segments. Figuring out how to fill these gaps is the main focus of the *Greenway Trail System Master Plan*, now under preparation. The emphasis of the planning effort is on developing the timely, practical, and solutions-oriented information needed to coordinate the completion of the mapped system. In line with this, the master plan work scope includes a long list of trail-specific questions. Some of these questions focus on the **Krueger Creek Trail**.

The *Greenway Trail System Master Plan* is intended to reflect community wishes and desires. As a neighborhood resident or business owner, the City wants to know what you think. This is why we are seeking your ideas and opinions. No segments of the **Krueger Creek Trail** have been completed as yet. The primary purpose of the present survey is to help identify neighborhood priorities for constructing all or some of the trail. To help accomplish this, we ask that you share your thoughts about the trail with us by completing the enclosed survey and returning it in the enclosed postage paid envelope. The 11-month Tigard *Greenway Trail System Master Plan* project is just now getting underway. Many other involvement opportunities will be available during the course of the study through open houses, meetings, webpage comments, and so on. This survey is part of a broader outreach effort. The survey results and all written comments will be provided to the stakeholder advisory committee, which includes citizens who oversee the study. The results and all comments also will be posted on the project website without identifying who they came from (check City of Tigard website in July for link to forthcoming project website). If you provide your name and contact information at the end of the survey, this will not be associated with your posted comments.

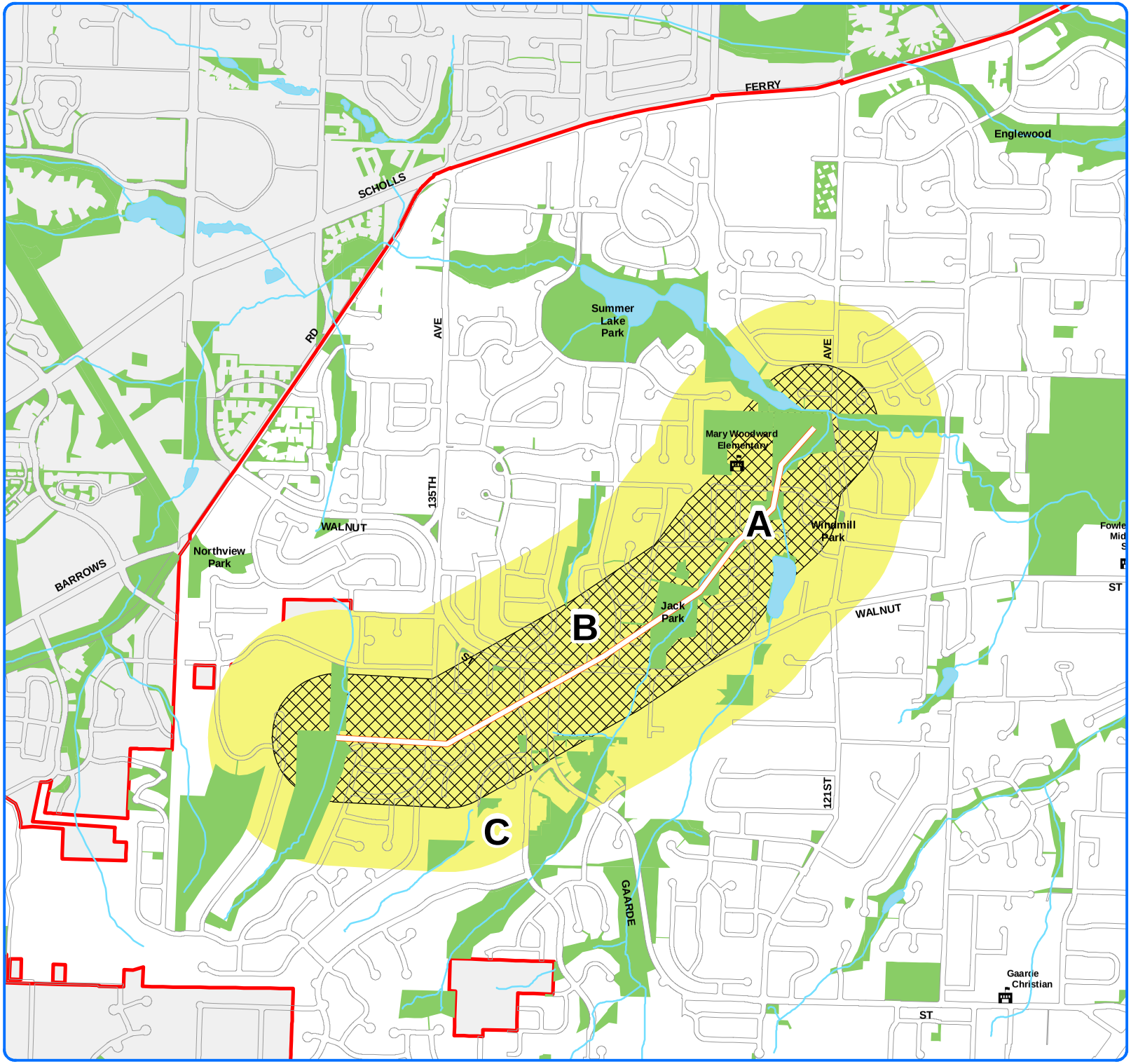
Thank you for taking the time to give us your input. Please call or email Duane Roberts, Project Planner, or Steve Martin, Parks and Facilities Manager, should you have any questions.

Duane Roberts, 503-718-2444, duane@tigard-or.gov
Steve Martin, 503-718-2583, steve@tigard-or.gov

Sincerely,

Duane Roberts
Project Planner

Steve Martin
Parks and Facilities Manager



Krueger Creek Greenway Trail Survey

City of Tigard Oregon

- Greenway Trail
- 1/8 mile buffer
- 1/4 mile buffer
- School
- Park/Greenspace
- Street ROW
- Tigard City Boundary

Miles
0 0.2 0.4

TIGARD MAPS
13125 SW Hall Blvd
Tigard, Oregon 97223
503 . 639 . 4171
www.tigard-or.gov

DATE CREATED: MAY 27, 2010

Krueger Creek Trail Survey Results

PLEASE SEE RESULTS TABLE FOR BREAKDOWN BY PROXIMITY TO TRAIL.

1. **How close do you live to the mapped trail route?** (check one):

18 (18%) Within area identified as "A" on the enclosed map. (Directly on the route)

44 (44%) Within area identified as "B" on the map.

36 (36%) Within area identified as "C" on the map.

2. **Which statement most closely describes your feelings about completing the entire length of the Krueger Creek Trail as shown on the map?** (check one):

61 (62%) I think it's a good idea.

19 (19%) I think it's a bad idea.

19 (19%) I'm neutral. I don't have an opinion either way.

3. If you think completing all of the trail is a bad idea, do you support installing one or more trail segments?

7 (37%) Yes

12 (63%) No

4. If you support installing one or more segments of the trail only, which segment(s) do you support installing?

Please also mark the specific locations on the enclosed map and return it, along with the survey sheets, using the enclosed self-addressed envelope.

Mary Woodward to Jack Park (4 mentions)
Jack Park to Gaarde St. (1 mention)
Jack Park to Bull Mountain (2 mentions)
only segments on property owned by the City—no acquisitions (1 mention).

5. If recommending the installation of one or more trail segments, are you or any member of your household likely to use the segment(s) if installed?

61 (92%) Yes

5 (8%) No

Tigard Greenways Trail System Master Plan Survey Results:

KRUEGER CREEK

Krueger Creek: All Responses

Response	Q2	Q3	Q4	Q5	Gen Comments	Contact
Yes		7		61		
No		12		5		
Good	61					
Bad	19					
Neutral	19					
Response			5		49	29
No Response/Invalid	0	80	94	33	50	70
TOTAL	**99**	**99**	**99**	**99**	**99**	**99**
% Yes		37		92		
% No		63		8		
% Good	62					
% Bad	19					
% Neutral	19					
% Response	100	19	5	67	49	29
% No Response/Invalid	0	81	95	33	51	71

Live along Proposed Trail

Response	Q2	Q3	Q4	Q5	Gen Comments	Contact
Yes		1		9		
No		2		2		
Good	9					
Bad	2					
Neutral	7					
Response			0		9	4
No Response/Invalid	0	15	18	7	9	14
TOTAL	**18**	**18**	**18**	**18**	**18**	**18**
% Yes		33		82		
% No		67		18		
% Good	50					
% Bad	11					
% Neutral	39					
% Response	100	17	0	61	50	22
% No Response/Invalid	0	83	100	39	50	78

Live within 1/8 mile of Proposed Trail

Response	Q2	Q3	Q4	Q5	Gen Comments	Contact
Yes		5		25		
No		6		1		
Good	27					
Bad	11					
Neutral	6					
Response			4		22	13
No Response/Invalid	0	33	40	18	22	31
TOTAL	**44**	**44**	**44**	**44**	**44**	**44**
% Yes		45		96		
% No		55		4		
% Good	61					
% Bad	25					
% Neutral	14					
% Response	100	25	9	59	50	30
% No Response/Invalid	0	75	91	41	50	70

Live within 1/4 mile of Proposed Trail

Response	Q2	Q3	Q4	Q5	Gen Comments	Contact
Yes		1		26		
No		4		2		
Good	24					
Bad	6					
Neutral	6					
Response			1		18	12
No Response/Invalid	0	31	35	8	18	24
TOTAL	**36**	**36**	**36**	**36**	**36**	**36**
% Yes		20		93		
% No		80		7		
% Good	66					
% Bad	17					
% Neutral	17					
% Response	100	14	3	78	50	33
% No Response/Invalid	0	86	97	22	50	67

Location not given

Response	Q2	Q3	Q4	Q5	Gen Comments	Contact
Yes		0		1		
No		0		0		
Good	1					
Bad	0					
Neutral	0					
Response			0		0	0
No Response/Invalid	0	1	1	0	1	1
TOTAL	**1**	**1**	**1**	**1**	**1**	**1**
% Yes		0		100		
% No		0		0		
% Good	100					
% Bad	0					
% Neutral	0					
% Response	100	0	0	100	0	0
% No Response/Invalid	0	100	100	0	100	100

Krueger Creek Trail Survey Results— General Citizen Comments

This makes me very angry! I figured you people would get around to destroying the last little bit of preserved territory in the area! This thing is gonna be going right in our backyard. We highly oppose you invading our privacy. Also yer causing traumatic damage to the wildlife that used to exist. We've lived here for over twenty years & watched it diminish. We have seen many species disappear. This is a known repeat blue crane nesting area (i.e. extremely shy species) that you want to put the trail right through it. Since the school starting messing with it we have seen deer, raccoons, pheasant, owls, etc. all disappear, not to mention for 19 years the creek has been fine. Now it's altering and has eaten away about 4 feet of my yard! This is a wildlife sanctuary basely still! You guys have to build on everything? Dang! Leave the rest alone. Preserve what is left, give the animals an area to exist not a place for this human intrusion! Also there are lots of kids that use that platform area to party as it is. Ya, that's a good idea… give them a venue right through my yard! If this thing goes in I am sure teenagers & etc. will be drinking and such back there. I will be bothering police on a daily basis. There is already more than enough nature trails around. This is altering the flow of the creek already and doing damage to my yard. We highly oppose this!

Hard to read map!

From what I have read, I'm in the 1/8th mile buffer area and my home will be taken by rule of eminent domain. I have lived in my home for 38 years, raised 5 sons and numerous cats and dogs and other pets. I will not give up my home! Please contact me and let me know what your intentions are.

Don't you know we are in recession—City doesn't need to spend more. WAKE UP!

Poorly designed questions. Hard to read map.

My concern with the trail ending at Mary Woodward Elementary is the opening of the area to strangers. I had a child at Mary Woodward and would not have been happy with the fact the school is connected by trails allowing entrance/exit easily to strangers. To me, it is clearly a child safety issue. Thank you for allowing input from the neighborhood.

Will only further despoil or disturb the natural habitat of wildlife!! Also, isn't the city looking at a budget crisis, therefore making this a "nice to have" in lieu of a necessity?

My wife and I are elderly, retired, and would not use the trails. I am concerned about costs—nothing was said in the letter—I would not support this trail plan if: (1) taxes go up; (2) bonds sold & need to be paid off; (3) assessments made for those nearby. Thank you.

It looks like the trail runs behind our house… Perhaps it is an uncompleted segment, but this is the first we've ever heard of this trail.

How much will it cost. Any considerations regarding wildlife. Providing adequate corridors and connections. How will this bring wildlife closer to homes. What companies will be doing the construction work.

---

1. We enjoy the green space and we have seen a number of deer and at least one coyote (several years ago) right on Katherine and on 121st north of Walnut. 2. We would enjoy using an extended trail system. 3. We would be a little concerned about misuse of the trail—as far as "kids" partying and the sale of drugs or whatever at certain points. In reference to the above—we have varied frequency of late night and early morning "action" at the Mary Woodward school and the green space/trail/park area adjacent to the school parking lot. We believe it is a good practice to regularly patrol the parking areas of the Woodward School, and any other parking areas associated with the trails.

How do you propose putting in the trail in residential areas? How would the buffer zones work or function? We live in Zone C and Summer Creek is behind us, literally in our backyard. I never heard of Krueger Creek. Does it run through the residential areas? It's not reflected on the map. i think the trail is a good idea, but I am concerned that it not be too intrusive in neighborhoods. I would not want to lose the privacy we have, so I would not want a trail put in behind us. Listen to the neighbors in meetings and this survey.

I feel that neighborhood trails are valuable and worthwhile community investments. In addition, I am impressed with the City of Tigard and the City staff.

From Jack Park to Mary Woodward seems like an OK idea. The rest of the trail seems like a waste of taxpayer resources.

I can't tell in detail where exactly this trail is planned to go through properties. It would be nice to know but impossible to see specific through the hatch marks on map. Concerned about deer being imposed upon even more so than they have been already. Bull Mt. people like to be detached from roads below so please consider <u>not</u> extending clear up the mountain! I don't mind walking or driving down the road to hike Summer Lake now so a trail would not change that.

Please make trail bike friendly also.

Very confusing. Looks like proposed trail would go right through my backyard—yet I don't understand how it would be possible. Map doesn't show nearly enough detail.

I support a segment from Jack Park to Mary Woodward. A trail that links Jack Park, Mary Woodward, and Summer Lake Park would be ideal.

Good idea!

Our family would use the entire trail.

You should contact Tigard Boy Scout Troops 799, 423, 419 to see if they need Eagle Scout projects. That way much of the work can be done at no cost to the City.

All look great

All—great idea!

It looks like most of the trail would be going through existing neighborhoods—I don't think that's feasible without negative impact to those neighborhoods' livability or property values and the difficulty of obtaining right of way needs to be considered—looking at the map it appears the trail is going right through existing homes.

We live 1 block away from the Ascension Trail and use it frequently in the summer. I think that the more trails and parks we have in this area, the better. The resident deer are a constant source of amusement (and frustration when they covet our roses).

I support your idea of developing downtown Tigard with parks, outdoor amphitheatres, enhanced MAX, roller skating areas and the whole nine yards—flower and coffee vendors, antiques, etc. I don't mind this project. I would rather you work on one project at a time.

The area by my property floods every year. This area is also home to many animals and birds. Why would you want to disturb their habitat? Where will the animals go? I feel the money you are spending could be put to better use such as funding the schools, roads, library, pool, and the list goes on and on. Due to the flooding I have many concerns on how this trail will be constructed and maintained. If you change the area then my property has more of a chance of flooding. The creek is already changing its course slowly, over time. I have concerns about people that will not keep their dogs on leashes and pick up after them. Trash and dog manure does not make me happy. I feel this is a bad idea. We already have trails, bike lanes, sidewalks, lots of schools nearby where people can run and walk. Spending money to build in a flood plain makes no sense. Displacing the animals is wrong. I am not thrilled to have raccoons, skunks, coyotes coming in and out of my backyard, but on the other hand where will they live if you disturb their homes? Protect this land and creek—leave it alone. I hope this isn't already a done deal!

Install all Great idea! Hope to connect with Fanno Creek Trail!!

Install none, especially the ones right next to homes.

My neighbors and I have been talking about the impact Krueger Trail would have on our area. It is apparent it would have a negative impact on the existing wildlife (we have already destroyed a great deal of their habitat). It is bad enough that we have the existing trail next to Ascension Dr. People seldom use the trail (we have nice sidewalks). Those who do use the trail are sometimes noisy and some of them have dogs (not always on leashes). It is sad to acknowledge that we have a deer hamstrung apparently by a dog. In my thinking we need to use a little kindness. Connecting Krueger Creek Trail to the existing small trail would be a mistake. It certainly would have a negative effect on nature in the area.

The current street system has already been developed without trails in mind. I have been living here for over 25 years before the streets were rammed through Bull Mountain. If planning would have been correct and transparent then, the trails could have easily been planned. Now, streets are even difficult to complete. I think using the current street and sidewalk system to connect the proposed trail is currently the best and least cost option.

I think it would be good to route the section from Gaarde to Jack Park onto existing sidewalks and improvement of the irregular sidewalks on 128th.

My only reservation for this type of project is for the unexpected consequences there may be. We moved from Southeast PDX and there were problems because transients were able to camp on the 205 bike path and use that as a base for burglary and other crimes against the residents. There was some legal issues over jurisdiction, so the local police couldn't seem to rout them out. Don't want that happening here.

NE end of Krueger Creek Trail needs to have connections to Summer Lake Park and Fanno Creek trails. SW end of Krueger Creek Trail needs to connect with unimproved trail up Fanno Creek ravine. I assume routing of Krueger Creek Trail is concept only and details are to be determined? Have you considered routing central portion of Krueger Creek Trail to connect with greenspace/unimproved trails east of Benchview? (see markup attached)

I'm neutral because I'm in the ¼ mile buffer. It looks like the people in the 1/8th mile buffer are impacted more by this trail. While trails are a wonderful thing in theory, if it goes by your bedroom window it's not so great. I would like to see a proper map which shows actual streets that you can see, making an opinion easier to construct. I would like to see a map showing how close to real houses this trail is.

What is the financial impact of this project? What additional debt will need to be incurred to complete this project?

Great!

Trails encourage residents to get outside and walk in a healthier environment than a busy road.

Great! When I moved here, my best friend congratulated me because I moved right in the middle of a great biking area. Even though he lived in Milwaukie on the east side, he was familiar with Tigard's trails. We purchased this home partly because of the lay out of Summer Lake Park. It is kind of like a miniature Sunriver. Sunriver is designed to be biker friendly for shopping and all other activities. Just this weekend a friend of mine rode his bike from over past Bridgeport shopping center to my house by Summer Lake to have me help him on a project. He used his Bike Tigard map for the best route. My wife has a friend who is a surgeon, and her husband is a successful contractor and they want to move their family to the west side. They are looking for a flat area that is good for bike riding. I gave them one of the Bike Tigard maps. More bike trails will attract more health conscious people to the Tigard area.

I think it is in a silly place. Right now it is going through backyards, etc. which is not feasible—from Essex to Jack Park. Also going to Mary Woodward and ending seems like a segment—it should go connect with the Fanno Creek trail at Fowler so we don't just have lots of segments, but really useful trails—maybe a side trail to Mary Woodward but not one that just stops there.

How about waiting until we dig ourselves out of this recession before spending our tax dollars on something that is not necessary at this time. Develop some fiscal responsibility for a change. We don't need a "new downtown" Tigard—we don't need a trail through neighborhood wetlands—we <u>do</u> need pot holes fixed. We do need a better way to get in and out of the post office parking lot without constantly blocking up traffic on Main Street. Get your priorities straight. We are in a recession now—we all have no money for these unnecessary "dream" projects at this time! Save this money for something more useful and that is absolutely necessary. Sure go ahead and throw this comment in the trash and do what you are going to do anyway.

We moved to Tigard about one year ago. We've been very happy with the City's focus on parks and green spaces. It is a beautiful city to call home! It doesn't look as if the trail will directly intersect our property, but it is hard to tell exactly how the trail will impact people's residences/property. If the trail was directly adjacent to my property, I would have concern with the additional foot traffic past my home (and the potential for litter, vandalism, and theft on my property and the neighborhood). Hopefully a part of the planning includes helping homeowners on the trail manage ther safety and privacy.

I am all for outdoor recreational opportunities in our City. However, I am passionately in favor of maintaining the few remaining "wildspaces" in our area. Bull Mountain has been virtually raped by developers over the years and a primary reason we built our current home where we did, was to be near one of those few places. If more people were NEAR green areas, I believe there would be more of them preserved. However, putting people INSIDE those areas, lessens them. Should this trail go through, it will greatly impact the ever-diminishing wildlife here. If there were more areas in Tigard for wildlife, it wouldn't be a big problem. Now though, there's nowhere else for wildlife to go. Since there are lots of places for people to hike, let's leave these few places for wildlife, to wildlife. On THIS trail—an emphatic NO from me! Thanks for the info and opportunity to express my opinion.

I like trails and do a lot of walking but usually drive to the two local wildlife refuges. But I can't afford to live in Tigard any longer and am moving—so have no comments.

I am not sure what kind of impact this has on the neighborhood?

We are adamantly opposed to installing a walking trail along the Krueger Creek greenway. There are enough trails already, especially including streets already in existence that can supplement the trail. When we purchased our house two years ago we asked point blank at the community meetings if a trail was planned, and were told no by the engineer, it wouldn't be sooner than 10 years in planning. At that same time we asked about the completion of 116th through from Katherine. Besides a desire for our privacy I have listed the reasons below which are the basis of our opinion: (1) The money should be spent on street repairs in these same areas. (2) The area can flood with little warning along Summer Lake Creek, within 1 hour if the dam at Summer Lake breaches up to 2 feet. (3) Wildlife protection in this area need protecting at current level. (4) Garbage left now along creeks is at a high level, if a path goes through there will be even more garbage we homeowners need to pick up. (5) Parking at path entrances is not available, check along the road by Fowler Middle School. (6) Coyotes have been spotted in area. (7) At the town meetings everyone asking for a trail did not live in the area, so don't have to face results of pushing trail through.

You know it would have helped if you had included existing trails. Including the existing park/greenspace does not help if one is unfamiliar with the trails in those parks/greenspaces. Just a suggestion for next time…

Pathfinder-Genesis Survey

Dear Neighborhood Resident or Business Owner:

You are receiving this letter because you live or own a business located within a quarter-mile of an official Tigard greenway trail route, specifically, the **Pathfinder-Genesis Trail** (see map on other side of this page). Your assistance is needed to gather vital information about the trail and any concerns or preferences you may have about it. Please read on and respond to the enclosed survey.

Tigard's official greenway trail system includes seven trails. At present, the biggest problem associated with the trail system is gaps between segments. Figuring out how to fill these gaps is the main focus of the *Greenway Trail System Master Plan*, now under preparation. The emphasis of the planning effort is on developing the timely, practical, and solutions-oriented information needed to coordinate the completion of the mapped system. In line with this, the master plan work scope includes a long list of trail-specific questions. Some of these questions focus on the **Pathfinder-Genesis Trail**.

The *Greenway Trail System Master Plan* is intended to reflect community wishes and desires. As a neighborhood resident or business owner, the City wants to know what you think. This is why we are seeking your ideas and opinions. The primary purpose of the present survey is to help identify neighborhood priorities for improving and extending the **Pathfinder-Genesis Trail**. To help accomplish this, we ask that you share your thoughts about the trail with us by completing the enclosed survey and returning it in the enclosed postage paid envelope.

The 11-month Tigard *Greenway Trail System Master Plan* project is just now getting underway. Many other involvement opportunities will be available during the course of the study through meetings, open houses, webpage comments, and so on. This survey is part of a broader outreach effort. The survey results and all written comments will be provided to the stakeholder advisory committee, which includes citizens who oversee the study. The results and all comments also will be posted on the project website without identifying who they came from (check City of Tigard website in July for link to forthcoming project website). If you provide your name and contact information at the end of the survey, this will not be associated with your posted comments.

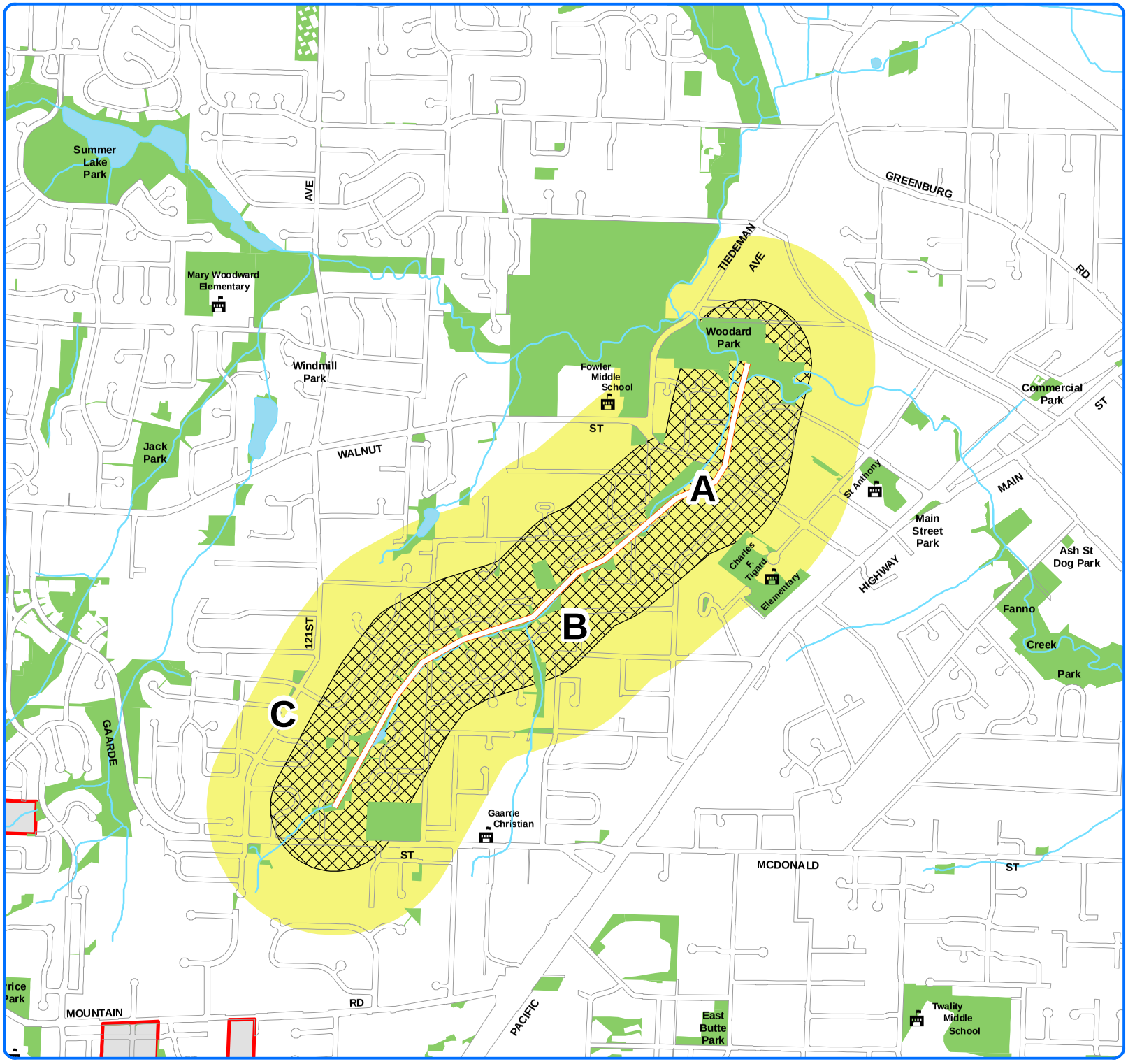
Thank you for taking the time to give us your input. Please call or email Duane Roberts, Project Planner, or Steve Martin, Parks and Facilities Manager, should you have any questions.

Duane Roberts, 503-718-2444, duane@tigard-or.gov
Steve Martin, 503-718-2583, steve@tigard-or.gov

Sincerely,

Duane Roberts
Project Planner

Steve Martin
Parks and Facilities Manager



Pathfinder-Genesis Greenway Trail Survey

City of Tigard Oregon

- Greenway Trail
- 1/8 mile buffer
- 1/4 mile buffer
- School
- Park/Greenspace
- Street ROW
- Tigard City Boundary

Miles
0 0.2 0.4

TIGARD MAPS
13125 SW Hall Blvd
Tigard, Oregon 97223
503 . 639 . 4171
www.tigard-or.gov

DATE CREATED: MAY 27, 2010

Pathfinder-Genesis Survey Results

PLEASE SEE RESULTS TABLE FOR BREAKDOWN BY PROXIMITY TO TRAIL.

1. How close do you live to the Pathfinder-Genesis Trail route? (check one):

32 (21%) Within area identified as "A" on the enclosed map. (Directly on the route)

63 (41%) Within area identified as "B" on the map.

56 (37%) Within area identified as "C" on the map.

2. Do you or any member of your household currently use the Pathfinder-Genesis Trail?

110 (73%) Yes

41 (27%) No

3. If yes, in the past month, how often have you used this trail?

19 (17%) ❑ Daily
60 (56%) ❑ 0-5 times
14 (13%) ❑ 6-10 times
15 (14%) ❑ 11-20 times

4. Which statement most closely describes your feelings about improving (paving, repaving, widening, etc.) existing segments of the Pathfinder-Genesis Trail? (check one):

96 (64%) I think it's a good idea.

21 (14%) I think it's a bad idea. .

33 (22%) I'm neutral. I don't have an opinion either way.

5. Which statement most closely describes your feelings about extending the Pathfinder-Genesis Trail to connect with Gaarde Street?

90 (59%) I think it's a good idea. I support extending the trail to connect with Gaarde Street.

22 (15%) I think it's a bad idea. I do not support the trail's extension to Gaarde Street.

39 (26%) I'm neutral. I don't have an opinion either way.

6. Which statement most closely describes your feelings about extending the Pathfinder-Genesis Trail to connect with the Fanno Creek Trail?

108 (73%) I think it's a good idea. I support extending the trail to connect with the Fanno Creek Trail.

18 (12%) I think it's a bad idea. I do not support the trail's extension to the Fanno Creek Trail.

22 (15%) I'm neutral. I don't have an opinion either way.

7. Are you and your family likely to use the trail if it is improved or extended?

115 (79%) Yes

31 (21%) No

8. If you support the Pathfinder-Genesis Trail's improvement or extension, what is the highest priority project for improving/extending the trail?

If recommending a site-specific trail improvement, please also mark the specific location on the enclosed map and return it, along with the survey sheets, using the enclosed self-addressed envelope.

Extend to Fanno Creek Trail/Woodard Park (24 mentions)
Extend to Gaarde St. (11 mentions)
Extensions generally (6 mentions)
Connections between existing segments (9 mentions)
Paving segments (6 mentions)
Widen segments (4 mentions)
No widening or paving (5 mentions)
Removal of blackberries/invasive species (4 mentions)
Signage/wayfinding (3 mentions)
Sidewalks on Fonner St. (2 mentions)

Others:
"Stairway at end of Fairhaven St. needs a handrail, very slippery when wet"
"Widen it for bike use with center line marked for safe passage"
"Keeping the surface smooth and walkable"
"Just keep the trails as is, and maintain"
"An occasional patrol of a bike cop (maybe at dawn and dusk?)"
"That it won't cost much, raise taxes"
"Need to have a safe way for families coming or going from Tiedeman to Woodard Park"
"Put in cross walks at major streets connecting the trails especially on Tiedeman connecting to trail at Fowler"
"Make the trail accessible from the cul-de-sac of Terrace Trails. This means putting a bridge across the creek"
"Connection with the Fanno Creek trail is important because the current Walnut crossing option is dangerous"
"Widen and lay pebble stone (but not pave) with 'bump-out' areas for sitting"

Tigard Greenways Trail System Master Plan Survey Results:

PATHFINDER-GENESIS

Pathfinder-Genesis: All Responses

Response	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Comments	Contact
Yes	110					115			
No	41					31			
Good			96	90	108				
Bad			21	22	18				
Neutral			33	39	22				
0-5 times		60							
6-10 times		14							
11-20 times		15							
Daily		19							
Response							59	92	52
No Response	1	44	2	1	4	6	93	60	100
TOTAL	**152**	**152**	**152**	**152**	**152**	**152**	**152**	**152**	**152**
% Yes	73					79			
% No	27					21			
% Good			64	59	73				
% Bad			14	15	12				
% Neutral			22	26	15				
% 0-5 times		56							
% 6-10 times		13							
% 11-20 times		14							
Daily		17							
% Response	99	71	99	99	97	96	39	60	34
% No Response	1	29	1	1	3	4	61	40	66

Live along Existing or Proposed Trail

Response	Q2	Q3	Q4	Q5	Q6	Q7	Q8	n Comments	Contact
Yes	27					26			
No	5					4			
Good			24	21	22				
Bad			4	3	1				
Neutral			4	8	8				
0-5 times		16							
6-10 times		5							
11-20 times		1							
Daily		5							
Response							17	23	8
No Response	0	5	0	0	1	2	15	9	24
TOTAL	**32**	**32**	**32**	**32**	**32**	**32**	**32**	**32**	**32**
% Yes	84					87			
% No	16					13			
% Good			75	66	71				
% Bad			13	9	3				
% Neutral			13	25	26				
% 0-5 times		59							
% 6-10 times		19							
% 11-20 times		4							
Daily		19							
% Response	100	84	100	100	97	94	53	72	25
% No Response	0	16	0	0	3	6	47	28	75

Live within 1/8 mile of Existing or Proposed Trail

Response	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Comments	Contact
Yes	48					46			
No	15					15			
Good			40	36	45				
Bad			10	9	8				
Neutral			13	18	8				
0-5 times		24							
6-10 times		5							
11-20 times		7							
Daily		11							
Response							22	37	27
No Response	0	16	0	0	2	2	41	26	36
TOTAL	**63**	**63**	**63**	**63**	**63**	**63**	**63**	**63**	**63**
% Yes	76					75			
% No	24					25			
% Good			63	57	74				
% Bad			16	14	13				
% Neutral			21	29	13				
% 0-5 times		51							
% 6-10 times		11							
% 11-20 times		15							
Daily		23							
% Response	100	75	100	100	97	97	35	59	43
% No Response	0	25	0	0	3	3	65	41	57

Live within 1/4 mile of Existing or Proposed Trail

Response	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Comments	Contact
Yes	35					43			
No	21					12			
Good			32	33	41				
Bad			7	10	9				
Neutral			16	13	6				
0-5 times		20							
6-10 times		4							
11-20 times		7							
Daily		3							
Response							20	31	17
No Response	0	22	1	0	0	1	36	25	39
TOTAL	**56**	**56**	**56**	**56**	**56**	**56**	**56**	**56**	**56**
% Yes	63					78			
% No	37					22			
% Good			58	59	73				
% Bad			13	18	16				
% Neutral			29	23	11				
% 0-5 times		59							
% 6-10 times		12							
% 11-20 times		20							
Daily		9							
% Response	100	61	98	100	100	98	36	55	30
% No Response	0	39	2	0	0	2	64	45	70

Location not given

Response	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Comments	Contact
Yes	0					0			
No	0					0			
Good			0	0	0				
Bad			0	0	0				
Neutral			0	0	0				
0-5 times		0							
6-10 times		0							
11-20 times		0							
Daily		0							
Response							0	1	0
No Response	1	1	1	1	1	1	1	0	1
TOTAL	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
% Yes	0					0			
% No	0					0			
% Good			0	0	0				
% Bad			0	0	0				
% Neutral			0	0	0				
% 0-5 times		0							
% 6-10 times		0							
% 11-20 times		0							
Daily		0							
% Response	0	0	0	0	0	0	0	100	0
% No Response	100	100	100	100	100	100	100	0	100

Pathfinder-Genesis Trail Survey Results— General Citizen Comments

If it costs money—I'm against it. Cut spending!!

One of the reasons I live in the area of the Fanno Creek Trail is because of its usefulness and livability advantages. It's very pleasant and I value the existing access and beautification that has occurred in the recent past. Keep a good thing going with extension and improvement of the trail as it encourages exercise.

I support [connection with the Fanno Creek Trail] more than extending it to Gaarde St. I would like to have all the sections of Fanno Creek Trail connected so that we can walk the full length.

I really can't comment as I can no longer walk freely—arthritis. No family in area.

We like the trail as-is. It is bucolic and rustic.

The trails are the best part about living in Tigard.

The existing trails in this area (Pathfinder-Genesis and Fanno Creek) are already highly valued by both of us, and we use them frequently. We support ongoing maintenance and improvements and truly appreciate the trail system. Having the trails so close to us encourages us to walk more, and walk to complete errands rather than drive.

Areas are not clearly defined. How high a priority is it relative to other city needs? Where does the money come from? Not enough information. Maybe I would support connecting to Gaarde Street—not enough information. Impacts? Cost? This map is inadequate and misleading. Reduction of taxes is the highest priority so people can get back to work and support their families. This project is only a "nice to have" if other things are taken care of.

There is already a sidewalk on 118th Ct., connecting Gaarde to the trail. Your map doesn't show where Fanno Creek or the extension would go. Your map does not label the 2 trails or the extension.

Have in the past used this trail.

We would use the trail more if extended to the downtown area. We walk our small puppy daily and it would be nice to visit the businesses downtown which are usually out of our way when driving.

[Trail] seems fine to me—don't think it needs improving. I thought it was a part of Fanno Creek Trail. I'm concerned about some of the people the trails bring into the neighborhood—tends to make us older residents less safe.
I would like a foot map available so I can find the connecting path down the street.

I believe if the project can be completed before the summer ends, it'd be great so we can use it in time.

Getting too old to manipulate the hills (slopes)! Although we don't use the Derry Dell Trail anymore we have used a lot in the past and appreciate its upkeep.

I live on Terrace Trails Dr. off 115th. My backyard is on the greenway side or trail side. A friend and I walk the Genesis trail daily, but not the gravel trail between 115th and 118th Ct. (behind my house) on Terrace Trails. I do walk this trail with my grandkids—they love it. Upkeep and maintenance is fine, but leave the natural (nature trail) part as is. Do not pave the trail along Terrace Trails. It is already near Gaarde where the trail ends. Because we live on the section of the trail that is mostly wooded and on an incline, has swampy areas, we do not want an asphalt sidewalk running through. It is very narrow and mostly wide enough for one person, or some people ride their bikes through on the trail as well. My grandkids, ages 4 ½-9, love to walk this part of the trail as it seems more like "the woods", they explore, and enjoy nature in a more natural setting. Keeping the blackberry vines under control is very appreciated, though. My friend and I walk daily, use the asphalt trails through the genesis development and streets, or sidewalks when available, and are happy with that.

I'm impressed with the improvements in the past. The repaving provided last year was a great enhancement. The security vehicle was nice to see. The prickly bushes planted along the walkway is great for safety reasons and keeping the grass trimmed is also nice to see. I assume that is also for safety reasons as well as others.

Signage to direct to next trail since they are not connected. For example: Fanno Creek Trail stops at Woodard park at Johnson, but no sign to direct to Pathfinder-Genesis route or to downtown/library path.

Need to have a safe way for families coming or going from Tiedeman to Woodard Park. I watch people with bikes/trikes etc. trying to cross and it's a very unsafe thing they have to do to get across Tiedeman to continue their outing. Also the families that come for baseball/soccer practice or games are faced with the same problem of getting their children across safely. You'd be amazed at how many people do not stop or slow down for these pedestrians, most of them young children.

Completion of the few blocks of 121st (widen and curbs) would serve a much greater number of people. A safer and a more serviceable project that has been somewhere in the plans since I moved here in 1967! Spend money for service rather than recreation! (Ball fields, pools, etc.)

We don't use the path between 118th and 115th where it's only dirt—too dark—doesn't seem safe to walk alone. (We skip that and take the path—or one of mnay wonderful side paths in and around the Genesis neighborhood.) The paths are a wonderful asset to the area and should be supported. Would love to see a connection at Gaarde.

We do not use the trail because I do not believe it is safe. No one can see us if we are walking on the trail. And according to one sex offender website there is a registered sex offender living in one of the houses that back up to the trail. No thank-you. I prefer to walk on the road where everyone can see me. I would prefer money was spent to put sidewalks on the roads that do not have them. I love to walk but it is too dangerous to walk with a five year old in tow on a road without sidewalks.

My wife and I love this trail. We use it <u>every</u> day.

If you make access *too* easy, traffic will increase and there will be more bicycle thru traffic, all of which affect wildlife habitat. There is access to Gaarde already thru 122nd Street. There is access to Fanno Creek Trail thru Woodland Park and the back side of Fowler MS. I do think there should be an "on-demand" crosswalk on Tiedeman Ave. and Tigard St. crossings for safety. Safer option would be to hook a trail all the way through to the corner of Walnut and Tiedeman, or at least sidewalks for safety. Widening the existing trails would entail disturbing wildlife and loss of habitat space. I think they're wide enough for access.

Please keep up the good work—our neighborhood enjoys all the trail. Thank-you

---

We have lived in Tigard for 30 years and love the trails. It's great for our health and relieving stress!!

Extending the trail to Gaarde… the trail comes out on street that is a dead end, no traffic and walking the short distance to Gaarde is not an issue.

I love having the trail by my house and would love to see an expansion. I would mind seeing improvements to the trail that's behind the homes of Terrace Trails giving access from the top of the cul-de-sac. I don't see it necessary to widen it too much since it's nice seeing the nature areas unless you put in separate trails for bicycles only since they seem to take up most of the trails. I wouldn't mind seeing the trail extended up to Bull Mtn.

Even though I marked "I'm neutral", I believe our taxpayer dollars could be better spent on other important items such as road maintenance.

The present trail system is not adequately maintained. Adding more trail will mean more inadequately maintained trail. First maintain what is there to a higher standard before adding on. Define the precise benefits of adding on to this system. Thank you.

Too steep and inaccessible in some areas to pave without serious environmental impact. Areas that have already been paved are washing out or lumpy because of tree root growth. I think the trail would receive much more use if it were connected, wide enough for 2 people throughout and paved or other surface that would accommodate bicycles. However, I am concerned about the environmental impact of paving and widening. The path would be less necessary if there were sidewalks on all streets including Fonner from 115th to Walnut. That is a dangerous area for pedestrians and forces them onto the paths. I actually rate sidewalks a higher priority than the trail. I realize some of the areas needing sidewalks are county property, but I don't want to wait until a child or other pedestrian is hurt to do something about it.

I would like a safer way to get to the trail. Fonner Road needs sidewalks or a cut through to the trail.

We use Fanno Creek Trail; I didn't know this other trail existed.

I use and enjoy the trail. I marked "not a good idea" to the expansion and improvements because I would rather see my tax dollars spent on widening/sidewalks on 121st between Quail Hollow and Walnut. This project was scheduled several years ago and seems to have vanished off the City's radar. I have inquired about it many times and get no return calls or e-mails.

We had no idea that such a trail existed until we received this mailing.

We have been concerned of late at the type of pruning along the trail. It has appeared that the pruning of bushes is creating a mess. Either use of a poorly sharpened tool or someone who doesn't know the first thing about trimming or cutting brush. It has left an unsightly mess and spoils the enjoyment of walking or biking on the trail.

One of my greatest pleasures is to walk the trails every day. They are well maintained, and provide great exercise and tranquility. Thank you for building them.

We mostly use Fanno Creek Trail.

I would wholly support any improvements and would be willing to help on any committee regarding this project. I trust that decision makers will not overspend and improve wisely. To be truthful this pathway is one of the major reasons why we chose to live in this neighborhood. Thank you for interest!!

We didn't know about it! My neighbor regularly walks her dog on a trail that must be this one. I think she accesses it from Fonner St. I have never gone with her so I don't know for sure. But Fonner St. is very narrow, windey, with no shoulders or sidewalks. I wouldn't be comfortable taking my dog on that street until some improvements to Fonner St. have been made. I'm pleased to know about this trail that is so close to us, as I'm looking for ways to lengthen my walk time with my dog, especially during longer daylight hours.

It looks like the planners are planning on taking land from current land owners—this is wrong. Only support connecting with Fanno Creek Trail if Tigard buys and develops the land honestly. If planning this trail takes land in any way away from the current owners I think it is a bad idea. I think it would be better to have a larger piece of land to make a more natural park with trails—again not by taking land or rezoning property that is currently owned by others.

We are a family of seven. I have lived here for 10 years. Our children have gone from ages 9 and 17 to 19 and 27 and we live just fine without this trail. We consider it a waste of funds.

Not really necessary to do too much "improvement". Not necessary to make it a "superhighway" trail—just a useable trail.

We love the trail!

I have lived across the street from direct access to the trail. It was wonderful until you destroyed the blackberries, which I picked for 35+ years. A true nature path doesn't require macadam or cement. I would rather look at nature and walk on it. The only non-natural item should be the wooden bridges.

I use the trails but find them very unsafe to walk <u>alone</u>. Need to be patrolled for safety.

No one in the City of Tigard/Master Plan listened or cared what I had put forward at meetings for Woodard Park project. My quality of living has been ignored by any commissioner in Tigard. Everyone of my vehicles have been hit either in front of my house or parked in my driveway. I've had to eat $1,500 in deductible on my car insurance. My driveway and R.V. parking have been taken over by inconsiderate park users. Also unable to leave our own driveways due to illegal parked cars. Fire hydrant and mail boxes blocked. Gang problems in park and greenway trail. "Drug and alcohol" use on trail/park increased. "Poor" sign display for drivers. Perfect view of portojohn. No one on the board cared about us. Only their agenda mattered. Tigard will do anything to make sure it goes through, not what the neighborhood wants.

I use it almost daily for running and dog walking. I have preteen kids who I would rather have on the trails than on streets with cars. Thank you for maintaining green spaces in our community.

See above; some of the street curves (without sidewalks) are so dangerous, we avoid going over to the trail. I love the way some neighbors at Genesis have kept up their backyards so nicely that makes the trail so pleasant.

What is it going to cost each property owner?

Much of the traffic on the trail seems to be local neighborhood residents. My concern about the Gaarde extension is it would open a thruway to non-residents. Right now I feel relatively safe walking the path either early in the morning or at dusk. Then I would have a concern for property security for those homes that back on to the path. (Those residents should have more of a voice about any changes.) And lastly, I've been on the pathway that runs through Woodard Park—cyclists speeding along could be a concern if you are walking with young children or dogs on leashes. Accidents could occur.

I've ridden the path from 115th to Walnut many times. But your map implies there is some bike path from "A" down to Woodard Park. I know of no such section. I exit the path on Pathfinder Ct. to Walnut and then take a series of neighborhood streets over to Woodard Park. I'd like to see a path from Pathfinder to the Fanno Creek Trail.

I love the trail and wish it all connected—especially from Genesis to park on other side of Walnut.

In my opinion these trails sound nice but it is only making it easier for criminals and bums easier ways to get around our neighborhood. I see strange people now walking through the neighborhood where we have neighborhood watch, looking around checking out our homes. I feel now I can't go out at night because who knows who is standing around the bend or in the bushes. If there is not a police patrol on these trails (or some type of patrols) it will only bring in unwanted people camping along the trails and causing problems in the neighborhood.

Summer Creek Survey

Dear Neighborhood Resident or Business Owner:

You are receiving this letter because you live or own a business located within a quarter-mile of an official Tigard greenway trail route, specifically, the **Summer Creek Trail** (see map on other side of this page). Your assistance is needed to gather vital information about the trail and any concerns or preferences you may have about it. Please read on and respond to the enclosed survey.

Tigard's official greenway trail system includes seven trails. At present, the biggest problem associated with the trail system is gaps between segments. Figuring out how to fill these gaps is the main focus of the *Greenway Trail System Master Plan*, now under preparation. The emphasis of the planning effort is on developing the timely, practical, and solutions-oriented information needed to coordinate the completion of the mapped system. In line with this, the master plan work scope includes a long list of trail-specific questions. Some of these questions focus on the **Summer Creek Trail**.

The *Greenway Trail System Master Plan* is intended to reflect community wishes and desires. As a neighborhood resident or business owner, the City wants to know what you think. This is why we are seeking your ideas and opinions. The primary purpose of the present survey is to help identify neighborhood priorities for improving and extending the **Summer Creek Trail**. To help accomplish this, we ask that you share your thoughts about the trail with us by completing the enclosed survey and returning it in the enclosed postage paid envelope.

The 11-month Tigard *Greenway Trail System Master Plan* project is just now getting underway. Many other involvement opportunities will be available during the course of the study through open houses, meetings, webpage comments, and so on. This survey is part of a broader outreach effort. The survey results and all written comments will be provided to the stakeholder advisory committee, which includes citizens who oversee the study. The results and all comments also will be posted on the project website without identifying who they came from (check City of Tigard website in July for link to forthcoming project website). If you provide your name and contact information at the end of the survey, this will not be associated with your posted comments.

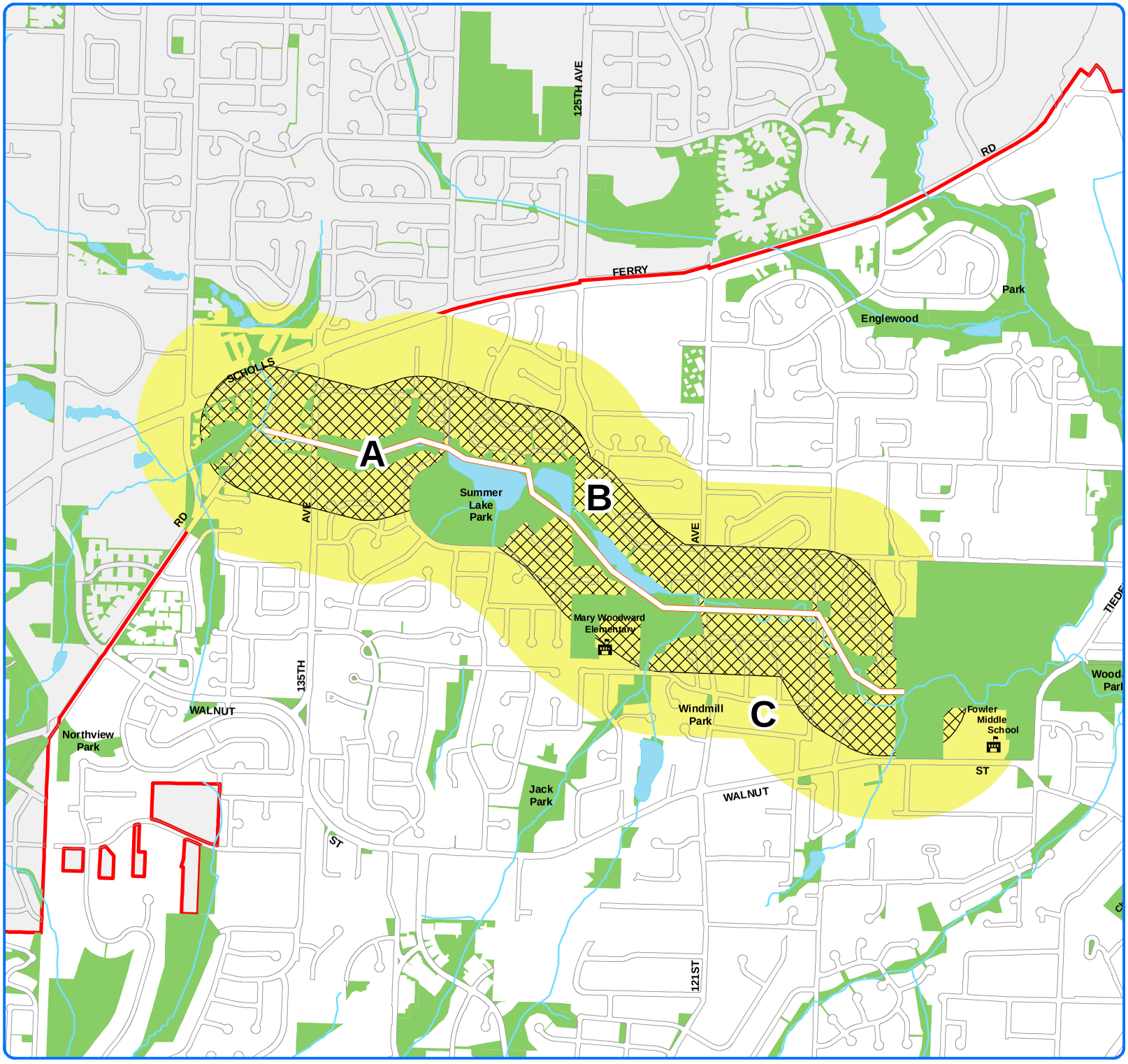
Thank you for taking the time to give us your input. Please call or email Duane Roberts, Project Planner, or Steve Martin, Parks and Facilities Manager, should you have any questions.

Duane Roberts, 503-718-2444, duane@tigard-or.gov
Steve Martin, 503-718-2583, steve@tigard-or.gov

Sincerely,

Duane Roberts
Project Planner

Steve Martin
Parks and Facilities Manager



Summer Creek Greenway Trail Survey

City of Tigard Oregon

- Greenway Trail
- 1/8 mile buffer
- 1/4 mile buffer
- School
- Park/Greenspace
- Street ROW
- Tigard City Boundary

Miles

0 0.2 0.4

TIGARD MAPS
13125 SW Hall Blvd
Tigard, Oregon 97223
503 . 639 . 4171
www.tigard-or.gov

TIGARD

DATE CREATED: MAY 27, 2010

Summer Creek Trail Survey Results

PLEASE SEE RESULTS TABLE FOR BREAKDOWN BY PROXIMITY TO TRAIL.

1. How close do you live to the Summer Creek Trail route? (check one):

30 (28%) Within area identified as "A" on the enclosed map. (Directly on the route)

34 (32%) Within area identified as "B" on the map.

42 (39%) Within area identified as "C" on the map.

2. Do you or any member of your household currently use any segment of the existing Trail?

83 (78%) Yes

24 (22%) No

3. If yes, in the past month, how often have you used the trail?

12 (14%) ❑ Daily
38 (46%) ❑ 0-5 times
18 (22%) ❑ 6-10 times
15 (18%) ❑ 11-20 times

4. Which statement most closely describes your feelings about improving (paving, repaving, or widening) existing, or already built segments of the Summer Creek Trail? (check one):

62 (58%) I think it's a good idea.

12 (11%) I think it's a bad idea.

33 (31%) I'm neutral. I don't have an opinion either way.

5. Which statement most closely describes your feelings about filling gaps in the Summer Creek Trail?

73 (68%) I support infilling trail gaps.

12 (11%) I think it's a bad idea. I do not support infilling gaps in the trail.

22 (21%) I'm neutral. I don't have an opinion either way.

6. Which statement most closely describes your feelings about extending the Summer Creek Trail to connect with the Fanno Creek Trail?

73 (70%) I support extending the trail to connect with the Fanno Creek Trail.

14 (13%) I think it's a bad idea. I do not support the trail's extension to the Fanno Creek Trail.

18 (17%) I'm neutral. I don't have an opinion either way.

7. Are you and your family likely to use the trail if improved, infilled, or extended?

81 (79%) Yes

21 (21%) No

8. If you support the Summer Creek Trail's improvement or extension, what is the highest priority project for improving/infilling/extending the trail?

If recommending a site-specific trail improvement, please also mark the specific location on the enclosed map and return it, along with the survey sheets, using the enclosed self-addressed envelope.

Infill or connect gaps between trail segments (13 mentions)
Extend to Fanno Creek Trail (12 mentions)
Extensions generally (9 mentions)
Extend to 135th Ave (3 mentions)
Extend along Summer Creek toward Murray Hill greenway (1 mention)
Add lighting for safety (4 mentions)
Add benches along the trail (2 mentions)
Make trail accessible to wheelchairs and disabled (1 mention)

Other:
"Provide doggie bags"
"Asphalt is expensive. A trail of wood chips would be a great first step"
"Need for more tennis courts and bathrooms near Edgewater Court end of Summer Lake Park"
"Clearer signage at pedestrian/vehicle intersections"
"Repairing any boards on the bridges"
"Mowing, edging, and watering the grasses"
"Wide trail—visibility"
"Emergency call locations"

Tigard Greenways Trail System Master Plan Survey Results:

SUMMER CREEK

Summer Creek: All Responses

Response	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Comments	Contact
Yes	83					81			
No	24					21			
Good			62	73	73				
Bad			12	12	14				
Neutral			33	22	18				
0-5 times		38							
6-10 times		18							
11-20 times		15							
Daily		12							
Response							36	55	40
No Response	0	24	0	0	2	5	71	52	67
TOTAL	**107**	**107**	**107**	**107**	**107**	**107**	**107**	**107**	**107**
% Yes	78					79			
% No	22					21			
% Good			58	68	70				
% Bad			11	11	13				
% Neutral			31	21	17				
% 0-5 times		46							
% 6-10 times		22							
% 11-20 times		18							
Daily		14							
% Response	100	78	100	100	98	95	34	51	37
% No Response	0	22	0	0	2	5	66	49	63

Live along Existing or Proposed Trail

Response	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Comments	Contact
Yes	20					18			
No	10					7			
Good			11	16	15				
Bad			5	5	5				
Neutral			14	9	8				
0-5 times		10							
6-10 times		6							
11-20 times		2							
Daily		2							
Response							11	19	10
No Response	0	10	0	0	2	5	19	11	20
TOTAL	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
% Yes	67					72			
% No	33					28			
% Good			37	53	54				
% Bad			17	17	18				
% Neutral			46	30	28				
% 0-5 times		50							
% 6-10 times		30							
% 11-20 times		10							
Daily		10							
% Response	100	67	100	100	93	83	37	63	33
% No Response	0	33	0	0	7	17	63	37	67

Live within 1/8 mile of Existing or Proposed Trail

Response	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Comments	Contact
Yes	29					30			
No	5					4			
Good			25	27	26				
Bad			4	3	3				
Neutral			5	4	5				
0-5 times		12							
6-10 times		3							
11-20 times		8							
Daily		6							
Response							13	17	13
No Response	0	5	0	0	0	0	21	17	21
TOTAL	**34**	**34**	**34**	**34**	**34**	**34**	**34**	**34**	**34**
% Yes	85					88			
% No	15					12			
% Good			73	79	76				
% Bad			12	9	9				
% Neutral			15	12	15				
% 0-5 times		41							
% 6-10 times		10							
% 11-20 times		28							
Daily		21							
% Response	100	85	100	100	100	100	38	50	38
% No Response	0	15	0	0	0	0	62	50	62

Live within 1/4 mile of Existing or Proposed Trail

Response	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Comments	Contact
Yes	33					32			
No	9					10			
Good			25	29	31				
Bad			3	4	6				
Neutral			14	9	5				
0-5 times		15							
6-10 times		9							
11-20 times		5							
Daily		4							
Response							12	19	17
No Response	0	9	0	0	0	0	30	23	25
TOTAL	**42**	**42**	**42**	**42**	**42**	**42**	**42**	**42**	**42**
% Yes	79					76			
% No	21					24			
% Good			60	69	74				
% Bad			7	10	14				
% Neutral			33	21	12				
% 0-5 times		45							
% 6-10 times		27							
% 11-20 times		15							
Daily		13							
% Response	100	79	100	100	100	100	29	45	40
% No Response	0	21	0	0	0	0	71	55	60

Location not given

Response	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Comments	Contact
Yes	1					1			
No	0					0			
Good			1	1	1				
Bad			0	0	0				
Neutral			0	0	0				
0-5 times		1							
6-10 times		0							
11-20 times		0							
Daily		0							
Response							0	0	0
No Response	0	0	0	0	0	0	1	1	1
TOTAL	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
% Yes	100					100			
% No	0					0			
% Good			100	100	100				
% Bad			0	0	0				
% Neutral			0	0	0				
% 0-5 times		100							
% 6-10 times		0							
% 11-20 times		0							
Daily		0							
% Response	100	100	100	100	100	100	0	0	0
% No Response	0	0	0	0	0	0	100	100	100

Summer Creek Trail Survey Results—General Citizen Comments

I would be interested in the improvements—just to know. Don't know how much and where the money is coming from—I already love the walking area.

This sounds like a great idea—I'd love to have a longer trail system in my neighborhood.

What you are suggesting is very nice and would sure to improve property values. But the economy is experiencing hard times, so this sort of thing should be placed on "the back burner." Schools very much need our attention!

While it would be great to have gaps filled with paved trail, asphalt is expensive. A trail of wood chips would be a great first step.

We prefer not to have it widened.

I like to see improvements to our area of Tigard.

Once the nice weather arrives we use the park and trail system daily for: walking, running, and biking. We would love to see the trail extended to Fanno Creek—it would make it that much easier for our biking and running. We do have some concerns about traffic on some of the nearby streets. Neighborhood traffic on SW 130th through the park area (over the small bridge) is concerning. There is a curve in the road cards are unable to see pedestrians and most cars speed through the section.

Does the trail cross 135th, toward Murray? It looks like it on the map!

Many people in our area enjoy walking. We would enjoy these trails which would enhance the quality of life as we live In Tigard.

Fantastic trail—take our dogs there all the time.

Need for more tennis courts and bathrooms near Edgewater Court end of Summer Lake Park. It is nice to ride bikes away from traffic on trails. Nice to have trail hook up with Cook Park.

For my purposes, the Summer Creek Trail is fine as it is, and I hate to think of having to dodge cyclists if it's extended. However, for future uses—generations etc. I think it should be started.

Infilling and extending will create more opportunities for use. The more users the trail system has, the more support there should be for improving (maintenance). In a physical sense, and an outreach sense, I'd put the priority on making connections.

Area A [referring to area W of Summer Lake Park] is where I live. I don't believe that it would be beneficial tax dollars to extend or improve existing structures (i.e. pavement). Bang for your buck! I think your money would be better spent improving structures at a low cost. #1: Incorporating more adult and teen facilities such as Frisbee golf which utilizes existing structure (9 holes at $200 per hole). There is a lot of land space that is not being utilized. So utilize what you already have to benefit a larger population of our community. The tennis and basketball courts are used throughout the summer months, however, these facilities could be used in a more beneficial way in our community if they were lighted. Both courts are not used in the winter and spring due to lighting conditions. Again these infill structures could be improved by adding lighting for the shorter seasons. The lighting could be set on timer systems, as to not waste. As our days get shorter in the winter months here in the NW we are forced inside to exercise. It would be great if we could create an outdoor alternative with an existing plat.

Extending or widening the existing trail does not bother us, however we don't see the need. Upkeep of the park grounds is our top concern.

I believe extending these trails and connecting them will increase/encourage the homeless traffic in both these areas.

Love running on trails. Thank you for improving/filling/and extending them.

There is not much information given in your letter, so it is hard to have an opinion one way or another. It would be great if the trails were wide enough to allow children to ride bikes without running into people walking or jogging on the trails. I am against any building that negatively impacts the wildlife around Summer Creek.

I do not think that any personal property should be taken to infill or continue the trail.

We support maintenance only, no expansion or extensions.

It is foolish to spend money on this in these times. It is my experience that trails like these are vectors for criminal activity. You will need (2) additional police officers to patrol these trails.

I have several concerns about the proposed Summer Creek Trail extension: (1) The area directly behind Mary Woodward school—particularly the small lake that exists off 121st—is one of the few undisturbed wildlife areas remaining. I personally witness on a regular basis ducks, geese, cranes, eagles, and hawks. (2) I have a real concern about creating access for teenagers to hang out with drugs/alcohol and just create trouble in general. The greenspace behind Mary Woodward is a prime location for this type of disturbance. This concern is based on the reality that it already happens off the trail that comes off the end of Winter Lake Drive. The police have been called in the past to break up these disturbances. I've walked out into the wooded area during the daytime and found their beer cans, bottles, and other "party" related trash. (3) A good portion of the trail (again behind Mary Woodward school) will be built in a designated Flood Zone AE. This area was reclassified by FEMA in July 2003 from a Class C to a Class AE. (4) The cost to build a trail where it is in a flood zone and with limited land space, without disturbing the wildlife, seems like not the best use of our tax dollars.

We don't really use the trail except to walk around Summer Lake.

I believe Tigard does need better non-motorized transportation routes but firmly believe they should be in the form of bike lanes and sidewalks with proper night time lighting. This trail goes through sensitive wetlands which floor severely every year. Altering these areas to eliminate this problem will destroy habitat. Furthermore, we cannot put in proper fencing to protect our property and privacy because the flooding would take out the fencing. We have a virtual river raging through the lower ½ of our property every time it floods. We are more than willing to deal with that problem to protect the wildlife that lives in the space behind us.

Reasons I do not support extension of trails: (1) Cost of construction and ongoing maintenance—The City has other higher priorities (police, fire, roads, schools) that need the funds. (2) Safety—The trails currently in use cause more bikers, joggers, and walkers to cross roads, for example Tigard St. and North Dakota, that are not safe for pedestrians or bikers. (3) Crime—Unfortunately, wooded parks and trails are away from public view and encourage criminal activity like drinking, drug use, assaults, and possibly muggings. Thank you for sending out this survey and allowing nearby residents to express their views.

We are adamantly opposed to installing a walking trail along the Summer Creek trail greenway. There are enough trails already, especially including streets already in the area that can substitute for a trail. When we purchased our home two years ago we asked at the community meetings if a trail was planned and were told no by the engineer, no sooner than 10 years. Besides our desire for privacy, I have listed the reasons below which are the basis of our objections: (1) Money spent on trails should be used for street repairs. (2) The area can flood with little warning along Summer Creek within 1 hour of the dam breaching up to 2 feet. (3) Wildlife protection should be a priority. (4) Garbage along the trail will increase that homeowners need to pick up. (5) Parking at path entrances is not available—check along the road by Fowler Middle School. (6) Coyotes have been spotted along this area. (7) Everyone I asked at the town meetings who wanted the trail did not live along the trail so would not suffer any ramifications.

APPENDIX B. GREENWAY TRAIL ALIGNMENT FEASIBILITY ASSESSMENT

PLEASE NOTE: The documents contained in this appendix reflect the initial trail alignment options and feasibility analyses conducted during development of the Tigard Greenway Trails System Master Plan. **These documents do not reflect the final alignments, analysis, recommendations, or cost estimates for greenway trail projects included in the final Tigard Greenway Trails System Master Plan**. They are provided only as background documentation to illustrate the breadth of alignments evaluated and the evaluation process used to develop the Plan.

TECHNICAL MEMORANDUM

Tigard Greenway Trails Master Plan

Specific Issues Report: Summer Creek, Krueger Creek, and Fanno Creek Trail Gaps and Opportunities

Date: November 10, 2010 Project #: 10622

To: Duane Roberts and Steve Martin, City of Tigard

From: Hannah Kapell, Robin Wilcox, and Mike Tresidder, Alta Planning + Design

cc: Beth Wemple and Erin Ferguson, Kittleson and Associates

Introduction

This memorandum considers specific implementation questions regarding the feasibility of closing the Summer Creek Trail, Kreuger Creek Trail, and Fanno Creek Trail gaps. Each section presents a brief overview of the proposed trail or gap, as well as opportunities and constraints associated with completing the segment. The Summer Creek Trail and Kreuger Creek Trail were divided into logical segments based on major roads or other barriers to completion, and each section is discussed independently. For the Fanno Creek Trail gaps, each option for infilling every gap is presented separately, due to the higher level of detail involved in that analysis.

TYPICAL CONSTRAINTS AND ISSUES

This analysis considers a multitude of constraints to developing the trails, including property impacts, Sensitive Lands Designation, wetland requirements, sensitive habitats, slopes, and other factors. Specific requirements for these factors will be discussed in the Environmental Memorandum that will accompany the Task 3 and Task 4 Specific Issue Reports. Where the designation would impact the cost estimate (e.g. wetlands require boardwalk), the costs were included in estimates.

Clean Water Services (CWS) allows a pathway up to 12' in width, including any structural embankment, and requires that the corridor be upgraded or returned to "Good Condition."[1] CWS allows paths up to 14' if constructed using low impact development approaches (LIDA),

[1] Definitions and upgrading strategies are available at:
http://www.cleanwaterservices.org/PermitCenter/DesignAndConstruction/DandCTable.aspx

including porous pavement.[2] In addition, no native trees greater than 6" diameter should be removed,[3] and the pathway should be in the outermost 40% of the Vegetated Corridor.

Metro's Green Trails handbook, CWS guidelines, and the City's Sensitive Lands information all indicate that creek crossings should be kept at a minimum and should be at the point with the shortest distance when feasible. The Green Trails handbook also makes the following recommendations:

- Avoid routes with habitat or wetland impact unless there is no alternative route... an alternative route would be a utility corridor or a nearby low-traffic road
- Preference should be given to areas that already show signs of user-disturbance
- If sensitive areas cannot be avoided, keep the trail at the habitat edge
- To limit impact use an elevated trail (boardwalk)
- Trails should not parallel long stretches of riparian or stream side corridor
- Encourage infiltration (use permeable asphalt and concrete if possible) and minimize erosion and runoff
- Avoid long sustained grades
- Avoid flat ground (less than 5% slope) and very steep ground (greater than 25%)

Under the Tigard Community Development Code, areas within the 100-year floodplain are designated Sensitive Lands. Trail in these areas require additional local permitting, although a 12' trail (or 14' provided LIDA standards are followed) is allowed as a conditional use. CWS "Design and Construction Standards" must be followed under these circumstances. Where a trail alignments is within the vegetated corridor, the information was noted but did not influence the cost estimate at this time.

COST ESTIMATES

Cost estimates and design treatments are based on Technical Memorandum #2, Greenway Trails Typical Sections. Cost estimates account for necessary design treatments, such as the need for retaining walls or stairs in areas with steep slopes. Trails in wetlands are assumed to use boardwalk, and also include an allowance for wetland mitigation and riprap[4] where the trail is parallel to a stream. Trails alignments in flood plains and 'strictly limit' habitat areas were identified in the discussion and evaluation. Costs for permitting were assumed to be 8% of the total construction cost of the project, although costs vary widely. Costs also include estimates for easements or land acquisition, based on an estimate of $6 per square foot in residential areas and $16 per square foot in commercial areas. The need for private property acquisition is also included as the 'right-of-way' evaluation criteria, discussed below.

[2] Section 4.07 CWS Design and Construction Standards
[3] If native trees over 6" in diameter must be removed for a trail alignment, additional mitigation is required per CWS standards.
[4] A medium to large angular rock that helps dissipate water flow and reduces erosion.

The minimum (low design) cost estimate therefore includes necessary design treatments; where possible or appropriate, the low cost assumes a soft surface trail surface, as well as no crossing elements, signing, lighting, or other amenities. In addition, the low cost estimate includes the least design appropriate for the trail type; for example, low design costs for Fanno Creek assume a paved facility. Depending on the location, a high level of treatment may consider a 12 -foot trail with 2' shoulders paved with permeable asphalt,[5] which would have wayfinding signage, lighting, and bicycle parking. Cost estimates are rounded to the nearest $1,000.

All proposed trail alignments are based on the Base Maps and field verifications performed by the Consultant team. Due to the higher level of detail, high, medium, and low design cost estimates were developed for all alternatives of the Fanno Creek Trail alignments, whereas the alternatives for Summer Creek and Krueger Creek Trails were themselves designated as high, medium, or low design. All cost estimates are provided in Appendix A.

EVALUATION CRITERIA

Several of the gaps considered in this analysis have multiple alternative potential alignments. In order to prioritize between these alignment options, the criteria and factors described in Table 1 were taken into account. These criteria were developed based on issues identified by the City of Tigard, Metro and ODOT, and reflect the challenges associated with the individual alignments. The evaluations informed alignment recommendations by providing information about the potential benefits and challenges associated with each alignment. These rankings were not combined into an overall rating for each alignment, but were used to inform decision-making through a qualitative process.

For the evaluation, a "●" indicates that the alignment fully meets the criteria, a "◑" means that the alignment somewhat fulfills the criteria, while a "○" indicates that the alignment does not meet the criteria.

[5] While CWS allows a trail over 12' in width if permeable surfacing is used, some soil composition types are not compatible with permeable surfacing. Based on geotechnical engineering judgment, the high design option may not be recommended for a particular alignment, and a 10' trail with 1' shoulders would be recommended.

Table 1. Evaluation Criteria

Criteria	Definition	Measures
Connectivity	This criterion evaluates connectivity and access to residential, commercial or employment areas as well as schools.	Provides the most direct access to destinations such as major employers, commercial centers Minimizes out of direction travel
Safety and Security	This criterion addresses the safety concerns of trail users traveling along the trail. The better the sightlines, the higher the score.	Surrounding area is open and visible from all angles Trail users have good lines of sight along the trail and to immediate adjacent surrounding area No buildings or large structures obscure views of the trail
User Experience	This criterion measures the quality of the users' experience of the trail. It considers potential views, environmental aesthetics, comfort and characteristics such as noise, and air quality.	Limits proximity of the trail major roads Limits views of industrial/commercial activity Minimizes level of noise from surrounding land uses such as roadways and railroads Potential and ease of providing amenities (e.g. directional signage)
Topographical Constraints	This criterion considers topographical constraints and the ease of providing for ADA accessibility. Higher scores if earth moving, retaining walls and long ramps are not needed or minimized.	Minimizes number of slopes associated with option If present, slopes are minimized Ample room to grade trail to meet ADA accessibility Minimizes length of ramps needed
Environmental Impacts	This criterion evaluates whether each alignment minimizes environmental impacts.	Minimizes impacts to floodplain, wetland, or Clean Water Services designated Sensitive Lands, or Goal 5 habitat
Cost	This criterion will score options based on the cost of design, engineering, and/or construction, based on the minimum cost estimates (the low design cost option).	Minimizes cost of easement / acquisition Minimizes cost of design/engineering/construction Minimizes cost of maintenance
Right-of-way	This criterion addresses the number of property owners that the City will need to work with in order to construct the alignment.	Alignment on land that is owned by the City of Tigard, Metro, or other public body Minimizes impacts on private property

The neighborhood survey provides a basis for public support of trail segments, which will be included in the final consideration of the implementation of the alternatives.

Summer Creek/Krueger Creek Trail Feasibility

Few segments of the Summer Creek Trail and Krueger Creek Trail have been completed or scheduled for construction. The City owns most of the land needed for proposed segments of these trail corridors; however, there is neighborhood opposition to some links due to proximity to the wetlands. The proposed alignments would connect into the existing paved Summerlake Park trails and the soft surface Ascension Trail. This section considers feasibility of these trails, evaluating the physical and other constraints associated with each corridor.

SUMMER CREEK TRAIL

The Summer Creek Trail has been constructed in the vicinity of Summerlake Park as well as short segments between Barrows Road and 135th Avenue and between 114th and Gallo Avenues. The proposed alignments connecting the gaps from Barrows Road to the existing Fanno Creek Trail are:

1. 135th Avenue to Summerlake Park
2. Summerlake Park to 121st Avenue
3. 121st Avenue to 114th & Gallo Neighborhood Trail
4. Gallo Avenue Trail to Fanno Creek Trail

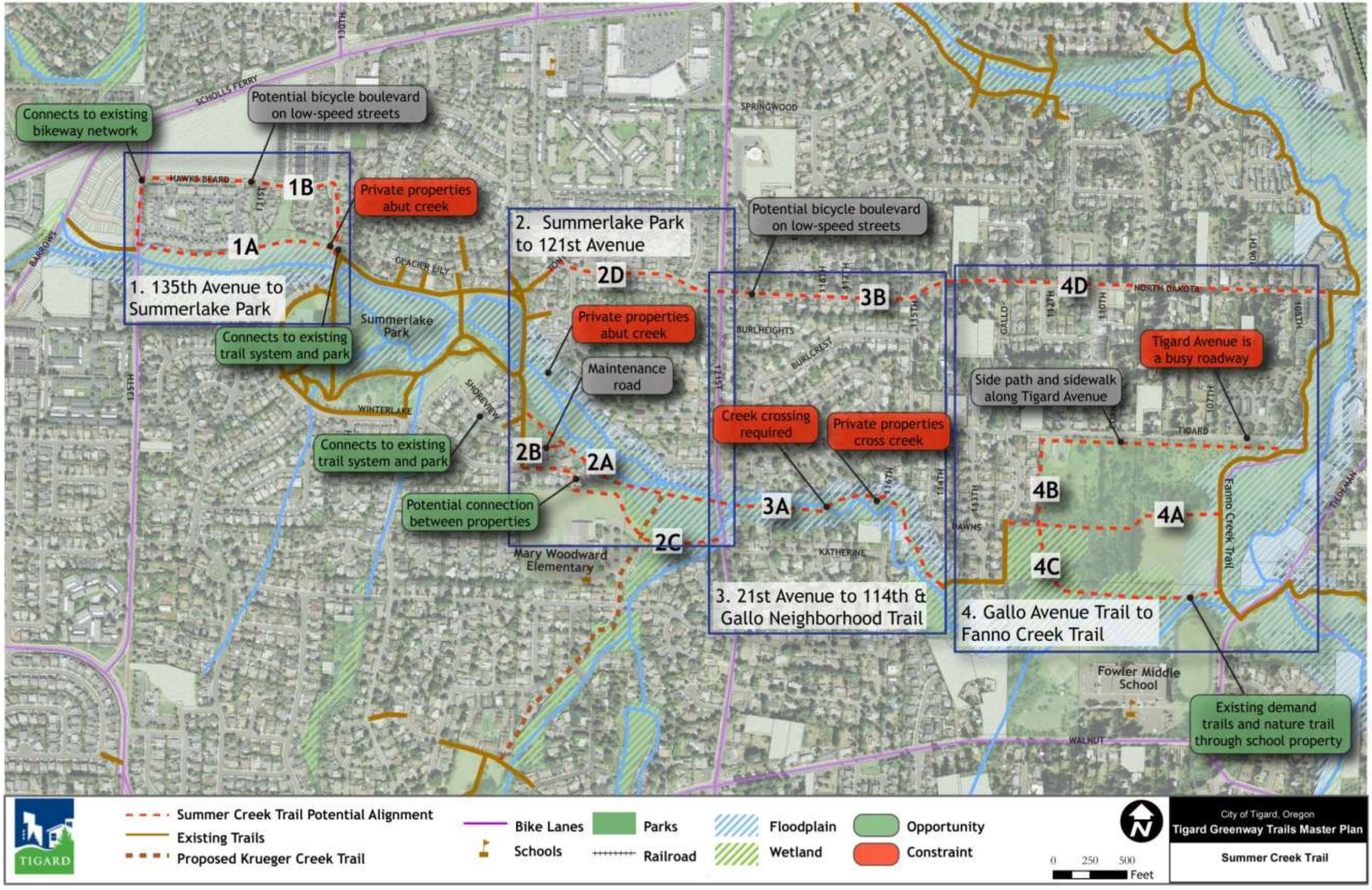
Evaluation

Significant barriers impact the feasibility of the Summer Creek Trail, particularly environmental constraints, private properties, and high costs. However, the proposed trail would connect to several parks, schools, and existing trails, and provide recreation and transportation benefits. Table 2 shows the analysis of the alignments. The on-street alignment along North Dakota Road (Alignments 2D, 3B, and 4D) would be a good short-term connection to Summerlake Park.

Table 2. Summer Creek Trail Evaluation of Alignments

	1. 135th Avenue to Summerlake Park		2. Summerlake Park to 121st Avenue				3. 121st Avenue to 114th & Gallo Neighborhood Trail		4. Gallo Avenue Trail to Fanno Creek Trail			
Criteria	**1A**	**1B**	**2A**	**2B**	**2C**	**2D**	**3A**	**3B**	**4A**	**4B**	**4C**	**4D**
Connectivity	●	◑	◑	◑	●	◑	◑	◑	●	●	●	●
Safety and Security – Trail Users	●	◑	◑	◑	●	◑	◑	◑	◑	●	○	◑
User Experience	●	◑	●	●	◑	◑	●	◑	◑	●	○	◑
Topographical Constraints	●	●	●	●	●	●	●	●	●	●	●	●
Environmental Impacts	○	●	○	○	○	●	●	●	◑	◑	●	●
Cost	○	●	○	○	◑	●	○	●	◑	◑	●	●
Right-of-way	○	●	○	○	◑	●	○	●	◑	◑	◑	●

Based on this analysis, it is recommended that the City continue pursuing the development of this trail, concentrating on areas that connect to the existing Summerlake Park trail system.


Connects to existing bikeway network
Potential bicycle boulevard on low-speed streets
Private properties abut creek
1B
1A
1. 135th Avenue to Summerlake Park
Connects to existing trail system and park
Summerlake Park
2. Summerlake Park to 121st Avenue
2D
Private properties abut creek
Maintenance road
2B
2A
Potential connection between properties
2C
Mary Woodward Elementary
Connects to existing trail system and park
Potential bicycle boulevard on low-speed streets
3B
Creek crossing required
Private properties cross creek
3A
3. 21st Avenue to 114th & Gallo Neighborhood Trail
4D
Tigard Avenue is a busy roadway
Side path and sidewalk along Tigard Avenue
4B
4A
4C
4. Gallo Avenue Trail to Fanno Creek Trail
Fanno Creek Trail
Fowler Middle School
Existing demand trails and nature trail through school property
SCHOLLS FERRY
SPRINGWOOD
HAWKS BEARD
GLACIER LILY
WINTERLAKE
SHOREVIEW
BURLHEIGHTS
BURLCREST
KATHERINE
NORTH DAKOTA
TIGARD
WALNUT
TIGARD
Summer Creek Trail Potential Alignment
Existing Trails
Proposed Krueger Creek Trail
Bike Lanes
Schools
Parks
Railroad
Floodplain
Wetland
Opportunity
Constraint
0 250 500
Feet
City of Tigard, Oregon
Tigard Greenway Trails Master Plan
Summer Creek Trail

Summer Creek Trail – 135th Avenue to Summerlake Park | 1

Summary

The two options for this segment are to follow the creek (Alignment 1A) or to provide an on-street connection (Alignment 1B). All of Alignment 1A is in a floodplain and a wetland. Several properties are directly adjacent to the water on both sides of the creek. The on-street Alignment 1B would make use of existing completed sidewalks and a bike lane on SW 135th Avenue. Improvements would include bicycle boulevard treatments on Hawks Beard Street and SW 130th Avenue. Both options would connect to an existing trail between SW 135th Avenue and Barrows Road, and the Summerlake Park Trails.

Private properties directly abut Summer Creek through this segment.

Opportunities

- Closes a gap between two existing trails (all)
- Connects to an existing bicycle route (all)
- Connects to Summerlake Park (all)
- Low volume street potential short-term alternative as bicycle boulevard (1B)

The east end of the proposed segment would connect across 130th Avenue to the existing Summerlake Park Trails.

Constraints

- Entire length through wetland and floodplain (1A)
- Length through 'strictly limit' habitat area (1A)
- Close proximity to multiple private properties (1A)
- Requires out-of-direction travel (1B)
- Less pleasant user experience (1B)

Summerlake Park trails are asphalt and 8 to 10 feet wide.

Cost Opinion

High Design Option: Alignment 1A

- Length: 1,315' (1,002' in wetland)
- Design: 12' asphalt/boardwalk, fencing, permitting
- Planning-level cost: $1,797,000

Medium Design Option: Alignment 1A

- Length: 1,315'(1,002' in wetland)
- Design: 6' gravel/boardwalk, fencing, permitting
- Planning-level cost: $1,320,000

Low Design Option: Alignment 1B

- Length: 2,118
- Design: on-street, pavement markings and signs
- Planning-level cost: $6,000

Summer Creek Trail –Summerlake Park to 121st Avenue | 2

Summary

Alignment 2A travels along the south side of the creek and is in a floodplain and wetland. A north side option would be difficult due to private properties adjacent to the creek. Alignment 2B would use an existing maintenance road, then follow Alignment 2A on the south side of the creek. Either would require crossing approximately 50' of Tigard-Tualatin School District Land. The partially on-street Alignment 2C would connect to Winter Lake Drive via the Summerlake Park trails. The trail could fit between two houses at the cul-de-sac and continue along an approximately 350' easement from Mary Woodward Elementary. Alignment 2D involves bicycle boulevard treatments on North Dakota Street, which has completed sidewalks and speed bumps.

Opportunities

- Connects the Summerlake Park trail system to Mary Woodward Elementary (all, especially 2C)
- Connects to an existing bicycle route (all)
- Connects to proposed Krueger Creek Trail (2A,2B,2C)
- Uses maintenance road to minimize impacts (2B)
- Along street with existing traffic calming (2D)

Constraints

- Significant portions through wetland and floodplain
- Close proximity to private property (all)
- Portions in 'strictly limit' habitat area (2A, 2B, 2C)
- Safety concerns with trail through elementary (2C)
- Need for easement between two houses (2C)

Cost Opinion

High Design Option: Alignment 2A
- Length: 1,588'
- Design: Boardwalk, fencing, permitting
- Planning-level cost: $2,733,000

Medium Design Option: Alignment 2B
- Length: 1,588'
- Design: Boardwalk/10' asphalt, permitting
- Planning-level cost: $2,643,000

Low Design Option 1: Alignment 2C
- Length: 1,584'
- Design: on-street, boardwalk/6' asphalt, permitting
- Planning-level cost: $1,924,000

Low Design Option 2: Alignment 2D
- Length: 1,223'
- Design: bicycle boulevard markings & signs
- Planning-level cost: $4,000

A maintenance road runs parallel to private properties along part of this segment.

The maintenance road continues to the waterfront and is overgrown at this pinch point between Summer Creek and private property.

A connection between Mary Woodward Elementary and Winter Lake Drive could be opened by providing access through this fence.

Summer Creek Trail – SW 121st Avenue to Neighborhood Trail | 3

Summary

This entire segment is in a floodplain and a wetland. Multiple private properties are adjacent to the creek and two fences cross the creek, blocking access. Additional field work is required to determine if these fences are on City- or privately-owned property. Alignment 3A would potentially require a creek crossing to avoid private property or meandering segments of the creek. Alignment 3B would connect to Alignment 2D and continue as bicycle boulevard pavement markings and signs on North Dakota Street.

Opportunities

- Connects to an existing trail (3A)
- Uses low-volume road with existing traffic calming (3B)
- Connects to an existing bicycle route (both)

Constraints

- Entire length through wetland and floodplain (3A)
- Requires creek crossing (3A)
- Close proximity to private property (3A)
- Majority of trail in 'strictly limit' habitat area (3A)
- Bicycle boulevard treatments less comfortable than trail alignment (3B)

Cost Opinion

High Design Option: Alignment 3A

- Length: 1,844'
- Design: 12' permeable asphalt/boardwalk, fencing, signal on SW 121st Avenue, permitting, acquisition
- Planning-level cost: $2,751,000

Medium Design Option: Alignment 3A

- Length: 1,844'
- Design: 10' asphalt/boardwalk, crosswalk, permitting, acquisition
- Planning-level cost: $2,526,000

Low Design Option: Alignment 3B

- Length: 1,263'
- Design: pavement markings, signs, sidewalk
- Planning-level cost: $542,000

Several private properties have fenced across the creek and blocked access.

A board has been used to cross the creek shortly before the fences make the southern shore impassible.

Looking north from the existing trail at the east end of the segment.

Summer Creek Trail – Gallo Avenue Trail to Fanno Creek Trail | 4

Summary

This segment would provide a connection from an existing neighborhood trail on Gallo Avenue to the Fanno Creek Regional Trail. Many demand trails currently exist through the area around Fowler Middle School, and an off-street connection could connect through the school property either along the soft surface nature trail (Alignment 4A) or above the sports field (Alignment 4B).. A side path could provide access along Tigard Street (Alignment 4C), as motor vehicle speeds and volumes are too high for an on-street bicycle route (2008 estimates: 1,900 ADT between 115th and Cornell Place; 3,000 ATD between Cornell Place and Tiedeman). A continuation of the on-street facilities on North Dakota Street would connect to Alignment 3B (Alignment 4D).

Blackberries grow densely along the property adjacent to Gallo Avenue.

Many demand trails cut through the wood around Fowler Middle School

Opportunities

- Connects a neighborhood trail to Fanno Creek (4A, 4B, 4C)
- Enhances safe routes to schools opportunities (all)
- New off-street path (4A, 4B, 4C)

Constraints

- All of Alignment 4A, 180′ of Alignment 4B and 250′ of Alignment 4C in 'strictly limit' habitat
- Majority of Alignment 4A in wetland
- Trail along Tigard Street (4C) less comfortable for users
- Bicycle boulevard treatments less comfortable than trail alignment (4D)

Cost Opinion

High Design Option 1: Alignment 4A

- Length: 1,645′
- Design: 12′ permeable asphalt/boardwalk, permitting
- Planning-level cost: $1,965,000

High Design Option 2: Alignment 4B

- Length: 1,228
- Design: 12′ permeable asphalt, permitting
- Planning-level cost: $283,000

Medium Design Option: Alignment 4C

- Length: 1,501′
- Design: 10′ asphalt, permitting
- Planning-level cost: $189,000

Low Design Option: Alignment 4D

- Length: 3,034
- Design: pavement markings and signs, sidewalks
- Planning-level cost: $835,000

KRUEGER CREEK TRAIL

The Kreuger Creek Trail proposed alignment begins along the proposed Summer Creek Trail near Mary Woodward Elementary. The trail would be located in the narrow creek corridor between private properties, connecting to the existing trails through Jack Park. The alignment would continue south adjacent to the newly-constructed fire station. After crossing Walnut Street, the trail would be located along an access road, then cross Gaarde Street and 132nd Avenue. The trail would ascend steeply between private properties along a partially-completed trail, which includes two sets of stairs. The trail would continue on-street along Broadmoor, Whitehall, and Lauren, to connect with the existing soft surface Ascension Trail via upgrades to the current narrow and steep switchbacks.

Evaluation

Section 1, the northeastern end of the proposed Krueger Creek Trail near Mary Woodward Elementary, would have significant environmental and property impacts. The greenway corridor is narrow, and the right-of-way between the creek and the private properties is insufficiently large for construction of a trail. In addition, the alignment would require several street crossings at locations with poor visibility. These factors indicate that this section of trail should not be a priority for the City of Tigard. However, the section from Jack Park to the parking lot at the fire station has been previously proposed and would provide a valuable connection. The route would follow an old road alignment and cross the creek, providing access to parking for Jack Park. An on-street connection along SW 125th Avenue, SW Ann Circuit, SW 127th Avenue, and SW 128th Avenue is a potential solution to connect Mary Woodward Elementary to Jack Park or as a short-term solution if other sections of the trail are completed.

The section from Walnut Street to Broadmoor Place has similar private property and environmental challenges, as well as challenging crossings at Walnut and Gaarde Streets. From Gaarde Street, a multi-use trail would not be possible, given steep slopes and limited right-of-way. This section does not provide direct connections to important destinations, and is not recommended as a priority for the City.

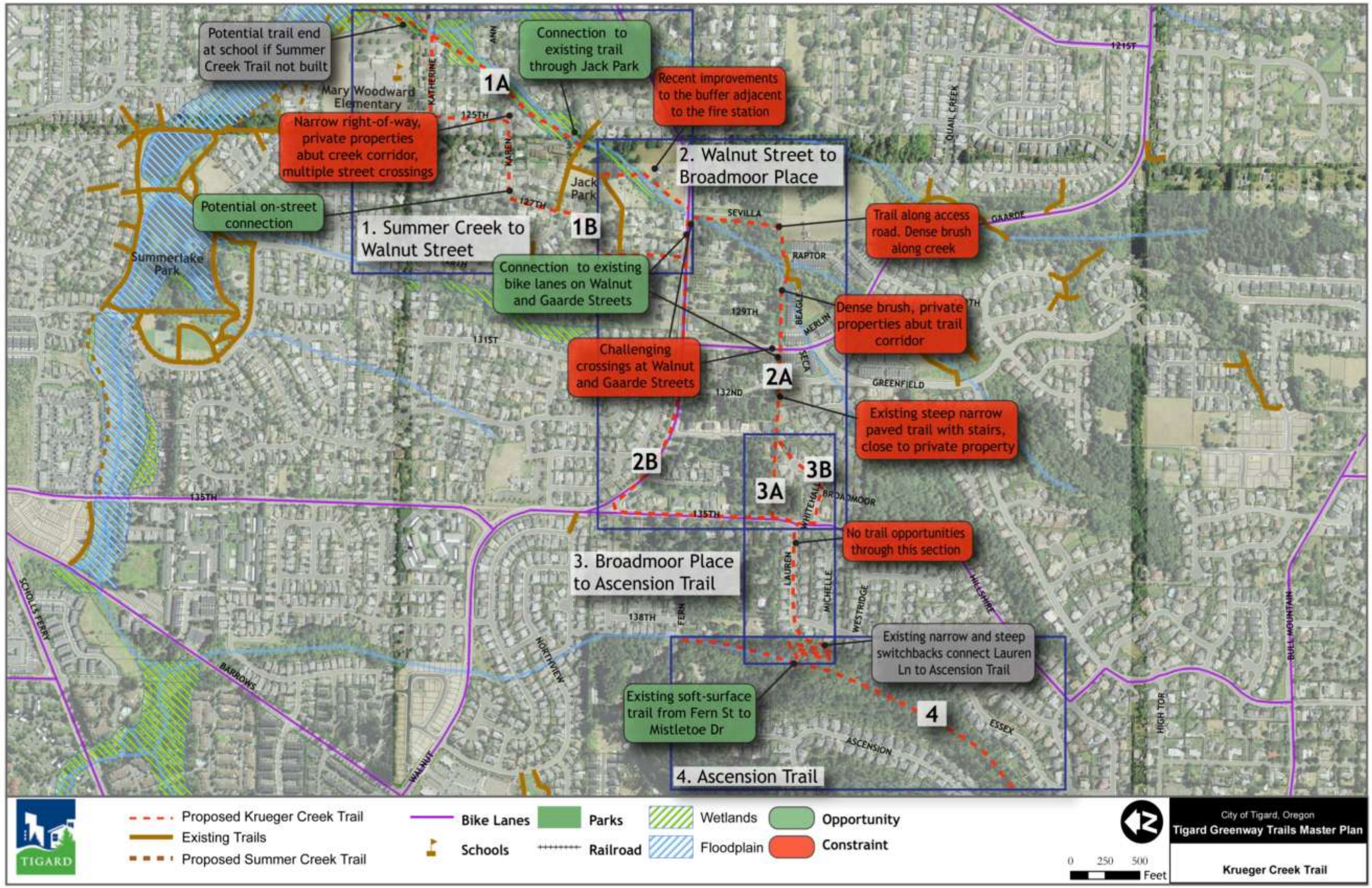
The on-street connection from Broadmoor Place to the Ascension Trail access at Lauren Lane would be relatively inexpensive, but would not be recommended unless the connection east to Gaarde Street was improved. However, the access to the Ascension trail could be improved to provide access to that facility.

Due to the natural environment, steep slopes, and sensitive habitat, it is recommended that the Ascension Trail not be paved, but potential upgrades would improve drainage, reduce erosion, and protect the environmental resources through the corridor. Significant additional use is likely to adversely impact the habitat and environment of the trail, further discouraging the connection to Summer Creek Trail.

Table 3 presents an evaluation of the Alignments considered for the Krueger Creek Trail.

Table 3. Krueger Creek Trail Evaluation of Alignments

Criteria	1. Summer Creek to Walnut Street		2. Walnut Street to Broadmoor Place		3. Broadmoor Place to Ascension Trail	4. Ascension Trail
	1A	1B	2A	2B	3	4
Connectivity	●	●	◑	◑	○	●
Safety and Security – Trail Users	●	◑	○	○	○	●
User Experience	◑	◑	◑	○	○	●
Topographical Constraints	●	●	○	○	○	◑
Environmental Impacts	○	●	◑	●	◑	◑
Cost	○	●	○	●	◑	◑
Right-of-way	○	●	◑	●	◑	●


Potential trail end at school if Summer Creek Trail not built
Connection to existing trail through Jack Park
Recent improvements to the buffer adjacent to the fire station
Mary Woodward Elementary
Narrow right-of-way, private properties abut creek corridor, multiple street crossings
1A
2. Walnut Street to Broadmoor Place
Potential on-street connection
1. Summer Creek to Walnut Street
1B
Summerlake Park
Connection to existing bike lanes on Walnut and Gaarde Streets
Trail along access road. Dense brush along creek
Dense brush, private properties abut trail corridor
Challenging crossings at Walnut and Gaarde Streets
2A
2B
3B
3A
Existing steep narrow paved trail with stairs, close to private property
No trail opportunities through this section
3. Broadmoor Place to Ascension Trail
Existing narrow and steep switchbacks connect Lauren Ln to Ascension Trail
Existing soft-surface trail from Fern St to Mistletoe Dr
4
4. Ascension Trail
Proposed Krueger Creek Trail
Existing Trails
Proposed Summer Creek Trail
Bike Lanes
Schools
Parks
Railroad
Wetlands
Floodplain
Opportunity
Constraint
TIGARD
0 250 500
Feet
City of Tigard, Oregon
Tigard Greenway Trails Master Plan
Krueger Creek Trail

Krueger Creek Trail – Summer Creek to Walnut Street | 1

Summary

This segment would provide a connection from the proposed Summer Creek Trail to Walnut Street. Approximately 70-150 feet of exists between existing buildings at most locations on this corridor. After accounting for topography, meandering of the creek, CWS standards, and private property lines, little space exists on either side of the creek for a continuous trail. A greenway trail on this segment would likely require easements, creek crossings, and boardwalks. Alignment 1A would traverse the creek corridor and connect to existing trails through Jack Park. It would continue south adjacent to the new fire station, along the proposed alignment to connect the Jack Park trails with the parking lot at the fire station. Significant improvements have been made to the buffer near the fire station, where the trail would pass. Alignment 1B considers an on-street connection along SW 125th Avenue, SW Ann Circuit, SW 127th Avenue, and SW 128th Avenue.

The area where Summer Creek Trail and Krueger Creek Trail would meet is dense wetlands.

Recent improvements have been made to the buffer near the new fire station on Walnut Street.

Opportunities

- Enhances safe routes to schools opportunities (all)
- Provides a new off-street trail with planned connection to fire station and parking for park (1A)

Constraints

- Majority of trail in wetland, small segment in floodplain (1A)
- The creek corridor is narrow and private properties abut on both sides (1A)
- Route crosses three residential streets, including Walnut Street (1A)
- On-street alternative requires out-of-direction travel, less comfortable environment (1B)
- Off-street options require easement from Tualatin Valley Fire & Rescue.

Cost Opinion

High Design Option: Alignment 1A

- Length: 2,501 (317' built in Jack Park)
- Design: boardwalk, signal at Walnut Street, crosswalks at SW Katherine Street/SW 124th Avenue, precast concrete bridge, permitting
- Planning-level cost: $3,803,000

Medium Design Option: Alignment 1A

- Length: 2,501 (317' built in Jack Park)
- Design: boardwalk, crosswalks at all streets (3), wood bridge, permitting
- Planning-level cost: $3,580,000

Low Design Option: Alignment 1B

- Length: 3,165
- Design: on-street, pavement markings and signs
- Planning-level cost: $8,000

Krueger Creek Trail –Walnut Street to Broadmoor Place | 2

Summary

This segment is a steep route up Bull Mountain. Parts of this segment are constructed, although they require walking along driveways with public easements. From Walnut Street, the trail would be adjacent to Sevilla Avenue, then would turn west to connect to the neighborhood trail between Raptor Place and Beagle Circuit. Alignment 2A would cross a creek and pass between private property to cross SW Gaarde Street and SW 132nd Terrace. It would connect to existing stairs and a narrow concrete trail that connects to Broadmoor Place via two driveways. Alignment 2B would make use of existing bike lanes on SW Walnut Street and SW 135th Avenue.

The woods between Sevilla Avenue and Gaarde Street are difficult to traverse due to fences and foliage.

The existing portion of this trail is close to private properties and would be difficult to widen.

Opportunities

- Provides a connection where no alternative walking route exists (2A)
- Enhances safe routes to schools opportunities (2A)

Constraints

- Steep slopes; requires stairs (2A)
- Close proximity to private property (2A)
- Route crosses Gaarde Street and 132nd Avenue (2A)
- Bike lanes on high traffic speed and volume road, steep slopes limit user types (2B)

Cost Opinion

High Design Option: Alignment 2A

- Length: 2,358'
- Design: 12' permeable asphalt,cast-in-place concrete stairs, signal at SW Gaarde Street, crosswalk at SW 132nd Terrace, permitting, acquisition
- Planning-level cost: $1,401,000

Medium Design Option: Alignment 2A

- Length: 2,358'
- Design: 10' asphalt trail, cast-in-place concrete stairs, 2 crosswalks, permitting, acquisition
- Planning-level cost: $1,032,000

Low Design Option: Alignment 2B

- Length: 2,358'
- Design: Bike lanes and signage on SW Walnut Street/SW 135th Ave, sidewalk on SW 135th Ave
- Planning-level cost: $189,000

Krueger Creek Trail – Broadmoor Place to Ascension Trail | 3

Summary

Alignment 3A continues directly to Lauren Lane, traversing land owned by Tigard Water District. The on-street route (Alignment 3B) would travel on Broadmoor Place to Whitehall Lane, crossing 135th Avenue to travel on Lauren Lane. Sidewalks exist along this section, and minimum improvements would be required. At Lauren Lane, the trail would consist of improvements to existing bench and switchbacks that descend to the existing soft surface Ascension Trail.

Opportunities

- Provides a connection to the partially completed Ascension trail

Constraints

- Connects to segments with steep slopes; no opportunity for multi-use trail
- Existing design is unstable
- On-street portion less comfortable for users

Cost Opinion

High Design Option: Alignment 3A

- Length:1,722′ (971′ on-street)
- Design: 12′ permeable asphalt trail, pavement markings/signs, crosswalk at SW 135th Avenue, 6′ gravel, switchbacks, permitting, acquisition
- Planning-level cost: $172,000

Medium Design Option: Alignment 3B

- Length: 2,082′ (1,509′ on-street)
- Design: on-street, pavement markings/signs, 6′ bark mulch, switchbacks
- Planning-level cost: $39,000

Low Design Option: Alignment 3B

- Length: 2,082′ (1,509′ on-street)
- Design: on-street, pavement markings/signs, 4′ native soil, switchbacks
- Planning-level cost: $22,000

At the end of Lauren Lane, signs warn trail users of descending to Ascension Trail.

Existing benches and switchbacks are steep and dangerous for users.

Krueger Creek Trail – Ascension Trail Segment | 4

Summary

The Ascension Trail is a soft surface trail though a gulley, leading from SW Fern Street to SW Mistletoe Drive. The trail includes stairs, wood retaining walls, and a bridge over the creek. Several accessways provide connections to adjacent properties.

Opportunities

- Existing soft surface trail
- Trail context and presence of alternate routes makes this a scenic walking route

Constraints

- Narrow trail corridor
- Significant slopes would prohibit bicycle use
- Majority of trail through 'strictly limit' habitat area

Cost Opinion

High Design Option: Alignment

- Length: 3,145'
- Design: 6' gravel trail, wood bridge, cribbed stairs, retaining wall, armored trail
- Planning-level cost: $491,000

Medium Design Option: Alignment

- Length: 3,145'
- Design: 6' bark mulch trail, wood bridge, cribbed stairs, retaining wall, armored trail
- Planning-level cost: $401,000

Low Design Option: Alignment

- Length: 3,145'
- 4' native surface trail, wood bridge, cribbed stairs, retaining wall, armored trail
- Planning-level cost: $293,000

Wayfinding signs are provided at the base of the access from Lauren Lane.

The trail is currently surfaced in bark mulch, and creek crossings and stairs do not meet established design standards.

Fanno Creek

The Fanno Creek Trail is a regional greenway trail. The existing segment in Tigard is located south of Scholls Ferry Road to SW Fanno Creek Drive (including a gap from Woodard Park to Main). The proposed extension would complete the length of the trail in Tigard and connect to the existing Tualatin River Trail.

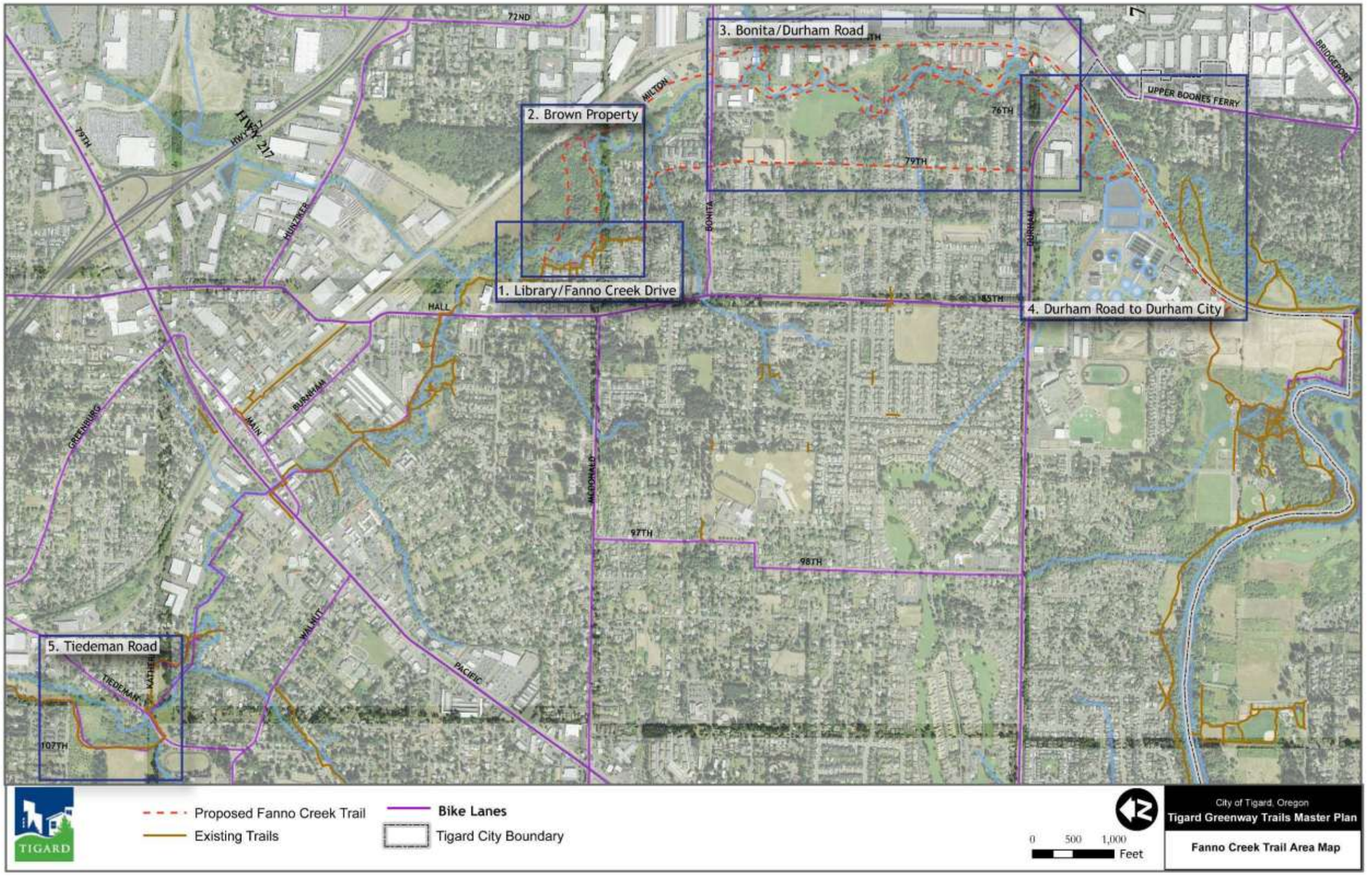
The following sections address possibilities of improving existing sections of the trail, where sharp curves or roadway crossings detract from users' comfort and safety. They also consider alignments for filling the gaps in the trail. Five sections of the Fanno Creek Trail were analyzed and the information following addresses the following questions:

1. Library/Fanno Creek Drive – Is it possible to straighten or reduce the many sharp twists and 90-degree turns that now characterize the Library/Fanno Creek Drive segment of the Fanno Creek Trail?

2. Brown Property - How feasible is the proposed "Brown Property" segment of the Fanno Creek Trail? Are there any fatal flaws or insurmountable obstacles to its construction? What is the most feasible alignment of the segment, including the most feasible stream crossing point?

3. Bonita/Durham Road - Which alignment or combination of alignments is the most feasible?

4. Durham Road/Durham City limits - Can the Durham Road/Durham City limits segment of the Fanno Creek trail realistically be accomplished given this corridor's extreme physical constraints, i.e. elevated rail bed, sewerage plant development, meandering creek, and deep gullies?


3. Bonita/Durham Road
2. Brown Property
1. Library/Fanno Creek Drive
4. Durham Road to Durham City
5. Tiedeman Road
72ND
79TH
HWY 217
MILTON
BONITA
DURHAM
76TH
85TH
UPPER BOONES FERRY
BRIDGEPORT
HUNTZIKER
HALL
GREENBURG
MAIN
BURNHAM
MCDONALD
97TH
98TH
WALNUT
PACIFIC
TIEDEMAN
KATHERINE
107TH
Proposed Fanno Creek Trail
Existing Trails
Bike Lanes
Tigard City Boundary
TIGARD
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Feet
City of Tigard, Oregon
Tigard Greenway Trails Master Plan
Fanno Creek Trail Area Map

1. LIBRARY/FANNO CREEK DRIVE

The segment of the Fanno Creek Trail south of the library is characterized by many sharp twists and 90-degree turns. Limited City land ownership through this area when the trail was developed required that the trail be constructed on the west and south sides of the creek, where private properties leave little space. In addition, the trail was designed to minimize impacts on the creek corridor. Since the time the trail was originally developed, Metro has purchased the "Brown Property," which provides additional options for trail alignments.

The alternatives for this section include continuing to use the current trail alignment while straightening the curves and bringing the trail up to regional standards (Alignment 1A). The alternative using the Brown property for a longer trail connection is discussed in the next section.

Evaluation

Table 4 provides an evaluation of the alignment for this section. This analysis indicates that it is currently feasible to reduce the sharp curves along the existing trail.

Table 4. Library/Fanno Creek Drive Evaluation of Alignments

Criteria	Alignment 1A
Connectivity	◑
Safety and Security – Trail Users	●
User Experience	●
Topographical Constraints	●
Environmental Impacts	○
Cost	○
Right-of-way	◑

Fanno Creek Trail – Library/Fanno Creek Drive | 1A

Summary

This Alignment considers straightening the curves along the existing trail segment. Options include:

- Remove stair banister encroaching on the trail
- Trail maintenance/landscaping to reduce blackberries encroaching

- North of Deeann Circuit – expand bench to reduce curve
- Connect north of Deeann Circuit to east of Char Court with trail, remove existing trail segment
- Level, grade, and repave the connection from Char Court to Fanno Creek Drive
- Wayfinding signage on Fanno Creek Drive

Opportunities

- Makes use of existing paved trail
  Many connections to residential uses

Constraints

- Maintenance issues include blackberry encroachment, trail surface, and obstacles in the trail
- Trail through a wetland and flood plain
- Entirely in 'strictly limit' habitat area

Cost Opinion

Length:

- North of Arthur Ct: 57' trail
- North of Deann Ct: 45' retaining wall, trail
- East of Char Ct: 395' boardwalk
- North of Fanno Creek Dr: 390'

High Design Option:

- Design: 12' boardwalk, precast concrete bridge, fence
- Planning-level cost: $733,000

Medium Design Option:

- Design: 12' boardwalk, wood bridge
- Planning-level cost: $686,000

Low Design Option:

- Design: 6' boardwalk, wood bridge
- Planning-level cost: $485,000

Stair banister and blackberries encroach on the trail.

An existing retaining wall at a tight corner; this could be expanded to reduce the turning radius of the trail.

Rerouting the trail across the sharp turns would reduce the quantity of paving within the creek corridor.

2. "BROWN PROPERTY" SEGMENT

Since the time the Fanno Creek Trail segment south of the library was developed, Metro has purchased a parcel that opens key options to modifying the trail. Called the "Brown property," this segment would allow a trail segment east and north of the creek, which would connect to Milton and bypass portions of the winding trail section discussed in the previous section. The most feasible alignment of this portion of the segment follows the upland demand trail on the property.

As noted, potential creek crossing locations and trail connections in the vicinity of the creek are not yet defined. Alignment options are evaluated in terms of the Brown property only.. Alignment2B breaks from the existing trail at the first corner and remains in City and Metro land, running along the north side of the Brown property. Alignment 2C would connect at the south end of the existing trail segment and travel due east, on the south side of Fanno Creek. Alignment 2D considers bicycle boulevard treatments along Fanno Creek Drive, from the end of the existing trail to Bonita Avenue.

Evaluation

The Brown property alignments are evaluated in Table 4. From this analysis, the recommended alignment and creek crossing location are shown in Alignment 2B.

Table 5. Brown Property Evaluation of Alignments

Criteria	Alignment 2B	Alignment 2C	Alignment 2D
Connectivity	●	◑	◑
Safety and Security – Trail Users	●	◑	◑
User Experience	●	◑	○
Topographical Constraints	◑	○	●
Environmental Impacts	◑	○	●
Cost	◑	○	●
Right-of-way	◑	○	●

Fanno Creek Trail – "Brown Property" Segment — 2B

Summary

This portion of the trail would travel along the north side of the Brown property.

Opportunities

- Improves trail use and user comfort
- Potential to bring trail to regional standards
- Would provide an alternative route than existing library section of trail
- Utilizes existing demand trail alignment

Constraints

- Reduces neighborhood connections
- Requires one creek crossing
- Trail through a floodplain

Cost Opinion

- High, medium, and low design options will be developed after final alignment options are defined.

The Brown Property provides a good trail environment with an existing demand trail.

Fanno Creek Trail – "Brown Property" Segment – Alignment C | 2C

Summary

This Brown property alignment would traverse the southern side of the Brown property. The majority of this alignment is located in wetland areas, the floodplain, and 'strictly limit' habitat areas. It is also likely to have greater private property impacts, due to limited right-of-way on the south side of Fanno Creek.

Opportunities

- Improves trail use and user comfort
- Potential to bring trail to regional standards

Constraints

- Requires one creek crossing
- Trail through a wetland and floodplain
- Would not provide an alternative route than existing library section of trail

Cost Opinion

- High, medium, and low design options will be developed after final alignment options are defined.

Much of the south side of the Brown property is overgrown with blackberries.

This alignment option is located within wetland, floodplain, and 'strictly limit' habitat areas.

Fanno Creek Trail – "Brown Property" Segment – Alignment D — 2D

Summary

Alignment 2D would consist of bicycle boulevard markings on the low-speed, low-volume Fanno Creek Drive.

Opportunities

- Connects trail to Bonita Road
- Inexpensive alignment

Constraints

- On-street alignment is not to regional trail standards

Cost Opinion

Length: 1,536'

High Design Option:

- Design: pavement markings every 50', 2 directional signs
- Planning-level cost: $4,600

Medium Design Option:

- Design: pavement markings every 50', 1 directional sign
- Planning-level cost: $4,000

Low Design Option:

- Design: pavement markings every 50'
- Planning-level cost: $3,600

This alignment would continue on-street with bicycle boulevard markings and signs along Fanno Creek Drive.

3. BONITA/DURHAM ROAD SEGMENT

This segment of the Fanno Creek Trail through an industrial district includes multiple owners and development located within 25-feet and closer to the top of the stream bank. Additionally, cooperative efforts with Metro over a four-year period to acquire right-of-way for a continuous streamside trail have achieved limited success.

While a combination of streamside alternatives exist, four alignments and three options were considered through this section. The alignments included:

- Alignment 3A: On-street on 74th Avenue – bike lanes or shared lane markings
    - Option 3Ai: Trail segment from 74th Avenue to west end of Metro parcel.
    - Option 3Aii: Trail loop within parcels in floodplain/wetland.
- Alignment 3B: On-street bike lanes on 74th Avenue, connect to stream-side from 74th Avenue via Metro-owned parcel
    - Option 3Bi: Trail loop from Metro parcel to parcel in floodplain/wetland.
- Alignment 3C: East side of creek from Bonita Road, crosses to west side of creek, adjacent to private properties
- Alignment 3D: On-street on 79th Avenue – bicycle boulevard treatments

An alignment that was identified in the Metro-sponsored Fanno Creek Action Plan (2003) which was not considered in this Plan is the rail-with-trail option alongside the railroad. Since 2003, Westside Express Service (WES) Commuter Rail trackage was laid along 74th Avenue, resulting in little available right-of-way for the trail alongside the railroad. In addition, the minimum setback (the distance between the paved edge of the rail-with-trail and the centerline of the closest active railroad) is between 10' to 50', depending on frequency and speed of the trains, fencing, and other considerations.[6] Given these constraints, the rail-with-trail alignment was not considered feasible.

All of the alignments have to cross Bonita Road. The Fanno Creek Action Plan recommended an unprotected mid-block crossing with overhead warning beacons.

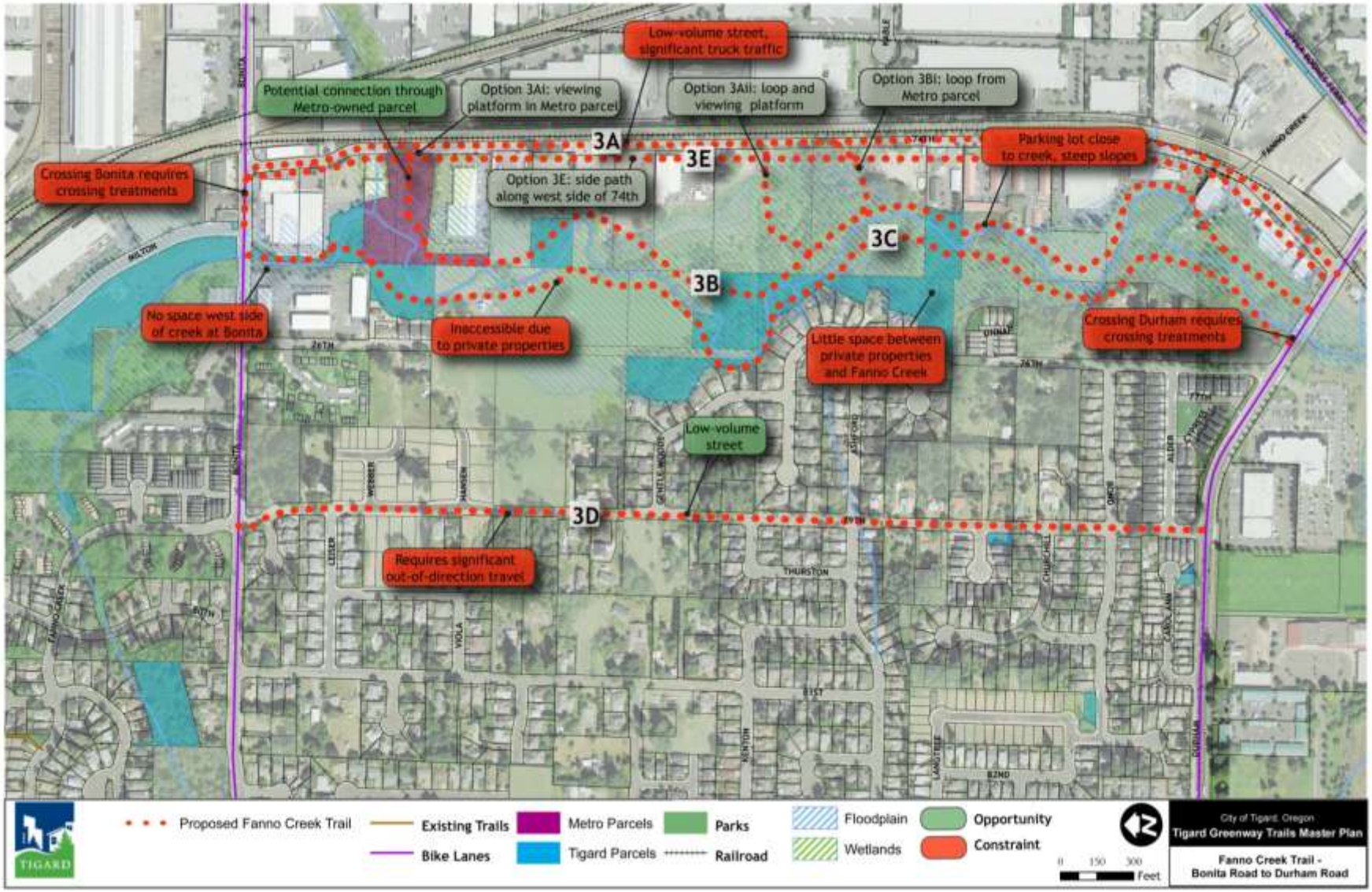
Evaluation

The alignments are evaluated in Table 4. Due to significant environmental and topographical constraints for the streamside alignments, it is recommended to pursue an on-street alternative on SW 74th Street in the short term. The City and Metro should continue working with landowners on both sides of the creek to determine which side is more feasible as a long-term solution. Given preliminary cost-estimates, Alignment B is the least-cost option, as it minimizes environmental impacts.

[6] U.S. Department of Transportation. (2002). *Rails-with-Trails: Lessons Learned.* http://www.fhwa.dot.gov/environment/rectrails/rwt/

Table 6. Bonita/Durham Road Evaluation of Alignments

Criteria	Alignment 3A	Alignment 3Ai	Alignment 3Aii	Alignment 3B	Alignment 3Bi	Alignment 3C	Alignment 3D	Alignment 3E
Connectivity	●	●	●	●	●	●	○	●
Safety and Security – Trail Users	◑	◑	◑	●	●	●	◑	●
User Experience	○	◑	◑	●	●	●	◑	◑
Topographical Constraints	●	●	◑	◑	◑	◑	●	●
Environmental Impacts	●	◑	◑	○	○	○	●	●
Cost	●	◑	◑	○	○	○	●	◑
Right-of-way	●	◑	◑	○	○	○	●	◑


Low-volume street, significant truck traffic
Potential connection through Metro-owned parcel
Option 3Ai: viewing platform in Metro parcel
Option 3Aii: loop and viewing platform
Option 3Bi: loop from Metro parcel
3A
3E
Parking lot close to creek, steep slopes
Crossing Bonita requires crossing treatments
Option 3E: side path along west side of 74th
3C
3B
No space west side of creek at Bonita
Inaccessible due to private properties
Little space between private properties and Fanno Creek
Crossing Durham requires crossing treatments
Low-volume street
3D
Requires significant out-of-direction travel
Proposed Fanno Creek Trail
Existing Trails
Bike Lanes
Metro Parcels
Tigard Parcels
Parks
Railroad
Floodplain
Wetlands
Opportunity
Constraint
0 150 300 Feet
City of Tigard, Oregon
Tigard Greenway Trails Master Plan
Fanno Creek Trail - Bonita Road to Durham Road

Fanno Creek Trail – Bonita/Durham Road Segment | 3A

Summary

SW 74th Avenue is a low-volume roadway, which could accommodate bicycles via bicycle improvements. Bike lanes would be preferred on this street due to relatively high truck volumes. This alternative would not be appropriate for some bicyclists who are less comfortable riding in traffic. Trucks are frequently parked along the roadway. An option for this alignment includes a potential trail segment within the Metro parcel, which could include a viewing platform (Option 3Ai). An additional option would be to provide a loop trail within parcels where development is limited due to wetland and floodplain status (Option 3Aii).

SW 74th Avenue looking north.

Trucks parked along SW 74th Avenue.

Opportunities

- Provides a connection extending Fanno Creek Trail south.
- On-street treatments are relatively inexpensive

Constraints

- Significant truck traffic would deter inexperienced or cautious bicyclists
- Requires crossing at Durham Road

Cost Opinion

Length: 4,923'

High Design Option:

- Design: bike lanes, signs, signal and pedestrian refuge
- Planning-level cost: $185,000

Medium Design Option:

- Design: bike lanes, signs, crosswalk and pedestrian refuge
- Planning-level cost: $103,000

Low Design Option:

- Design: Shared lane markings, signs, crosswalk
- Planning-level cost: $18,000

Option 3Ai additional cost:

- High (12' boardwalk): $513,000
- Medium (12' boardwalk): $512,000
- Low (6' boardwalk): $380,000

Option 3Aii additional cost:

- High (12' boardwalk): $1,351,000
- Medium (12' boardwalk): $1,243,000
- Low (6' boardwalk): $835,000

Fanno Creek Trail – Bonita/Durham Road Segment — 3B

Summary

This alignment is located on the east, or industrial side of Fanno Creek. Metro and the City of Tigard have sought to acquire land for this alignment and have been unsuccessful over the last four years. Parking lots abut the trail along this corridor. One alternative would be for the trail to use SW 74th Avenue to the Metro-owned parcel, and use that to access the stream.

View of the Metro property from SW 74th Avenue.

Parking lots directly abut the creek in several areas along this alignment option.

Opportunities

- Provides a trail connection extending Fanno Creek Trail south
- More scenic and comfortable for users than on-street alignment options

Constraints

- Challenging alignment; would require boardwalk, retaining walls, wetland mitigation, and other treatments
- All of trail in floodplain, wetland, and 'strictly limit' habitat area

Cost Opinion – Alignment 3B

Length:

- 640' on SW 74th Avenue
- 4,706' adjacent to creek

High Design Option:

- Design: 12' permeable asphalt/boardwalk, signal and refuge island
- Planning-level cost: $7,191,000

Medium Design Option:

- Design: 10' asphalt/boardwalk, crosswalk and refuge island
- Planning-level cost: $6,536,000

Low Design Option:

- Design: 6' gravel/boardwalk, crosswalk
- Planning-level cost: $4,604,000

Cost Opinion – Option 3Bi

Length:

- 2,130' on SW 74th Avenue
- 2,204' adjacent to creek

High Design Option:

- Design: 12' permeable asphalt/boardwalk, signal and refuge island
- Planning-level cost: $3,184,000

Medium Design Option:

- Design: 10' asphalt/boardwalk, crosswalk and refuge island
- Planning-level cost: $2,863 ,000

Low Design Option:

- Design: 6' gravel/boardwalk, crosswalk
- Planning-level cost: $2,239,000

Fanno Creek Trail – Bonita/Durham Road Segment | 3C

Summary

This alignment is located on the west, or single family ,]both sides consist of mainly privately-owned parcels) side of Fanno Creek. It would begin on the east side at Bonita Road, due to space limitations on the west side, then cross the creek. This alignment travels through a significant amount of private property.

Opportunities

- Provides a trail connection extending Fanno Creek Trail south.
- More scenic and comfortable for users than on-street alignment options

Constraints

- Would require significant easements or private property acquisition
- All of trail in floodplain, wetland, and 'strictly limit' habitat area

Cost Opinion

Length:

- 5,073'
- Includes crossing treatments on Bonita and Durham Roads
- Includes two creek crossings

High Design Option:

- Design: 12' permeable asphalt/boardwalk, signal and refuge island, precast concrete bridge
- Planning-level cost: $9,400,000

Medium Design Option:

- Design: 10' asphalt/boardwalk, crosswalk and refuge island, wood bridge
- Planning-level cost: $8,913,000

Low Design Option:

- Design: 6' gravel/boardwalk, crosswalk, wood bridge
- Planning-level cost: $6,457,000

Looking south from Bonita Road, there is no space between the fence line and a steep drop, which has been overgrown by blackberries.

Looking east from 79th Avenue; the creek would require an easement through this private property.

Fanno Creek Trail – Bonita/Durham Road Segment | 3D

Summary

SW 79th Avenue is a low-volume roadway, which could accommodate bicycles via bicycle boulevard improvements such as shared lane markings and wayfinding signage. While a more comfortable environment than SW 74th Avenue, this alignment requires significantly more out-of-direction travel.

Opportunities

- Provides a connection extending Fanno Creek Trail south.
- On-street treatments are relatively inexpensive

Constraints

- Significant out-of-direction travel required
- Difficult connection on Bonita if Brown property segment is built
  Difficult section on Durham Road

Cost Opinion

Length:

- 3,948'
- Includes crossing treatments on Bonita and Durham Roads

High Design Option:

- Design: bike lanes, signs, signal and refuge island, sidewalk
- Planning-level cost: $1,293,000

Medium Design Option:

- Design: bike lanes, signs, crosswalk and refuge island, sidewalk
- Planning-level cost: $1,210,000

Low Design Option:

- Design: Shared lane markings, signs, crosswalk, sidewalk
- Planning-level cost: $1,167,000

SW 79th Avenue is wider and has lower traffic speeds and volumes than SW 74th Avenue.

Fog lines on SW 78th Avenue act as bicycle lanes.

Fanno Creek Trail – Bonita/Durham Road Segment | 3E

Summary

An alternative to Alignment 3A, Alignment 3E would be alongside SW 74th Avenue, but would be a side path along the west side of the street. This alignment would provide additional protection from traffic, but would not require costly wetland mitigation or bridges. It would, however, require easements from the commercial operations along the road.

Opportunities

- Provides a connection extending Fanno Creek Trail south.
- Relatively inexpensive compared to options along the creek

Constraints

- Environment less appealing than a streamside alignment
- More expensive than on-street alternative

Cost Opinion

Length:

- 4,923'
- Includes crossing treatments on Bonita and Durham Roads

High Design Option:

- Design: 12' permeable asphalt, signal /refuge island
- Planning-level cost: $2,255,000

Medium Design Option:

- Design: 10' asphalt, crosswalk and refuge island
- Planning-level cost: $1,623,000

Low Design Option:

- Design: 10' asphalt, crosswalk
- Planning-level cost: $1,140,000

The west side of SW 74th Avenue at the Metro property.

Trucks parked along SW 74th Avenue.

4. DURHAM ROAD/DURHAM CITY LIMITS SEGMENT

Connecting the Fanno Creek Trail to Durham City limits would provide connections to the existing Tualatin River Trail. However, substantial constraints include the elevated rail bed, close proximity to the Clean Waster Services (CWS) sewerage plant, and the meandering creek. Much of the property through this alignment is owned by CWS and the Oregon Department of Transportation (ODOT) Rail Division. ODOT also regulates the railroad, and F&W Rail operates along the railroad. It was determined that discussions with CWS should take place above the staff level to ascertain the likelihood of acquiring permission to develop a trail on the edge of their property. A map was developed for those conversations, which shows a detailed view of the proposed facility and addresses initial concerns with the alignment.

The alignment options considered include:

- Alignment 4A: Between the railroad tracks and CWS property, crosses the creek on an independent structure adjacent to the railroad trestle.
    - Option 4Ai: Same as 4A, includes a detour adjacent to the creek prior to crossing.
- Alignment 4B: North side of creek, crosses under railroad, connects to Durham Park Trails, would require three creek crossings.
- Alignment 4C: On-street along existing bike lanes on Durham Road and 85th Street.

All of these alignments require crossing Durham Road from wherever the trail is developed through Section 3. The Metro-sponsored Fanno Creek Greenway Action Plan identified Durham Road as having high traffic volume (16,000 average daily traffic) and a posted speed of 35 mph. The ODOT Rail Crossing Division has jurisdiction over parallel pedestrian crossings within a safe stopping distance of at-grade rail crossings, which is 250 feet of the crossing along Durham Road.[7] Alignment 4A is the only alternative that would cross Durham Road within that distance of the railroad, and the crossing would require a safety evaluation, as well as a bicycle/pedestrian signal with crossing gates and lights. If this is cost prohibitive, the crossing for Alternative 4A could be moved to outside of the 250' under ODOT Rail supervision. The Action Plan recommended a signal on Durham Road at 74th Avenue.

Finally, alignments 4A, 4Ai, and 4C connect to the Cook Park access trail, which is officially identified as an emergency access road, rather than to the Tualatin River Trail, which runs along the river. CWS restoration of the area south of the plant as an oak savanna is underway and a trail is unlikely to be allowed to extend across their property to the Tualatin River Trail.

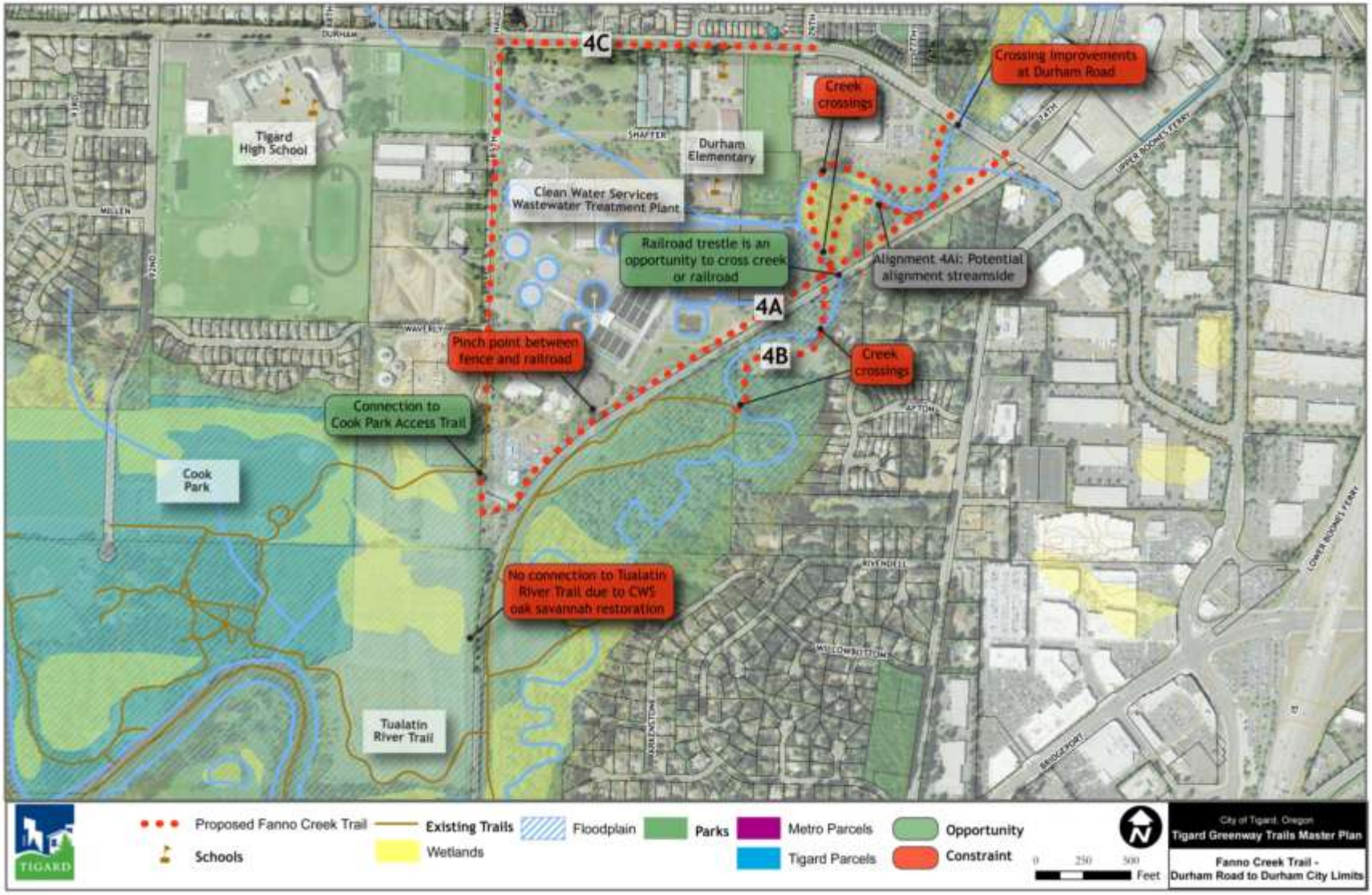
[7] http://www.oregon.gov/ODOT/RAIL/docs/Crossing_Safety/Tables_2009.pdf

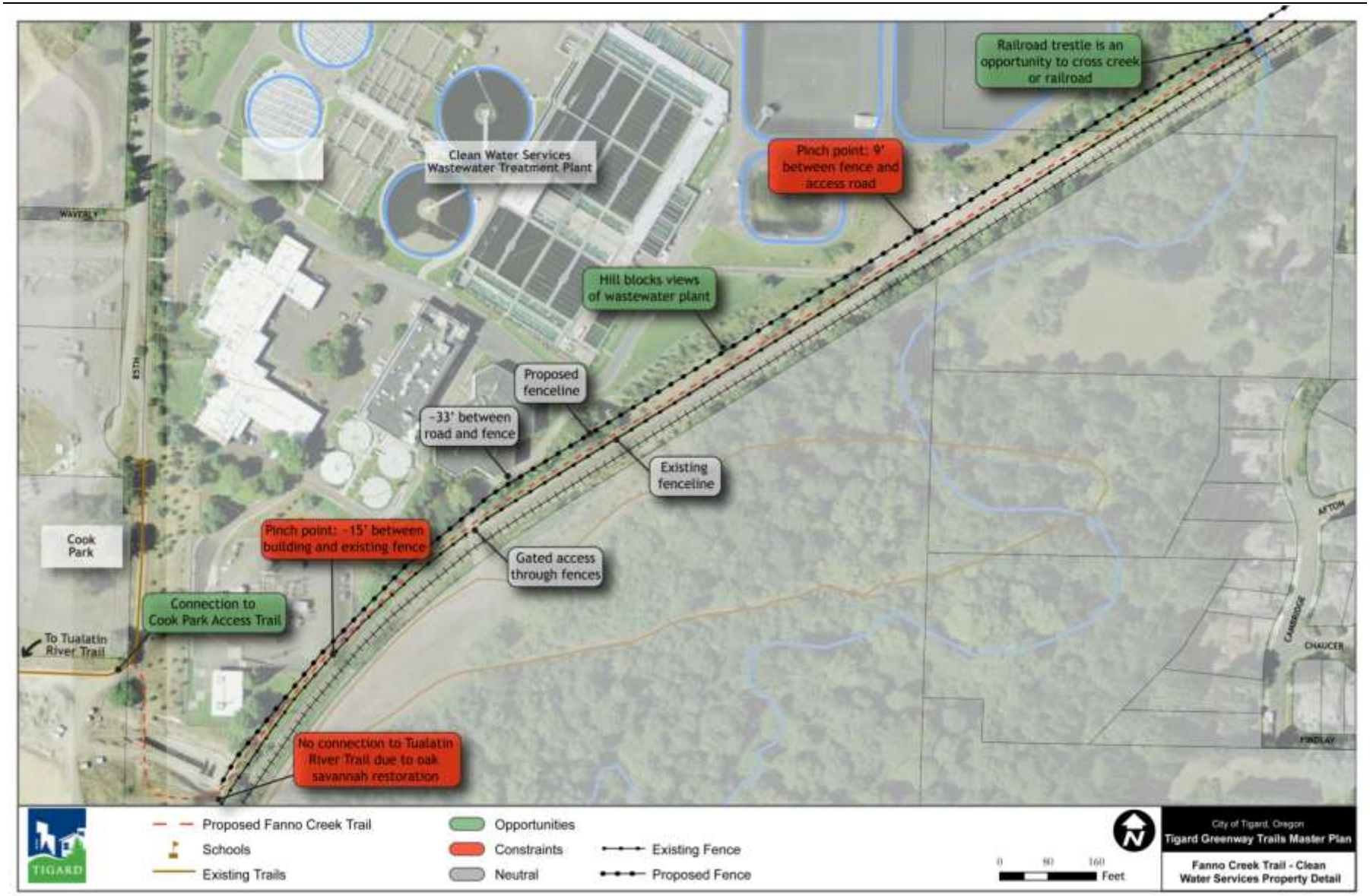
Evaluation

Constructing a trail from Durham Road to the Tualatin River Trail would provide good pedestrian and bicycle connectivity, improving routes to school and access to the Durham trail system. However, the lack of right-of-way between Clean Water Services' sewage plant and the railroad result in potential fatal flaws for Alignment 4A and 4Ai. The City should work with Clean Water Services to determine whether a trail could be constructed within the existing fence line, with another fence placed to deter trespassing. If CWS is unwilling to allow a trail, Alignment 4B would be a good alternative, although the requirement of four bridges makes this alignment expensive and have more environmental impacts. Table 7 shows the analysis of these alignment alternatives.

Table 7. Durham Road/Durham City Limits Evaluation of Alignments

Criteria	Alignment 4A	Alignment 4Ai	Alignment 4B	Alignment 4C
Connectivity	●	●	●	◑
Safety and Security – Trail Users	◑	◑	●	◑
User Experience	◑	●	●	○
Topographical Constraints	◑	◑	◑	●
Environmental Impacts	●	◑	◑	●
Cost	◑	◑	◑	●
Right-of-way	○	○	◑	●


4C
Crossing Improvements at Durham Road
Creek crossings
Tigard High School
Durham Elementary
Clean Water Services Wastewater Treatment Plant
Railroad trestle is an opportunity to cross creek or railroad
Alignment 4Ai: Potential alignment streamside
4A
4B
Pinch point between fence and railroad
Creek crossings
Connection to Cook Park Access Trail
Cook Park
No connection to Tualatin River Trail due to CWS oak savannah restoration
Tualatin River Trail
Proposed Fanno Creek Trail
Existing Trails
Floodplain
Parks
Metro Parcels
Opportunity
Schools
Wetlands
Tigard Parcels
Constraint
0 250 500 Feet
City of Tigard, Oregon
Tigard Greenway Trails Master Plan
Fanno Creek Trail - Durham Road to Durham City Limits


Railroad trestle is an opportunity to cross creek or railroad
Clean Water Services Wastewater Treatment Plant
Pinch point: 9' between fence and access road
Hill blocks views of wastewater plant
Proposed fenceline
~33' between road and fence
Existing fenceline
Pinch point: ~15' between building and existing fence
Gated access through fences
Cook Park
Connection to Cook Park Access Trail
To Tualatin River Trail
No connection to Tualatin River Trail due to oak savannah restoration
WAVERLY
85TH
APTOM
CAMBRIDGE
CHAUCER
FINDLAY
Proposed Fanno Creek Trail
Schools
Existing Trails
Opportunities
Constraints
Neutral
Existing Fence
Proposed Fence
0 80 160
Feet
TIGARD
City of Tigard, Oregon
Tigard Greenway Trails Master Plan
Fanno Creek Trail - Clean Water Services Property Detail

Fanno Creek Trail – Durham Road/Durham City Limits Segment | 4A

Summary

From Durham Road, the trail would follow a maintenance road adjacent to the railroad. The trail would cross Fanno Creek near the railroad trestle within the ODOT right-of-way to minimize environmental impact. Along Clean Water Services' property, the trail would require moving the fence and installing an additional fence to prevent trail users crossing the railroad. The Option 4Ai would veer away from the railroad and follow the curve of the creek along existing demand trails. Option 4Ai would meet up with Alignment A and cross Fanno Creek at the railroad trestle, continuing along Clean Water Services' property.

The trail would cross Fanno Creek at the existing railroad trestle.

Opportunities

- Connects to the Cook Park Access Trail
- Enhances safe routes to schools opportunities

Constraints

- Requires coordination with the railroad and Clean Water Services
- Trail partially in floodplain, 50' in wetland (at creek crossing)
- 206' of trail in 'strictly limit' habitat area

The trail would require moving Clean Water Services fence and installing an additional fence.

Cost Opinion

Length: 3,503'

High Design Option:

- Design: 12' permeable asphalt, precast concrete bridge, signal, lighting, fencing, permitting, acquisition
- Planning-level cost: $2,153 ,000

Medium Design Option:

- Design: 10' asphalt, crosswalk and refuge island, wood bridge, fencing, permitting, acquisition
- Planning-level cost: $1,543,000

Low Design Option:

- Design: 6' gravel, wood bridge, crosswalk, fencing, permitting, acquisition
- Planning-level cost: $887, 000

Option 4Ai additional cost:

- High (12' boardwalk): $951,000
- Medium (12' boardwalk): $861,000
- Low (6' boardwalk): $598,000

Fanno Creek Trail – Durham Road/Durham City Limits Segment | 4B

Summary

Alignment B is the recommended option from the Metro-sponsored Fanno Creek Action Plan. The alignment would be below the parking lot north of the creek. The Tigard-Tualatin School District owns the parcels just east of Durham Elementary, where steep slopes and existing fences would require the trail to cross Fanno Creek. The trail would cross the creek again and cross the railroad via an undercrossing of the existing railroad trestle.

Opportunities

- Connects to the Cook Park Access Trail
- Enhances safe routes to schools opportunities
- Buffers users from the railroad

Constraints

- Requires coordination with the railroad
- Trail partially in floodplain, 450' in wetland
- Most of trail in 'strictly limit' or 'moderately limit' habitat area

Cost Opinion

Length: 2,212'

High Design Option:

- Design: 12' permeable asphalt/boardwalk, signal, 4 precast concrete bridges, lighting, fencing, permitting, acquisition
- Planning-level cost: $3,249,000

Medium Design Option:

- Design: 10' asphalt/boardwalk, 4 wood bridges, crosswalk and refuge island, fencing, permitting, acquisition
- Planning-level cost: $3,255,000

Low Design Option:

- Design: 6' gravel/boardwalk, 4 wood bridges, crosswalk, fencing, permitting, acquisition
- Planning-level cost: $2,674,000

There is sufficient space for a trail to the north side of the creek just south of Durham Road.

South of Durham Elementary, steep slopes and private property would require the trail to cross Fanno Creek.

Fanno Creek Trail – Durham Road/Durham City Limits Segment 4C

Summary

The on-street alignment would make use of existing bike lanes on Durham Road and includes bicycle boulevard treatments on SW 85th Avenue. The existing signal at 85 Avenue would assist cyclists in making the left turn from Durham Road. The high design cost estimate includes striping a left-turn for bicyclists, which would require additional engineering review.

Opportunities

- Connects to the Cook Park Access Trail
- Low-cost

Constraints

- Substandard regional trail design, uncomfortable high-speed, high-volume roadway

Cost Opinion

Length:

High Design Option:

- Design: bike striping for left turn, pavement markings, 5 directional signs, sidewalk
- Planning-level cost: $106,000

Medium Design Option:

- Design: pavement markings, 4 directional signs, sidewalk
- Planning-level cost: $105,000

Low Design Option:

- Design: pavement markings,1 directional sign, sidewalk
- Planning-level cost: $105,000

The entrance to the Clean Water Services facility is located off of SW 85th Avenue.

5. TIEDMAN AVENUE INTERSECTION

The existing Fanno Creek Trail crosses Tiedeman Avenue near Fowler Middle School. A popular trail segment, the crossing requires trail users to walk on sidewalks or ride in bike lanes for approximately 200-feet across the bridge over Fanno Creek. No crossing treatments are provided across Tiedeman Avenue, which is a busy street with poor sightlines at the curve. On both sides, the access to the Fanno Creek Trail lacks curb ramps, significantly impairing use by cyclists and pedestrians using mobility devices. While Tiedeman Avenue has bike lanes on most of its length, they drop at the bridge. In addition, the difficulty of navigating the sharp turns and merging onto Tiedeman Avenue is not conducive to the types of uses expected on a regional trail.

A recent property acquisition by Metro has opened the possibility of reevaluating this crossing. However, Metro has a life estate on the property, and any alignments that pass through the parcel will be long-term solutions. The alternatives are:

- Alignment 5A – The trail would continue through the parcel and cross further away from the road, on the far side of Woodland City Park.
- Alignment 5B – The trail would turn east directly after crossing Tiedeman Avenue and cross Fanno Creek to meet up with the existing trail section.
- Alignment 5C – Improvements to existing crossing.
    - Option 5D i– Widen the sidewalk on one side of the road to accommodate trail users.

Evaluation

Table 8 provides an analysis of the alignment alternatives for this section. Because a new creek crossing would be expensive, it is recommended that the City pursue short-term improvements to the crossing, as described in Alignment 5C. As a mid-term solution, widening the sidewalk in advance of the bridge would make the crossing more comfortable for trail users. For the long-term solution, either Alignment 5A or 5B is feasible, although the costs and environmental impacts would be more for Alignment B.

Table 8. Tiedeman Intersection Evaluation of Alignments

Criteria	Alignment A	Alignment B	Alignment C	Option Ci
Connectivity	●	●	●	●
Safety and Security – Trail Users	◑	●	●	●
User Experience	●	◑	◑	●
Topographical Constraints	●	●	●	●
Environmental Impacts	◑	◑	●	●
Cost	◑	◑	●	◑
Right-of-way	◑	◑	●	●

Fanno Creek Trail – Tiedeman Avenue 5A

Summary

This Alignment would continue straight after crossing Tiedeman Avenue, crossing Fanno Creek at the far side of Woodland City Park. The Alignment would provide an enhanced user experience through separation from the roadway.

Opportunities

- Enhances safe routes to schools opportunities
- Improves safety and user comfort on a popular segment of a regional trail
- Separates users through a busy park, minimizing conflicts

Constraints

- Majority of trail in flood plain
- Crossing improvements on Tiedemann Avenue
- Requires bridge over Fanno Creek
  105' in 'strictly limit' habitat area

Cost Opinion

Length: 932'

High Design Option:

- Design: 12' permeable asphalt, precast concrete bridge, signal at Tiedeman Road, fencing, permitting
- Planning-level cost: $523,000

Medium Design Option:

- Design: 10' asphalt, wood bridge, crosswalk and refuge island at Tiedeman Road, permitting
- Planning-level cost: $266,000

Low Design Option: Length:

- Design: 6' gravel, wood bridge, crosswalk at Tiedeman Road, permitting
- Planning-level cost: $179,000

The majority of the recently-acquired parcel is outside of the floodplain and wetlands, improving feasibility.

The recommended crossing of Fanno Creek would be separated from the road.

Fanno Creek Trail – Tiedeman Avenue 5B

Summary

This Alignment would turn sharply after crossing Tiedeman Avenue and cross Fanno Creek via a bridge near the existing road bridge. The trail would connect to the Fanno Creek Trail in Woodard City Park.

Opportunities

- Enhances safe routes to schools opportunities
- Improves safety and user comfort on a popular segment of a regional trail

Constraints

- Majority of trail in flood plain
- Crossing improvements on Tiedemann Avenue
- Requires bridge over Fanno Creek
- 105' in 'strictly limit' habitat area

Cost Opinion

Length:

- 450'

High Design Option: Alignment

- Design: 12' permeable asphalt, precast concrete bridge, signal at Tiedeman Road, fencing
- Planning-level cost: $383,000

Medium Design Option: Alignment

- Design: 10' asphalt, wood bridge, crosswalk and refuge island at Tiedeman Road
- Planning-level cost: $205,000

Low Design Option: Length: Alignment

- Design: 6' gravel, wood bridge, crosswalk at Tiedeman Road
- Planning-level cost: $160,000

The existing bridge crossing on Tiedeman Avenue has sidewalks, but no curb ramps or bike lanes.

Fanno Creek just east of Tiedemam Avenue.

Fanno Creek Trail – Tiedeman Avenue | 5C

Summary

The short-term solution would be to provide signage, curb ramps, and a crossing treatments at the east side of the crossing with Tiedemann Avenue.

Looking west at the Fanno Creek Trail as it continues past Woodard City Park.

Opportunities

- Enhances safe routes to schools opportunities
- Improves safety and user comfort on a popular segment of a regional trail
- No environmental impacts
- Inexpensive option

Constraints

- Less comfortable for users than straight crossing would be

Cost Opinion

Length:

- 44'

High Design Option: Alignment

- Design: signal, bollards, curb ramps, directional signs
- Planning-level cost: $102,000

Medium Design Option: Alignment

- Design: crosswalk and refuge island, bollards, curb ramps, directional signs
- Planning-level cost: $31,000

Low Design Option: Length: Alignment

- Design: crosswalk, bollards, curb ramps, directional signs
- Planning-level cost: $21,000

Option 5Ci additional cost: $239,000 (406' sidewalk)

Appendix A. Cost Estimates

Summer Creek Trail

Updated November 2010

	Cost	Unit	1. 135th Avenue to Summerlake Park						2. Summerlake Park to 121st Avenue								3. 121st Avenue to Neighborhood Trail						4. Gallo Avenue Trail to Fanno Creek Trail									
			High 1A		Medium 1A		Low 1B		High 2A		Medium 2B		Low 1 2C		Low 2 2D		High 3A		Medium 3A		Low 3B		High Alt. A		High Alt. B		Medium Alt. C		Low Alt. D	
			1,319		1,319		2,118		1,687		1,687		1,597		1,223		1,841		1,841		1,263		1,645		1,288		1,501		3,034	
Surfacing Options																														
12' Permeable Asphalt Trail	$105.00	LF	317	$33,285		$0		$0		$0		$0		$0		$0	398	$41,790		$0		$0	195		1,288	$135,240				$ -
10' Asphalt Trail	$60.00	LF		$0		$0		$0		$0		$0	393	$23,580	393			$0	398	$23,880		$0		$0		$0	1,501	$90,060		$ -
6' Gravel Trail	$18.00	LF		$0	317	$5,706		$0		$0		$0		$0		$0		$0		$0		$0		$0		$0		$0		$ -
Boardwalk (12')	$384.00	LF	1,002	$384,768		$0		$0	1,687	$647,808	1,687	$647,808	755	$289,920	755		1,443	$554,112	1,443	$554,112		$0	1,450	$556,800		$0		$0		$ -
Boardwalk (6')	$192.00	LF			1,002	$192,384												$0		$0		$0		$0		$0		$0		$ -
Additional Elements																														
Riprap (parallel to stream)	$99.90	LF	1,319	$131,768	1,319	$131,768		$0	1,687	$168,531	1,687	$168,531	1,597	$159,540	1,223		1,841	$183,916	1,841	$183,916		$0		$0		$0		$0		$ -
Wetland mitigation	$262.50	LF	1,002	$263,025	1,002	$263,025		$0	1,687	$442,838	1,687	$442,838	1,687	$442,838	1,687		1,443	$378,788	1,443	$378,788		$0	1,450	$380,625		$0		$0		$ -
Bridge (precast concrete)	$1,225.00	LF		$0		$0		$0		$0		$0		$0		$0	40	$49,000	40	$49,000		$0		$0		$0		$0		$ -
Bridge (wood)	$980.00	LF		$0		$0		$0		$0		$0		$0		$0		$0		$0		$0		$0		$0		$0		$ -
Intersection Improvements																														
Curb ramp	$1,000.00	EA	2	$2,000	2	$2,000		$0	1	$1,000	1	$1,000	1	$1,000	1		1	$1,000	1	$1,000		$0		$0		$0		$0		$ -
Bollard	$550.00	EA	2	$1,100	2	$1,100		$0	1	$550	1	$550	2	$1,100	2		1	$550	1	$550		$0		$0		$0		$0		$ -
High-visibility crosswalk	$7,465.00	EA	1	$7,465		$0		$0		$0		$0		$0		$0		$0	1	$7,465		$0		$0		$0		$0		$ -
Signal	$49,000.00	EA		$0		$0		$0		$0		$0		$0		$0	1	$49,000		$0		$0		$0		$0		$0		$ -
Amenities																														
Fencing	$25.00	LF	1,319	$32,975	1,319	$32,975		$0	1,687	$42,175		$0		$0		$0	1,841	$46,025		$0		$0		$0		$0		$0		$ -
Directional sign	$250.00	EA	2	$500	2	$500	4	$1,000	2	$500		$0		$0	2	$500	2	$500		$0	1	$250		$0		$0	1	$250	2	$ 500
Informational kiosk	$500.00	EA	1	$500		$0		$0	1	$500		$0		$0		$0	1	$500		$0		$0		$0		$0		$0		$ -
Pavement marking	$60.00	EA		$0		$0	35	$2,090		$0					24	$1,468		$0			25			$0		$0		$0	2	$ 120
Bike lane striping	$2.26	LF														$0								$0		$0		$0	2,014	$ 4,552
Sidewalk (6')	$92.78	LF																			2,785	$258,393							4,561	$ 423,171
Direct Construction Costs			**$857,386**		**$629,458**		**$3,090**		**$1,303,902**		**$1,260,727**		**$917,978**		**$1,968**		**$1,305,180**		**$1,198,710**		**$258,643**		**$937,425**		**$135,240**		**$90,310**		**$428,343**	
Multipliers																														
Engineering/Construction	20%		$171,477		$125,892		$618		$260,780		$252,145		$183,596		$394		$261,036		$239,742		$51,729		$187,485		$27,048		$18,062		$85,669	
Mobilization	15%		$128,608		$94,419		$464		$195,585		$189,109		$137,697		$295		$195,777		$179,807		$38,796		$140,614		$20,286		$13,547		$64,251	
A & E Fees	20%		$171,477		$125,892		$618		$260,780		$252,145		$183,596		$394		$261,036		$239,742		$51,729		$187,485		$27,048		$18,062		$85,669	
Contingency	40%		$342,954		$251,783		$1,236		$521,561		$504,291		$367,191		$787		$522,072		$479,484		$103,457		$374,970		$54,096		$36,124		$171,337	
Cost Opinion for Construction			**$ 1,671,904**		**$ 1,227,444**		**$ 6,027**		**$ 2,542,609**		**$ 2,458,418**		**$ 1,790,058**		**$ 3,838**		**$ 2,545,103**		**$ 2,337,486**		**$ 504,355**		**$ 1,827,980**		**$ 263,719**		**$ 176,105**		**$ 835,269**	
Permitting and ROW																														
Permitting estimate	8%		$125,393		$92,058				$190,696		$184,381		$134,254				$190,883		$175,311		$37,827		$137,098		$19,779		$13,208			
Right-of-way acquisition																														
Residential	$6.00	SF															156	$14,976	156	$13,104										
Commercial	$16.00	SF																												
Cost Opinion			**$ 1,797,297**		**$ 1,319,503**		**$ 6,027**		**$ 2,733,305**		**$ 2,642,800**		**$ 1,924,312**		**$ 3,838**		**$ 2,750,961**		**$ 2,525,902**		**$ 542,182**		**$ 1,965,078**		**$ 283,498**		**$ 189,313**		**$ 835,269**	

Krueger Creek Trail

Updated November 2010

			1. Summer Creek to Walnut Street						2. Walnut Street to Broadmoor Place						3. Broadmoor Place to Ascension Trail						4. Ascension Trail					
			High 1A		Medium 1A		Low 1B		High 2A		Medium 2A		Low 2B		High 3A		Medium 3B		Low 3B		High		Medium		Low	
	Cost	Unit	2,501		2,501 ft		3,165 ft		2,358		2,358 ft		3,722 ft		1,722		2,028 ft		2,028 ft		3,145		3,145 ft		3,145 ft	
Surfacing Options																										
12' Permeable Asphalt Trail	$105.00	LF		$ -		$ -		$ -	1,978	$ 207,690		$ -		$ -	358	$ 37,590		$ -		$ -		$ -		$ -		$ -
10' Asphalt Trail	$60.00	LF		$ -		$ -		$ -		$ -	1,978	$ 118,680		$ -		$ -		$ -		$ -		$ -		$ -		$ -
6' Gravel Trail	$18.00	LF		$ -		$ -		$ -		$ -		$ -		$ -	573	$ 10,314		$ -		$ -	3,145	$ 56,610		$ -		$ -
Bark mulch/chip	$15.00			$ -		$ -		$ -		$ -		$ -		$ -		$ -	573	$ 8,595		$ -		$ -	3,145	$ 47,175		$ -
Native soil	$5.00			$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	573	$ 2,865		$ -		$ -	3,145	$ 15,725
Boardwalk (12')	$384.00	LF	2,184	$ 838,656	2,184	$ 838,656		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Boardwalk (6')	$192.00	LF		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Additional Elements																										
Riprap (parallel to stream)	$99.90	LF	2,184	$ 218,182	2,184	$ 218,182		$ -	1,491	$ 148,951	1,491	$ 148,951		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Wetland mitigation	$262.50	LF	2,184	$ 573,300	2,184	$ 573,300		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Bridge (precast concrete)	$1,225.00	LF	40	$ 49,000		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Bridge (wood)	$980.00	LF		$ -	40	$ 39,200		$ -		$ -		$ -		$ -		$ -		$ -		$ -	6	$ 5,880	6	$ 5,880	6	$ 5,880
Retaining wall	$235.00	LF		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Cast-in-place concrete stairs	$282.00	LF		$ -		$ -		$ -	380	$ 107,160	380	$ 107,160		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Cribbed stairs	$ 26.67	SF		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	600	$ 16,000	400	$ 10,667	400	$ 10,667
Switchback	$2,700.00	EA													3	$ 8,100	3	$ 8,100	3	$ 8,100						
Retaining wall (soft surface)	$ 80.00	LF		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	786	$ 62,900	393	$ 31,450	100	$ 8,000
Armored trail	$ 11.67	SF		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	9,435	$ 110,075	9,435	$ 110,075	9,435	$ 110,075
Intersection Improvements																										
Curb ramp	$1,000.00	EA	5	$ 5,000	5	$ 5,000		$ -	5	$ 5,000	5	$ 5,000		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Bollard	$550.00	EA	5	$ 2,750	5	$ 2,750		$ -	5	$ 2,750	5	$ 2,750		$ -		$ -		$ -		$ -		$ -		$ -		$ -
High-visibility crosswalk	$7,465.00	EA	2	$ 14,930	3	$ 22,395		$ -	1	$ 7,465	2	$ 14,930		$ -	1	$ 7,465		$ -		$ -		$ -		$ -		$ -
Signal	$49,000.00	EA	1	$ 49,000		$ -		$ -	1	$ 49,000		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Amenities																										
Fencing	$25.00	LF	2,501	$ 62,525		$ -		$ -	2,358	$ 58,950		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Directional sign	$250.00	EA	2	$ 500	2	$ 500	2	$ 500	2	$ 500	2	$ 500	4	$ 1,000	5	$ 1,250	5	$ 1,250	2	$ 500	2	$ 500	2	$ 500		$ -
Informational kiosk	$500.00	EA	1	$ 500		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Pavement marking	$60.00	EA		$ -		$ -	63	$ 3,798		$ -		$ -		$ -	16	$ 949	30	$ 1,811		$ -		$ -		$ -		$ -
Sidewalk	$92.78	LF								$ -		$ -	1,033	$ 95,842												
Direct Construction Costs			$ 1,814,343		$ 1,699,983		$ 4,298		$ 587,466		$ 397,971		$ 96,842		$ 65,668		$ 19,756		$ 11,465		$ 251,965		$ 205,747		$ 150,347	
Multipliers																										
Engineering/ Construction	20%		$ 362,869		$ 339,997		$ 860		$ 117,493		$ 79,594		$ 19,368		$ 13,134		$ 3,951		$ 2,293		$ 50,393		$ 41,149		$ 30,069	
Mobilization	15%		$ 272,151		$ 254,997		$ 645		$ 88,120		$ 59,696		$ 14,526		$ 9,850		$ 2,963		$ 1,720		$ 37,795		$ 30,862		$ 22,552	
A & E Fees	20%		$ 362,869		$ 339,997		$ 860		$ 117,493		$ 79,594		$ 19,368		$ 13,134		$ 3,951		$ 2,293		$ 50,393		$ 41,149		$ 30,069	
Contingency	40%		$ 725,737		$ 679,993		$ 1,719		$ 234,986		$ 159,188		$ 38,737		$ 26,267		$ 7,902		$ 4,586		$ 100,786		$ 82,299		$ 60,139	
Cost Opinion for Construction			$ 3,537,969		$ 3,314,967		$ 8,382		$ 1,145,559		$ 776,044		$ 188,843		$ 128,054		$ 38,525		$ 22,358		$ 491,333		$ 401,207		$ 293,177	
Permitting and ROW																										
Permitting estimate	8%		$265,348		$265,348				$85,917		$85,917				$9,604						$0		$0		$0	
Right-of-way acquisition																										
Residential	$6.00	SF							2,358	$169,776	2,358	$169,776			358	$34,368										
Mixed Use	$10.00	SF																								
Commercial	$16.00	SF																								
Cost Opinion			$ 3,803,317		$ 3,580,315		$ 8,382		$ 1,401,252		$ 1,031,737		$ 188,843		$ 172,026		$ 38,525		$ 22,358		$ 491,333		$ 401,207		$ 293,177	

Library & Brown Property Fanno Creek Trail Gaps

Updated November 2010

	Cost	Unit	Library/Fanno Creek Drive - Alternative 1A						Library/Fanno Creek Drive - Alternative 1B					
			High		Medium		Low		High		Medium		Low	
			497 ft		497 ft		497 ft		896 ft		896 ft		896 ft	
Surfacing Options														
12' Permeable Asphalt Trail	$105.00	LF		$ -		$ -		$ -		$ -		$ -		$ -
10' Asphalt Trail	$60.00	LF		$ -		$ -		$ -		$ -		$ -		$ -
6' Gravel Trail	$18.00	LF		$ -		$ -		$ -		$ -		$ -		$ -
Boardwalk (12')	$384.00	LF	497	$ 190,848	497	$ 190,848		$ -	896	$ 344,064	896	$ 344,064		$ -
Boardwalk (6')	$192.00	LF				$ -	497	$ 95,424				$ -	896	$ 172,032
Additional Elements														
Riprap (parallel to stream)	$99.90	LF	497	$ 49,650	497	$ 49,650	497	$ 49,650	896	$ 89,510	896	$ 89,510	896	$ 89,510
Wetland mitigation	$262.50	LF	180	$ 47,250	180	$ 47,250	180	$ 47,250	579	$ 151,988	579	$ 151,988	579	$ 151,988
Bridge (precast concrete)	$1,225.00	LF	40	$ 49,000		$ -		$ -	80	$ 98,000		$ -		$ -
Bridge (wood)	$980.00	LF		$ -	40	$ 39,200	40	$ 39,200		$ -	80	$ 78,400	80	$ 78,400
Retaining wall	$235.00	LF		$ -		$ -		$ -	45	$ 10,575	45	$ 10,575	45	$ 10,575
Amenities														
Lighting	$3,500.00	EA		$ -		$ -		$ -		$ -		$ -		$ -
Fencing	$25.00	LF	497	$ 12,425		$ -		$ -	896	$ 22,400		$ -		$ -
Mileage marker	$250.00	EA		$ -		$ -		$ -		$ -		$ -		$ -
Directional sign	$250.00	EA	2	$ 500	2	$ 500		$ -	2	$ 500	2	$ 500		$ -
Trail etiquette sign	$250.00	EA		$ -		$ -		$ -		$ -		$ -		$ -
Informational kiosk	$500.00	EA		$ -		$ -		$ -		$ -		$ -		$ -
Pavement marking	$60.00	EA		$ -		$ -		$ -		$ -		$ -		$ -
Trail centerline	$1.56	LF		$ -		$ -		$ -	896	$ 1,398		$ -		$ -
Direct Construction Costs			**$ 349,673**		**$ 327,448**		**$ 231,524**		**$ 718,435**		**$ 675,037**		**$ 502,505**	
Multipliers														
Engineering/ Construction	20%		$ 69,935		$ 65,490		$ 46,305		$ 143,687		$ 135,007		$ 100,501	
Mobilization	15%		$ 52,451		$ 49,117		$ 34,729		$ 107,765		$ 101,256		$ 75,376	
A & E Fees	20%		$ 69,935		$ 65,490		$ 46,305		$ 143,687		$ 135,007		$ 100,501	
Contingency	40%		$ 139,869		$ 130,979		$ 92,610		$ 287,374		$ 270,015		$ 201,002	
Cost Opinion for Construction			**$ 681,864**		**$ 638,525**		**$ 451,473**		**$ 1,400,949**		**$ 1,316,323**		**$ 979,886**	
Permitting and ROW														
Permitting estimate	8%		$51,140		$47,889		$33,861		$105,071		$98,724		$73,491	
Right-of-way acquisition														
Residential	$6.00	SF												
Mixed Use	$10.00	SF												
Commercial	$16.00	SF												
Cost Opinion			**$ 733,004**		**$ 686,415**		**$ 485,334**		**$ 1,506,020**		**$ 1,415,047**		**$ 1,053,377**	

	Brown Property - Alternative 2A						Brown Property - Alignment 2B					
	High		Medium		Low		High		Medium		Low	
	2,853 ft		2,853 ft		2,853 ft		2,276 ft		2,276 ft		2,276 ft	
Surfacing Options												
12' Permeable Asphalt Trail	1,834	$ 192,570		$ -		$ -	1,578	$ 165,690		$ -		$ -
10' Asphalt Trail		$ -	1,834	$ 110,040		$ -		$ -	####	$ 94,680		$ -
6' Gravel Trail		$ -		$ -	1,834	$ 33,012		$ -		$ -	####	$ 28,404
Boardwalk (12')	1,019	$ 391,296	1,019	$ 391,296		$ -	732	$ 281,088	732	$ 281,088		$ -
Boardwalk (6')					1,019	$ 195,648					732	$ 140,544
Additional Elements												
Riprap (parallel to stream)	1,019	$ 101,798	1,019	$ 101,798	1,019	$ 101,798	732	$ 73,127	732	$ 73,127	732	$ 73,127
Wetland mitigation	1,019	$ 267,488	1,019	$ 267,488	1,019	$ 267,488	732	$ 192,150	732	$ 192,150	732	$ 192,150
Bridge (precast concrete)	40	$ 49,000		$ -		$ -	40	$ 49,000		$ -		$ -
Bridge (wood)		$ -	40	$ 39,200	40	$ 39,200		$ -	40	$ 39,200	40	$ 39,200
Retaining wall		$ -		$ -		$ -		$ -		$ -		$ -
Amenities												
Lighting	6	$ 19,971		$ -		$ -	5	$ 15,932		$ -		$ -
Fencing	2,853	$ 71,325		$ -		$ -	2,276	$ 56,900		$ -		$ -
Mileage marker	1	$ 250	1	$ 250		$ -	1	$ 250	1	$ 250		$ -
Directional sign	2	$ 500	2	$ 500		$ -	2	$ 500	2	$ 500		$ -
Trail etiquette sign	1	$ 250	1	$ 250		$ -	1	$ 250		$ -		$ -
Informational kiosk	1	$ 500		$ -		$ -	1	$ 500		$ -		$ -
Pavement marking		$ -						$ -				
Trail centerline	2,853	$ 4,451		$ -		$ -	2,276	$ 3,551		$ -		$ -
Direct Construction Costs	**$ 1,099,398**		**$ 910,822**		**$ 637,146**		**$ 838,937**		**$ 680,995**		**$ 473,425**	
Multipliers												
Engineering/ Construction	$ 219,880		$ 182,164		$ 127,429		$ 167,787		$ 136,199		$ 94,685	
Mobilization	$ 164,910		$ 136,623		$ 95,572		$ 125,841		$ 102,149		$ 71,014	
A & E Fees	$ 219,880		$ 182,164		$ 127,429		$ 167,787		$ 136,199		$ 94,685	
Contingency	$ 439,759		$ 364,329		$ 254,858		$ 335,575		$ 272,398		$ 189,370	
Cost Opinion for Construction	**$ 2,143,828**		**$ 1,776,103**		**$ 1,242,435**		**$ 1,635,929**		**$ 1,327,941**		**$ 923,179**	
Permitting and ROW												
Permitting estimate	$160,787		$133,208		$93,183		$122,695		$99,596		$69,238	
Right-of-way acquisition												
Residential	560	$53,760	560	$47,040	560	$26,880						
Mixed Use												
Commercial												
Cost Opinion	**$ 2,358,375**		**$ 1,956,351**		**$ 1,362,497**		**$ 1,758,623**		**$ 1,427,536**		**$ 992,418**	

	Brown Property - Alternative 2C						Brown Property - Alternative 2D					
	High		Medium		Low		High		Medium		Low	
	1,391 ft		1,391 ft		1,391 ft		1,536 ft		1,536 ft		1,536 ft	
Surfacing Options												
12' Permeable Asphalt Trail	182	$ 19,110		$ -		$ -		$ -		$ -		$ -
10' Asphalt Trail		$ -	182	$ 10,920		$ -		$ -		$ -		$ -
6' Gravel Trail		$ -		$ -	182	$ 3,276		$ -		$ -		$ -
Boardwalk (12')	1,209	$ 464,256	1,209	$ 464,256		$ -		$ -		$ -		$ -
Boardwalk (6')		$ -		$ -	1,209	$ 232,128		$ -		$ -		$ -
Additional Elements												
Riprap (parallel to stream)	1,209	$ 120,779	1,209	$ 120,779	1,209	$ 120,779		$ -		$ -		$ -
Wetland mitigation	1,209	$ 317,363	1,209	$ 317,363	1,209	$ 317,363		$ -		$ -		$ -
Bridge (precast concrete)	40	$ 49,000		$ -		$ -		$ -		$ -		$ -
Bridge (wood)		$ -	40	$ 39,200	40	$ 39,200		$ -		$ -		$ -
Retaining wall		$ -		$ -		$ -		$ -		$ -		$ -
Amenities												
Lighting	3	$ 9,737		$ -		$ -		$ -		$ -		$ -
Fencing	1,391	$ 34,775		$ -		$ -		$ -		$ -		$ -
Mileage marker	1	$ 250	1	$ 250		$ -		$ -		$ -		$ -
Directional sign	2	$ 500	2	$ 500		$ -	2	$ 500	1	$ 250		$ -
Trail etiquette sign	1	$ 250		$ -		$ -		$ -		$ -		$ -
Informational kiosk	1	$ 500		$ -		$ -		$ -		$ -		$ -
Pavement marking		$ -					31	$ 1,843	31	$ 1,843	31	$ 1,843
Trail centerline	1,391	$ 2,170		$ -		$ -		$ -		$ -		$ -
Direct Construction Costs	**$ 1,018,690**		**$ 953,268**		**$ 712,746**		**$ 2,343**		**$ 2,093**		**$ 1,843**	
Multipliers												
Engineering/ Construction	$ 203,738		$ 190,654		$ 142,549		$ 469		$ 419		$ 369	
Mobilization	$ 152,803		$ 142,990		$ 106,912		$ 351		$ 314		$ 276	
A & E Fees	$ 203,738		$ 190,654		$ 142,549		$ 469		$ 419		$ 369	
Contingency	$ 407,476		$ 381,307		$ 285,098		$ 937		$ 837		$ 737	
Cost Opinion for Construction	**$ 1,986,446**		**$ 1,858,873**		**$ 1,389,855**		**$ 4,570**		**$ 4,083**		**$ 3,595**	
Permitting and ROW												
Permitting estimate	$148,983		$139,415		$104,239		$0		$0		$0	
Right-of-way acquisition												
Residential	665	$63,840	665	$55,860	665	$31,920						
Mixed Use												
Commercial												
Cost Opinion	**$ 2,199,269**		**$ 2,054,148**		**$ 1,526,014**		**$ 4,570**		**$ 4,083**		**$ 3,595**	

Bonita/Durham Roads Fanno Creek Trail Gaps

Updated November 2010

	Cost	Unit	Bonita/Durham Road - Alternative 3A						Bonita/Durham Road - Alternative 3Ai						Bonita/Durham Road - Alternative 3Aii						Bonita/Durham Road - Alternative 3B						Bonita/Durham Road - Alternative 3Bi					
			High		Medium		Low		High		Medium		Low		High		Medium		Low		High		Medium		Low		High		Medium		Low	
			4,923 ft		4,923 ft		4,923 ft		325 ft		325 ft		325 ft		5,808 ft		5,808 ft		5,808 ft		5,346 ft		5,346 ft		5,346 ft		4,334 ft		4,334 ft		4,334 ft	
Surfacing Options																																
12' Permeable Asphalt Trail	$105.00	LF		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	1,800	$ 189,000		$ -		$ -	1,723	$ 180,915		$ -		$ -
10' Asphalt Trail	$60.00	LF		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	1,800	$ 108,000		$ -		$ -	1,723	$ 103,380		$ -
6' Gravel Trail	$18.00	LF		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	1,800	$ 32,400		$ -		$ -	1,723	$ 31,014
Boardwalk (12')	$384.00	LF		$ -		$ -		$ -	325	$ 124,800	325	$ 124,800		$ -	629	$ 241,536	629	$ 241,536		$ -	3,546	$ 1,361,664	3,546	$ 1,361,664		$ -	481	$ 184,704	481	$ 184,704		$ -
Boardwalk (6')	$192.00	LF		$ -		$ -		$ -		$ -		$ -	325	$ 62,400		$ -		$ -	629	$ 120,768		$ -		$ -	3,546	$ 680,832		$ -		$ -	481	$ 92,352
Additional Elements																																
Riprap (parallel to stream)	$99.90	LF		$ -		$ -		$ -	325	$ 32,468	325	$ 32,468	325	$ 32,468	629	$ 62,837	629	$ 62,837	629	$ 62,837	3,546	$ 354,245	3,546	$ 354,245	3,546	$ 354,245	2,204	$ 220,180	2,204	$ 220,180	2,204	$ 220,180
Wetland mitigation	$262.50	LF		$ -		$ -		$ -	325	$ 85,313	325	$ 85,313	325	$ 85,313	629	$ 165,113	629	$ 165,113	629	$ 165,113	3,546	$ 930,825	3,546	$ 930,825	3,546	$ 930,825	2,204	$ 578,550	2,204	$ 578,550	2,204	$ 578,550
Bridge (precast concrete)	$1,225.00	LF		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Bridge (wood)	$980.00	LF		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Retaining wall	$235.00	LF		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Intersection Improvements																																
Curb ramp	$1,000.00	EA		$ -		$ -		$ -	1	$ 1,000	1	$ 1,000	1	$ 1,000	2	$ 2,000	2	$ 2,000	2	$ 2,000		$ -		$ -		$ -	2	$ 2,000	2	$ 2,000	2	$ 2,000
Bollard	$550.00	EA		$ -		$ -		$ -	1	$ 550	1	$ 550		$ -	2	$ 1,100	2	$ 1,100		$ -		$ -		$ -		$ -	2	$ 1,100	2	$ 1,100	2	$ 1,100
High-visibility crosswalk	$7,465.00	EA		$ -	1	$ 7,465	1	$ 7,465		$ -		$ -		$ -		$ -	1	$ 7,465	1	$ 7,465		$ -	1	$ 7,465	1	$ 7,465		$ -	1	$ 7,465	1	$ 7,465
Signal	$49,000.00	EA	1	$ 49,000		$ -		$ -		$ -		$ -		$ -	1	$ 49,000		$ -		$ -	1	$ 49,000		$ -		$ -	1	$ 49,000		$ -		$ -
Refuge island	$21,797.00	EA	1	$ 21,797	1	$ 21,797		$ -		$ -		$ -		$ -	1	$ 21,797	1	$ 21,797		$ -	1	$ 21,797	1	$ 21,797		$ -	1	$ 21,797	1	$ 21,797		$ -
Amenities																																
Lighting	$3,500.00	EA		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Fencing	$25.00	LF		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	5,346	$ 133,650		$ -		$ -		$ -		$ -		$ -		$ -
Mileage marker	$250.00	EA	4	$ 932	4	$ 932		$ -		$ -		$ -		$ -	4	$ 932	4	$ 932		$ -	4	$ 1,013	4	$ 1,013		$ -	3	$ 821	3	$ 821		$ -
Directional sign	$250.00	EA	2	$ 500	2	$ 500	2	$ 500		$ -		$ -		$ -	2	$ 500	2	$ 500	2	$ 500	2	$ 500	2	$ 500	2	$ 500	2	$ 500	2	$ 500	2	$ 500
Trail etiquette sign	$250.00	EA		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	1	$ 250		$ -		$ -		$ -		$ -		$ -		$ -
Informational kiosk	$500.00	EA	1	$ 500		$ -		$ -	1	$ 500		$ -		$ -	1	$ 500		$ -		$ -	1	$ 500		$ -		$ -	1	$ 500		$ -		$ -
Pavement marking	$60.00	EA		$ -		$ -	20	$ 1,182		$ -		$ -		$ -		$ -		$ -	20	$ 1,182		$ -		$ -		$ -		$ -		$ -	9	$ 511
Bike lane striping	$2.26	LF	9,846	$ 22,252	9,846	$ 22,252		$ -		$ -		$ -		$ -	####	$ 22,252	9,846	$ 22,252		$ -		$ -		$ -		$ -	4,260	$ 9,628	4,260	$ 9,628		$ -
Trail centerline	$1.56	LF		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	5,346	$ 8,340		$ -		$ -		$ -		$ -		$ -		$ -
Sidewalk (6')	$92.78	LF																														
Direct Construction Costs			**$ 94,981**		**$ 52,946**		**$ 9,147**		**$ 244,630**		**$ 244,130**		**$ 181,180**		**$ 567,567**		**$ 525,532**		**$ 359,864**		**$ 3,050,784**		**$ 2,785,509**		**$ 2,006,267**		**$ 1,249,694**		**$ 1,130,124**		**$ 933,672**	
Multipliers																																
Engineering/Construction Management	20%		$ 18,996		$ 10,589		$ 1,829		$ 48,926		$ 48,826		$ 36,236		$ 113,513		$ 105,106		$ 71,973		$ 610,157		$ 557,102		$ 401,253		$ 249,939		$ 226,025		$ 186,734	
Mobilization	15%		$ 14,247		$ 7,942		$ 1,372		$ 36,695		$ 36,620		$ 27,177		$ 85,135		$ 78,830		$ 53,980		$ 457,618		$ 417,826		$ 300,940		$ 187,454		$ 169,519		$ 140,051	
A & E Fees	20%		$ 18,996		$ 10,589		$ 1,829		$ 48,926		$ 48,826		$ 36,236		$ 113,513		$ 105,106		$ 71,973		$ 610,157		$ 557,102		$ 401,253		$ 249,939		$ 226,025		$ 186,734	
Contingency	40%		$ 37,993		$ 21,179		$ 3,659		$ 97,852		$ 97,652		$ 72,472		$ 227,027		$ 210,213		$ 143,946		$ 1,220,313		$ 1,114,204		$ 802,507		$ 499,878		$ 452,050		$ 373,469	
Cost Opinion for Construction			**$ 185,215**		**$ 103,246**		**$ 17,837**		**$ 477,029**		**$ 476,054**		**$ 353,302**		**$ 1,106,756**		**$ 1,024,788**		**$ 701,736**		**$ 5,949,029**		**$ 5,431,743**		**$ 3,912,222**		**$ 2,436,904**		**$ 2,203,743**		**$ 1,820,661**	
Permitting and ROW																																
Permitting estimate	8%								$35,777		$35,704		$26,498		$83,007		$76,859		$52,630		$446,177		$407,381		$293,417		$182,768		$165,281		$136,550	
Right-of-way acquisition																																
Residential	$6.00	SF																														
Mixed Use	$10.00	SF																														
Commercial	$16.00	SF													629	$161,024	629	$140,896	629	$80,512	3,110	$796,160	3,110	$696,640	3,110	$398,080	2,204	$564,224	2,204	$493,696	2,204	$282,112
Cost Opinion			**$ 185,215**		**$ 103,246**		**$ 17,837**		**$ 512,807**		**$ 511,759**		**$ 379,800**		**$ 1,350,787**		**$ 1,242,543**		**$ 834,878**		**$ 7,191,366**		**$ 6,535,764**		**$ 4,603,719**		**$ 3,183,896**		**$ 2,862,720**		**$ 2,239,323**	

Bonita/Durham Roads Fanno Cr

Updated November 2010

	Cost	Unit	Bonita/Durham Road - Alternative 3C						Bonita/Durham Road - Alternative 3D						Bonita/Durham Road - Alternative 3E					
			High		Medium		Low		High		Medium		Low		High		Medium		Low	
			5,073 ft		5,073 ft		5,073 ft		3,948 ft		3,948 ft		3,948 ft		4,923 ft		4,923 ft		4,923 ft	
Surfacing Options																				
12' Permeable Asphalt Trail	$105.00	LF		$ -		$ -		$ -		$ -		$ -		$ -	4,589	$ 481,845		$ -		$ -
10' Asphalt Trail	$60.00	LF		$ -		$ -		$ -		$ -		$ -		$ -		$ -	4,589	$ 275,340	4,589	$ 275,340
6' Gravel Trail	$18.00	LF		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Boardwalk (12')	$384.00	LF	5,073	$ 1,948,032	5,073	$ 1,948,032		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Boardwalk (6')	$192.00	LF		$ -		$ -	5,073	$ 974,016		$ -		$ -		$ -		$ -		$ -		$ -
Additional Elements																				
Riprap (parallel to stream)	$99.90	LF	5,073	$ 506,793	5,073	$ 506,793	5,073	$ 506,793		$ -		$ -		$ -		$ -		$ -		$ -
Wetland mitigation	$262.50	LF	5,073	$ 1,331,663	5,073	$ 1,331,663	5,073	$1,331,663		$ -		$ -		$ -		$ -		$ -		$ -
Bridge (precast concrete)	$1,225.00	LF	40	$ 49,000	40	$ 49,000		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Bridge (wood)	$980.00	LF		$ -		$ -	40	$ 39,200		$ -		$ -		$ -		$ -		$ -		$ -
Retaining wall	$235.00	LF		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Intersection Improvements																				
Curb ramp	$1,000.00	EA		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Bollard	$550.00	EA		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
High-visibility crosswalk	$7,465.00	EA		$ -	1	$ 7,465	1	$ 7,465		$ -	1	$ 7,465	1	$ 7,465		$ -	1	$ 7,465	1	$ 7,465
Signal	$49,000.00	EA	1	$ 49,000		$ -		$ -	1	$ 49,000		$ -		$ -	1	$ 49,000		$ -		$ -
Refuge island	$21,797.00	EA	1	$ 21,797	1	$ 21,797		$ -	1	$ 21,797	1	$ 21,797		$ -	1	$ 21,797	1	$ 21,797		$ -
Amenities																				
Lighting	$3,500.00	EA		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Fencing	$25.00	LF	5,073	$ 126,825		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Mileage marker	$250.00	EA	4	$ 961	4	$ 961		$ -	3	$ 748		$ -		$ -	4	$ 932		$ -		$ -
Directional sign	$250.00	EA	2	$ 500	2	$ 500	2	$ 500	2	$ 500	2	$ 500	2	$ 500	2	$ 500	2	$ 500	2	$ 500
Trail etiquette sign	$250.00	EA	1	$ 250		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Informational kiosk	$500.00	EA	1	$ 500		$ -		$ -	1	$ 500		$ -		$ -		$ -		$ -		$ -
Pavement marking	$60.00	EA		$ -		$ -		$ -	8	$ 474	8	$ 474	8	$ 474		$ -		$ -		$ -
Bike lane striping	$2.26	LF		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Trail centerline	$1.56	LF	5,073	$ 7,914		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Sidewalk (6')	$92.78	LF							6,362	$ 590,268	6,362	$ 590,268	6,362	$ 590,268		$ -		$ -		$ -
Direct Construction Costs			**$ 4,043,234**		**$ 3,866,210**		**$ 2,859,636**		**$ 663,287**		**$ 620,504**		**$ 598,707**		**$ 554,074**		**$ 305,102**		**$ 283,305**	
Multipliers																				
Engineering/Construction Management	20%			$ 808,647		$ 773,242		$ 571,927		$ 132,657		$ 124,101		$ 119,741		$ 110,815		$ 61,020		$ 56,661
Mobilization	15%			$ 606,485		$ 579,931		$ 428,945		$ 99,493		$ 93,076		$ 89,806		$ 83,111		$ 45,765		$ 42,496
A & E Fees	20%			$ 808,647		$ 773,242		$ 571,927		$ 132,657		$ 124,101		$ 119,741		$ 110,815		$ 61,020		$ 56,661
Contingency	40%			$ 1,617,294		$ 1,546,484		$1,143,854		$ 265,315		$ 248,202		$ 239,483		$ 221,630		$ 122,041		$ 113,322
Cost Opinion for Construction			**$ 7,884,307**		**$ 7,539,110**		**$ 5,576,292**		**$ 1,293,410**		**$ 1,209,984**		**$ 1,167,480**		**$ 1,080,446**		**$ 594,950**		**$ 552,446**	
Permitting and ROW																				
Permitting estimate	8%			$591,323		$565,433		$418,222												
Right-of-way acquisition																				
Residential	$6.00	SF																		
Mixed Use	$10.00	SF																		
Commercial	$16.00	SF	3,610	$924,160	3,610	$808,640	3,610	$462,080							4,589	$1,174,784	4,589	$1,027,936	4,589	$587,392
Cost Opinion			**$ 9,399,790**		**$ 8,913,184**		**$ 6,456,593**		**$ 1,293,410**		**$ 1,209,984**		**$ 1,167,480**		**$ 2,255,230**		**$ 1,622,886**		**$ 1,139,838**	

Durham Road/Durham City Limits Fanno Creek Trail Gaps

Updated November 2010

	Cost	Unit	Durham Road/Durham City Limits - Alternative 4A			Durham Road/Durham City Limits - Alternative 4Ai			Durham Road/Durham City Limits - Alternative 4B			Durham Road/Durham City Limits - Alternative 4C		
			High	Medium	Low	High	Medium	Low	High	Medium	Low	High	Medium	Low
			3,503 ft	3,503 ft	3,503 ft	450 ft	450 ft	450 ft	2,212 ft	2,212 ft	2,212 ft	4,535 ft	4,535 ft	4,535 ft
Surfacing Options														
12' Permeable Asphalt Trail	$105.00	LF	3,503 $ 367,815	$ -	$ -	450 $ 47,250	$ -	$ -	0 $ -	$ -	$ -	$ -	$ -	$ -
10' Asphalt Trail	$60.00	LF	$ -	3,503 $ 210,180	$ -	$ -	450 $ 27,000	$ -	$ -	2,212 $ 132,720	$ -	$ -	$ -	$ -
6' Gravel Trail	$18.00	LF	$ -	$ -	3,503 $ 63,054	$ -	$ -	450 $ 8,100	$ -	$ -	2,212 $ 39,816	$ -	$ -	$ -
Boardwalk (12')	$384.00	LF	$ -	$ -	$ -	450 $ 172,800	450 $ 172,800	$ -	405 $ 155,520	405 $ 155,520	$ -	$ -	$ -	$ -
Boardwalk (6')	$192.00	LF	$ -	$ -	$ -	$ -	$ -	450 $ 86,400	$ -	$ -	405 $ 77,760	$ -	$ -	$ -
Additional Elements														
Riprap (parallel to stream)	$99.90	LF	$ -	$ -	$ -	450 $ 44,955	450 $ 44,955	450 $ 44,955	2,212 $ 220,979	2,212 $ 220,979	2,212 $ 220,979	$ -	$ -	$ -
Wetland mitigation	$262.50	LF	$ -	$ -	$ -	450 $ 118,125	450 $ 118,125	450 $ 118,125	2,212 $ 580,650	2,212 $ 580,650	2,212 $ 580,650	$ -	$ -	$ -
Bridge (precast concrete)	$1,225.00	LF	50 $ 61,250	$ -	$ -	$ -	$ -	$ -	160 $ 196,000	$ -	$ -	$ -	$ -	$ -
Bridge (wood)	$980.00	LF	$ -	50 $ 49,000	50 $ 49,000	$ -	$ -	$ -	$ -	160 $ 156,800	160 $ 156,800	$ -	$ -	$ -
Retaining wall	$235.00	LF	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Intersection Improvements														
Curb ramp	$1,000.00	EA	1 $ 1,000	1 $ 1,000	1 $ 1,000	$ -	$ -	$ -	1 $ 1,000	1 $ 1,000	1 $ 1,000	$ -	$ -	$ -
Bollard	$550.00	EA	1 $ 550	1 $ 550	1 $ 550	$ -	$ -	$ -	1 $ 550	1 $ 550	1 $ 550	$ -	$ -	$ -
High-visibility crosswalk	$7,465.00	EA	$ -	1 $ 7,465	1 $ 7,465	$ -	$ -	$ -	$ -	1 $ 7,465	1 $ 7,465	$ -	$ -	$ -
Refuge island	$5,000.00	EA	$ -	1 $ 5,000	$ -	$ -	$ -	$ -	$ -	1 $ 5,000	$ -	$ -	$ -	$ -
Signal	$49,000.00	EA	1 $ 49,000	$ -	$ -	$ -	$ -	$ -	1 $ 49,000	$ -	$ -	$ -	$ -	$ -
Amenities														
Lighting	$3,500.00	EA	7 $ 24,521	$ -	$ -	1 $ 3,150	$ -	$ -	4 $ 15,484	$ -	$ -	$ -	$ -	$ -
Fencing	$25.00	LF	3,503 $ 87,575	3,503 $ 87,575	3,503 $ 87,575	450 $ 11,250	$ -	$ -	2,212 $ 55,300	2,212 $ 55,300	2,212 $ 55,300	$ -	$ -	$ -
Mileage marker	$250.00	EA	3 $ 663	3 $ 663	$ -	$ -	$ -	$ -	2 $ 419	$ -	$ -	$ -	$ -	$ -
Directional sign	$250.00	EA	2 $ 500	2 $ 500	2 $ 500	$ -	$ -	$ -	2 $ 500	2 $ 500	1 $ 250	4 $ 1,000	2 $ 500	1 $ 250
Trail etiquette sign	$250.00	EA	1 $ 250	$ -	$ -	$ -	$ -	$ -	1 $ 250	$ -	$ -	$ -	$ -	$ -
Informational kiosk	$500.00	EA	1 $ 500	$ -	$ -	1 $ 500	$ -	$ -	1 $ 500	$ -	$ -	$ -	$ -	$ -
Pavement marking	$60.00	EA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	38 $ 2,279	38 $ 2,279	38 $ 2,279
Bike lane striping	$2.26	LF	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	16 $ 36	$ -	$ -
Trail centerline	$1.56	LF	3,503 $ 5,465	$ -	$ -	450 $ 702	$ -	$ -	2,212 $ 3,451	$ -	$ -	$ -	$ -	$ -
Sidewalk (6')	$92.78	LF										552 $ 51,215	552 $ 51,215	552 $ 51,215
Direct Construction Costs			**$ 599,089**	**$ 361,933**	**$ 209,144**	**$ 398,732**	**$ 362,880**	**$ 257,580**	**$ 1,279,602**	**$ 1,316,484**	**$ 1,140,570**	**$ 54,530**	**$ 53,994**	**$ 53,744**
Multipliers														
Engineering/Construction Management	20%		$ 119,818	$ 72,387	$ 41,829	$ 79,746	$ 72,576	$ 51,516	$ 255,920	$ 263,297	$ 228,114	$ 10,906	$ 10,799	$ 10,749
Mobilization	15%		$ 89,863	$ 54,290	$ 31,372	$ 59,810	$ 54,432	$ 38,637	$ 191,940	$ 197,473	$ 171,085	$ 8,179	$ 8,099	$ 8,062
A & E Fees	20%		$ 119,818	$ 72,387	$ 41,829	$ 79,746	$ 72,576	$ 51,516	$ 255,920	$ 263,297	$ 228,114	$ 10,906	$ 10,799	$ 10,749
Contingency	40%		$ 239,636	$ 144,773	$ 83,658	$ 159,493	$ 145,152	$ 103,032	$ 511,841	$ 526,594	$ 456,228	$ 21,812	$ 21,597	$ 21,497
Cost Opinion for Construction			**$ 1,168,225**	**$ 705,771**	**$ 407,832**	**$ 777,528**	**$ 707,617**	**$ 502,282**	**$ 2,495,226**	**$ 2,567,144**	**$ 2,224,112**	**$ 106,334**	**$ 105,288**	**$ 104,801**
Permitting and ROW														
Permitting estimate	8%		$87,617	$52,933	$30,587	$58,315	$53,071	$37,671	$187,142	$192,536	$166,808			
Right-of-way acquisition Commercial	$16.00	SF	3,503 $896,768	3,503 $784,672	3,503 $448,384	450 $115,200	450 $100,800	450 $57,600	2,212 $566,272	2,212 $495,488	2,212 $283,136	$0	$0	$0
Cost Opinion			**$ 2,152,610**	**$ 1,543,376**	**$ 886,803**	**$ 951,043**	**$ 861,488**	**$ 597,553**	**$ 3,248,640**	**$ 3,255,168**	**$ 2,674,056**	**$ 106,334**	**$ 105,288**	**$ 104,801**

Tiedeman Road Fanno Creek Trail Gaps

Updated November 2010

	Cost	Unit	Tiedman - Alternative 5A			Tiedman - Alternative 5B			Tiedman - Alternative 5C			Tiedman - Alternative 5Ci
			High	Medium	Low	High	Medium	Low	High	Medium	Low	
			932 ft	932 ft	932 ft	450 ft	450 ft	450 ft	44 ft	44 ft	44 ft	406 ft
Surfacing Options												
12' Permeable Asphalt Trail	$105.00	LF	872 $ 91,560	$ -	$ -	390 $ 40,950	$ -	$ -	$ -	$ -	$ -	$ -
10' Asphalt Trail	$60.00	LF	$ -	872 $ 52,320	$ -	$ -	390 $ 23,400	$ -	$ -	$ -	$ -	$ -
6' Gravel Trail	$18.00	LF	$ -	$ -	872 $ 15,696	$ -	$ -	390 $ 7,020	$ -	$ -	0 $ -	$ -
Boardwalk (12')	$384.00	LF	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Boardwalk (6')	$192.00	LF	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Additional Elements												
Riprap (parallel to stream)	$99.90	LF	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Wetland mitigation	$262.50	LF	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Bridge (precast concrete)	$1,225.00	LF	60 $ 73,500	$ -	$ -	60 $ 73,500	$ -	$ -	$ -	$ -	$ -	$ -
Bridge (wood)	$980.00	LF	$ -	60 $ 58,800	60 $ 58,800	$ -	60 $ 58,800	60 $ 58,800	$ -	$ -	$ -	$ -
Retaining wall	$235.00	LF	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Intersection Improvements												
Curb ramp	$1,000.00	EA	2 $ 2,000	2 $ 2,000	2 $ 2,000	2 $ 2,000	2 $ 2,000	2 $ 2,000	2 $ 2,000	2 $ 2,000	2 $ 2,000	$ -
Bollard	$550.00	EA	2 $ 1,100	2 $ 1,100	2 $ 1,100	2 $ 1,100	2 $ 1,100	2 $ 1,100	2 $ 1,100	2 $ 1,100	2 $ 1,100	$ -
High-visibility crosswalk	$7,465.00	EA	$ -	1 $ 7,465	1 $ 7,465	$ -	1 $ 7,465	1 $ 7,465	$ -	1 $ 7,465	1 $ 7,465	$ -
Refuge island	$5,000.00	EA	$ -	1 $ 5,000	$ -	$ -	1 $ 5,000	$ -	$ -	1 $ 5,000	$ -	$ -
Signal	$49,000.00	EA	1 $ 49,000	$ -	$ -	1 $ 49,000	$ -	$ -	1 $ 49,000	$ -	$ -	1 $ 49,000
Amenities												
Lighting	$3,500.00	EA	2 $ 6,524	$ -	$ -	1 $ 3,150	$ -	$ -	$ -	$ -	$ -	$ -
Fencing	$25.00	LF	932 $ 23,300	$ -	$ -	450 $ 11,250	$ -	$ -	$ -	$ -	$ -	$ -
Mileage marker	$250.00	EA	1 $ 177	1 $ 177	$ -	$ -	0 $ -	$ -	$ -	$ -	$ -	$ -
Directional sign	$250.00	EA	1 $ 250	1 $ 250	1 $ 250	1 $ 250	1 $ 250	1 $ 250	2 $ 500	2 $ 500	1 $ 250	$ -
Trail etiquette sign	$250.00	EA	1 $ 250	$ -	$ -	1 $ 250	$ -	$ -	$ -	$ -	$ -	$ -
Informational kiosk	$500.00	EA	1 $ 500	$ -	$ -	1 $ 500	$ -	$ -	$ -	$ -	$ -	$ -
Sidewalk	$181.00	LF										406 $ 73,486
Trail centerline	$1.56	LF	932 $ 1,454	$ -	$ -	450 $ 702	$ -	$ -	$ -	$ -	$ -	$ -
Direct Construction Costs			**$ 249,614**	**$ 127,112**	**$ 85,311**	**$ 182,652**	**$ 98,015**	**$ 76,635**	**$ 52,600**	**$ 16,065**	**$ 10,815**	**$ 122,486**
Multipliers												
Engineering/Construction Management	20%		$ 49,923	$ 25,422	$ 17,062	$ 36,530	$ 19,603	$ 15,327	$ 10,520	$ 3,213	$ 2,163	$ 24,497
Mobilization	15%		$ 37,442	$ 19,067	$ 12,797	$ 27,398	$ 14,702	$ 11,495	$ 7,890	$ 2,410	$ 1,622	$ 18,373
A & E Fees	20%		$ 49,923	$ 25,422	$ 17,062	$ 36,530	$ 19,603	$ 15,327	$ 10,520	$ 3,213	$ 2,163	$ 24,497
Contingency	40%		$ 99,846	$ 50,845	$ 34,124	$ 73,061	$ 39,206	$ 30,654	$ 21,040	$ 6,426	$ 4,326	$ 48,994
Cost Opinion for Construction			**$ 486,749**	**$ 247,868**	**$ 166,357**	**$ 356,172**	**$ 191,130**	**$ 149,439**	**$ 102,571**	**$ 31,328**	**$ 21,090**	**$ 238,849**
Permitting and ROW												
Permitting estimate	8%		$36,506	$18,590	$12,477	$26,713	$14,335	$11,208				
Right-of-way acquisition												
Residential	$6.00	SF										
Commercial	$16.00	SF										
Cost Opinion			**$ 523,255**	**$ 266,459**	**$ 178,834**	**$ 382,885**	**$ 205,465**	**$ 160,647**	**$ 102,571**	**$ 31,328**	**$ 21,090**	**$ 238,849**

TECHNICAL MEMORANDUM

Tigard Greenway Trails Master Plan

Task 4 Specific Issues Report: Tualatin River, Pathfinder-Genesis, Washington Square Loop, and Tigard Street Trail Gaps and Opportunities

Date: December 20, 2010 Project #: 10622

To: Duane Roberts and Steve Martin, City of Tigard

From: Jamie Parks, Erin Ferguson, and Jessica Horning, Kittelson and Associates, Inc.

cc: Hannah Kapell, Robin Wilcox, and Mike Tresidder, Alta Planning + Design

Introduction

This memorandum addresses specific implementation questions and issues regarding construction feasibility of the Tigard Street and Washington Square Loop Trails and extensions to the Tualatin River and Pathfinder-Genesis Trails. Each section presents a brief overview of the proposed trail or extension, as well as opportunities and constraints associated with completing the segment. Each trail is divided into logical segments based on major roads or other barriers to completion, and each segment is discussed independently.

TYPICAL CONSTRAINTS AND ISSUES

Similar to the Task 3 Specific Issues Report addressing the Summer Creek, Kreuger Creek, and Fanno Creek Trails, this memorandum assesses a multitude of potential constraints to developing the trails, including: property impacts, Sensitive Areas Designation, wetland requirements, sensitive habitats, slopes, and other factors. Recommendations for addressing environmental constraints from the Metro Green Trails Handbook, Clean Water Services (CWS) Design and Construction Standards, and City of Tigard's Sensitive Areas Requirements are also considered. For example, all three of these sources indicate that creek crossings should be kept at a minimum and should be at the point with the shortest distance between the stream banks when feasible.

Under the Tigard Community Development Code, areas within the 100-year floodplain are designated Sensitive Areas. Whenever development is allowed within and/or adjacent to the 100-year floodplain, the City requires consideration of dedication of sufficient open land area for a greenway, including portions at a suitable elevation for construction of a pedestrian/bicycle pathway in accordance with the adopted pedestrian bicycle pathway plan. In Sensitive Areas, a 12-foot trail is allowed as a conditional use (or 14-foot trail where low impact development

approach standards are followed), but additional permitting may be required.[1] Pedestrian/bicycle pathway projects within the floodplain must include a wildlife habitat assessment that shows the proposed alignment minimizes impacts to significant wildlife habitat while balancing the community's recreation and environmental educational goals. CWS Design and Construction Standards must also be certified as having been met prior to the City application for local land use approval.

Clean Water Services enforces rules to protect water resources from the impacts of development by requiring Vegetated Corridors, enhancement, and mitigation for impacts. Vegetated Corridors, also known as buffers, must be preserved and maintained adjacent to Sensitive Areas to protect their water quality functions. CWS Design and Construction Standards allow pathways within Vegetated Corridors up to 12 feet in width, including any structural embankment, and require that any development activities enhance the Vegetated Corridor or make the corridor exceed "Good Condition." Where trails encroach into the CWS Vegetated Corridor, the area of impact must be mitigated by the on-site expansion of the Vegetated Corridor or the off-site enhancement of a degraded area.[2] In addition, no native trees greater than 6" diameter should be removed and the pathway should be in the outermost 40% of a Vegetated Corridor.[3] CWS allows paths up to 14 feet if constructed using low impact development approaches, including porous pavement.[4] Where proposed trail alignments are within the CWS Vegetated Corridor, the information is noted but did not influence the cost estimate at this time.

Metro's Green Trails Handbook makes the following additional recommendations:

- Avoid routes with habitat or wetland impact unless there is no alternative route... an alternative route would be a utility corridor or a nearby low-traffic road
- Give preference to areas that already show signs of user-disturbance
- If Sensitive Areas cannot be avoided, keep the trail at the habitat edge
- To limit impact, use an elevated trail (i.e., boardwalk)
- Trails should not parallel long stretches of riparian or stream side corridor
- Encourage infiltration (use permeable asphalt and concrete if possible) and minimize erosion and runoff
- Avoid long sustained grades
- Avoid flat ground (less than 5% slope) and steep ground (greater than 25% slope)

Specific requirements for these factors will be discussed in the Environmental Memorandum that will accompany the Task 3 and Task 4 Specific Issue Reports.

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[1] An applicant, who wishes to develop within a sensitive area, as defined in Chapter 18.775, must obtain a permit in certain situations. Depending on the nature and intensity of the proposed activity within a sensitive area, either a Type II or Type III permit is required, as delineated in Sections 18.775.020.F and 18.775.020.G.
[2] Definitions and upgrading strategies are available at:
http://www.cleanwaterservices.org/PermitCenter/DesignAndConstruction/DandCTable.aspx
[3] If native trees over 6" in diameter must be removed for a trail alignment, additional mitigation is required per CWS standards.
[4] Section 4.07 CWS Design and Construction Standards

COST ESTIMATES

Cost estimates and design treatments are based on Technical Memorandum #2, Greenway Trails Typical Sections. Cost estimates account for necessary design treatments, such as the need for boardwalks in wetlands or retaining walls in areas with steep slopes. Trails in wetlands are assumed to use boardwalk and also include an allowance for wetland mitigation and riprap[5] where the trail is parallel to a stream. Trail alignments in flood plains and 'strictly limited' habitat areas were identified in the discussion and evaluation. Costs for permitting were assumed to be 8% of the total construction cost of the project, although costs vary widely. Costs also include estimates for easements or land acquisition, based on an estimate of $6 per square foot in residential areas and $10 per square foot in commercial areas (2010 dollars). The need for private property acquisition is also included in the 'right-of-way' evaluation criteria, discussed below.

The minimum (low) design cost estimates include only necessary design treatments. Where possible or appropriate, the low cost assumes a soft surface trail with no crossing elements, signing, lighting, or other amenities. The low cost estimate includes the least design appropriate for the trail type; for example, low design costs for Fanno Creek assume a paved facility because Fanno Creek is designated as a regional trail. Medium and high design cost estimates include additional design treatments beyond the minimum necessary. Depending on the location, a high level of treatment may consider a 12-foot trail paved with permeable asphalt, wayfinding signage, lighting, and bicycle parking.

All proposed trail alignments are based on the Base Maps and field verifications performed by the Consultant team. High, medium, and low design cost estimates were developed for all segments of each of the trails. All cost estimates are provided in Appendix A. Cost estimates are rounded to the nearest $1,000.

[5] A medium to large angular rock that helps dissipate water flow and reduces erosion.

EVALUATION CRITERIA

Several of the gaps considered in this analysis have multiple alternative potential alignments. Table 1 shows the primary criteria and factors taken into account to prioritize these alignment options. For the evaluation, a "●" indicates that the alignment fully meets the criteria, a "◑" means that the alignment somewhat fulfills the criteria, while a "○" indicates that the alignment does not meet the criteria.

Table 1. Evaluation Criteria

Criteria	Definition	Measures
Connectivity	Evaluates connectivity and access to residential, commercial or employment areas as well as schools.	Provides the most direct access to destinations, such as major employers and commercial centers. Minimizes out of direction travel
Safety and Security	Addresses the safety concerns of trail users traveling along the trail. The better the sightlines, the higher the score.	Surrounding area is open and visible from all angles Trail users have good lines of sight along the trail and to immediate adjacent surrounding area No buildings or large structures obscure views of the trail
User Experience	Measures the quality of the users' experience of the trail. Considers potential views, environmental aesthetics, comfort and characteristics such as noise, and air quality.	Limits proximity of the trail major roads Limits views of industrial/commercial activity Minimizes level of noise from surrounding land uses such as roadways and railroads Potential and ease of providing amenities (e.g. directional signage)
Topographical Constraints	Considers topographical constraints and the ease of providing for ADA accessibility. Higher scores if earth moving, retaining walls and long ramps are not needed or minimized.	Minimizes number of slopes associated with option If present, slopes are minimized Ample room to grade trail to meet ADA accessibility Minimizes length of ramps needed
Environmental Impacts	Evaluates whether each alignment minimizes environmental impacts.	Minimizes impacts to floodplain, wetland, or Clean Water Services designated Sensitive Areas, or Goal 5 habitat
Cost	Scores options based on the cost of design, engineering, and/or construction, based on the minimum cost estimates (the low design cost option).	Minimizes cost of easement / acquisition Minimizes cost of design/engineering/construction Minimizes cost of maintenance
Right-of-Way	Addresses the number of property owners that the City will need to work with in order to construct the alignment.	Alignment on land that is owned by the City of Tigard, Metro, or other public body Minimizes impacts on private property

The neighborhood survey provides a basis for public support of trail segments; input from this survey will be included in the final consideration of alternatives and recommendations for implementation.

Tualatin River Trail Extension and Improvements Feasibility

The Tualatin River Trail is a regional greenway trail consisting of a mixture of land and waterway trails. The existing land trail segments are primarily paved, with a few short unpaved segments. The segment of the Tualatin River Trail in Tigard follows the Tualatin River from 85th Avenue, through Cook Park, to 108th Avenue. The proposed extension described in the Park System Master Plan would extend the trail along the Tualatin River west of 108th Avenue, past City limits to Highway 99W and a future Westside Trail extension south of Tigard. A second potential extension would create a connection between the Tualatin River Trail in the City of Durham and the 85th Avenue Trail in Tigard.

The following subsections consider the feasibility of these extensions and address possibilities for improving existing segments of the trail where inconsistent trail widths and poor pavement quality detract from users' comfort and safety. Three segments of the Tualatin River Trail were analyzed to address the following questions:

1. *Durham City Limits to 85th Avenue* - Is it possible to connect the existing segments of the Tualatin River Trail in the City of Durham, the 85th Avenue Trail, and segments of the Tualatin River Trail in the City of Tigard to create a loop trail?
2. *85th Avenue to 108th Avenue* – What upgrades are appropriate for the existing trail segment?
3. *108th Avenue to Highway 99W* – What is the feasibility and approximate cost of extending the Tualatin River Trail to Highway 99W, as called for in the Park System Master Plan?

Evaluation

The existing portion of the Tualatin River Trail is well-used and connects multiple Tigard neighborhoods to Cook Park, nature opportunities near the Tualatin River, and other recreation opportunities. Extending the trail would provide additional connections to regional trails and bicycle facilities and increase the trail's value as a transportation and recreation resource. However, significant barriers impact the feasibility of the proposed Tualatin River Trail extensions, particularly private properties, environmental constraints, and high costs. Figure 1 shows the trail segments that were analyzed and potential alignments for proposed Tualatin Trail extensions. Table 2 shows the analysis of the alignments.

Table 2. Tualatin River Trail Evaluation of Alignments

Criteria	Durham City Limits to 85th Avenue	85th Avenue to 108th Avenue	108th Avenue to Highway 99W	
			A	B
Connectivity	◑	●	◑	●
Safety and Security – Trail Users	●	◑	◑	◑
User Experience	◑	●	◑	●
Topographical Constraints	●	◑	○	◑
Environmental Impacts	○	◑	◑	◑
Cost	○	◑	○	○
Right of Way	○	●	○	○

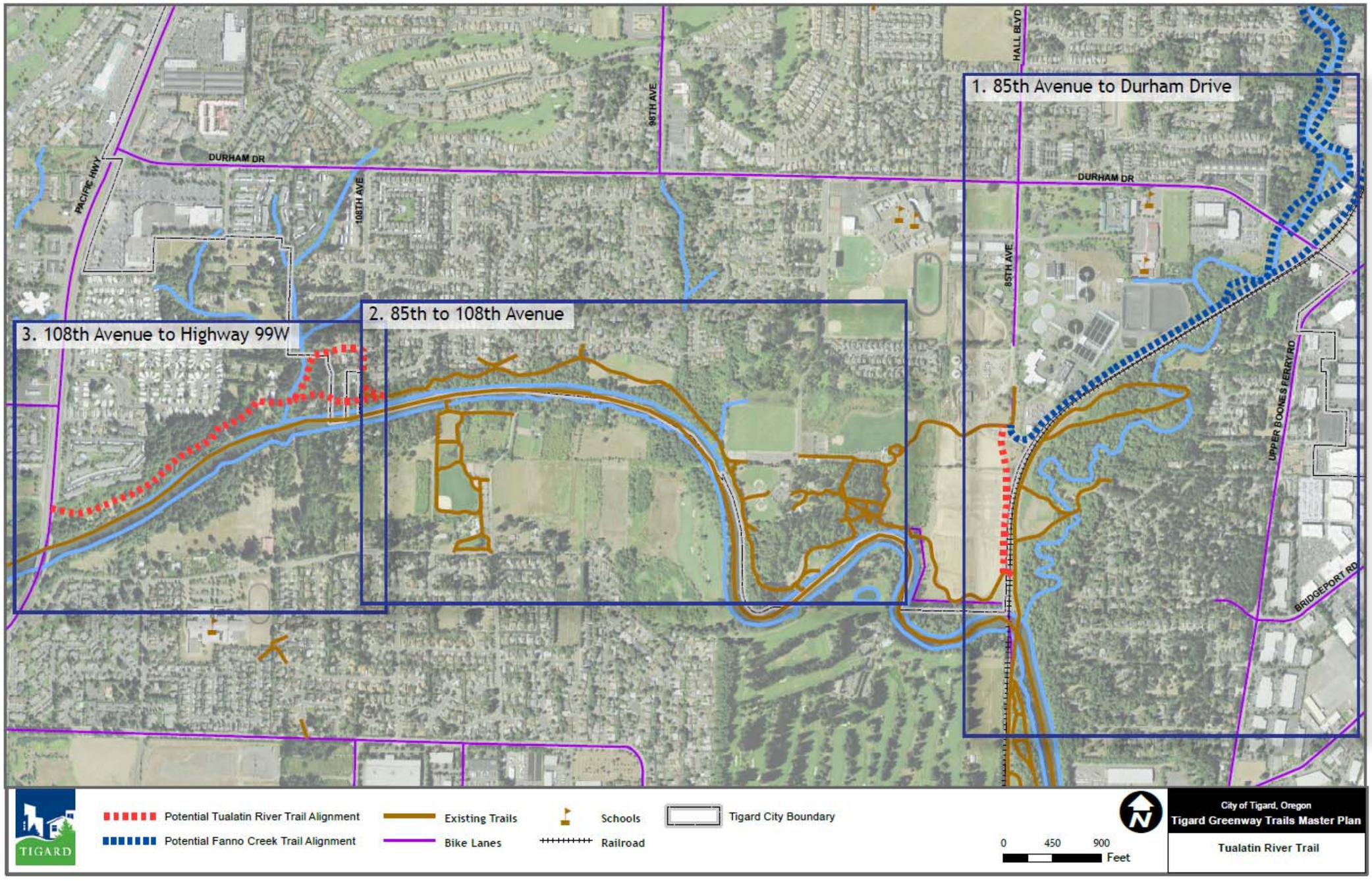
Based on this analysis, the project team recommends that the City continue pursuing the development of the Tualatin River Trail, concentrating on improvements that enhance user experience and safety on existing portions of the trail. These improvements include: adding wayfinding and mileage signs, upgrading the southern existing soft surface trail through Cook Park to an asphalt surface trail to improve bicycle and ADA accessibility, repairing damaged asphalt trail surfaces, and reducing the grade and curve at the 108th Avenue trail entrance.

Constructing a western trail extension to Highway 99W would enhance bicycle and pedestrian connectivity considerably; however, the lack of right-of-way on this corridor limits its feasibility. Although alignment 3A would utilize a City-owned parcel in part, both alignment 3A and 3B would have significant private property impacts. Both alignments would also require a creek crossing in an area with steep slopes, a trail underpass under the Highway 99W bridge, and improved connections to the bicycle lanes and sidepaths along Highway 99W. These factors combined with the fact that this trail segment is located outside of Tigard city limits indicates that this segment of trail should not be a priority for the City at this time. The City should consider contacting private property owners along the potential alignments to determine levels of support for the extension and reexamine this opportunity after the Westside Trail extension is constructed.

The eastern connection from Durham City Limits to 85th Avenue has similar private property issues and environmental challenges. The two Fanno Creek Trail extensions to Durham City discussed in Technical Memo #2 would both provide a direct Fanno Creek - Tualatin River Trail connection and Safe Routes to School benefits for students attending Durham Elementary. However, both links would also require extensive coordination with Clean Water Services and the Railroad to construct a trail link within the narrow corridor easement between Durham Road and 85th Avenue with adequate separation from the railroad tracks . The potential Tualatin River Trail extension from Durham City limits examined in this memo would provide a direct route from segments of the Tualatin River Trail within the City of Durham to an existing trail railroad undercrossing and the 85th Avenue Trail. However, this alignment would not provide a direct

Fanno Creek - Tualatin River Trail connection and would travel through a Clean Water Services oak savannah restoration area. In Task 5, the project team will coordinate with Clean Water Services and the City to begin to determine the level of support for these trail alignments and plan next steps accordingly.

Figure 1 Tualatin River Trail Analysis Segments



Tualatin River Trail – Durham City Limits to 85th Avenue | 1

Summary

Technical Memorandum #2 documented the feasibility of two potential trail alignments that would connect a proposed extension of the Fanno Creek Trail to Durham City limits and the 85th Avenue Trail. Both alignments (4A and 4B) would run along a narrow corridor between the creek, railroad tracks, and Clean Water Services property. Another potential connection from Durham City limits (1C) would use an existing trail railroad undercrossing and follow the western side of the railroad tracks north to connect to the 85th Avenue Trail. Figure 2 shows the potential alignments for connections from Durham City limits to the Fanno Creek Trail, 85th Avenue Trail, and Tualatin River Trail.

Opportunities

- Connects to Durham City trails and bicycle routes
- Utilizes an existing demand trail and railroad crossing
- Provides a direct connection from the 85th Avenue Trail and Tualatin River Trail to Durham City

Constraints

- Requires coordination with the railroad and property owner (alignment passes through two parcels owned by CWS)
- Trail is entirely in wetlands and CWS oak savannah restoration area

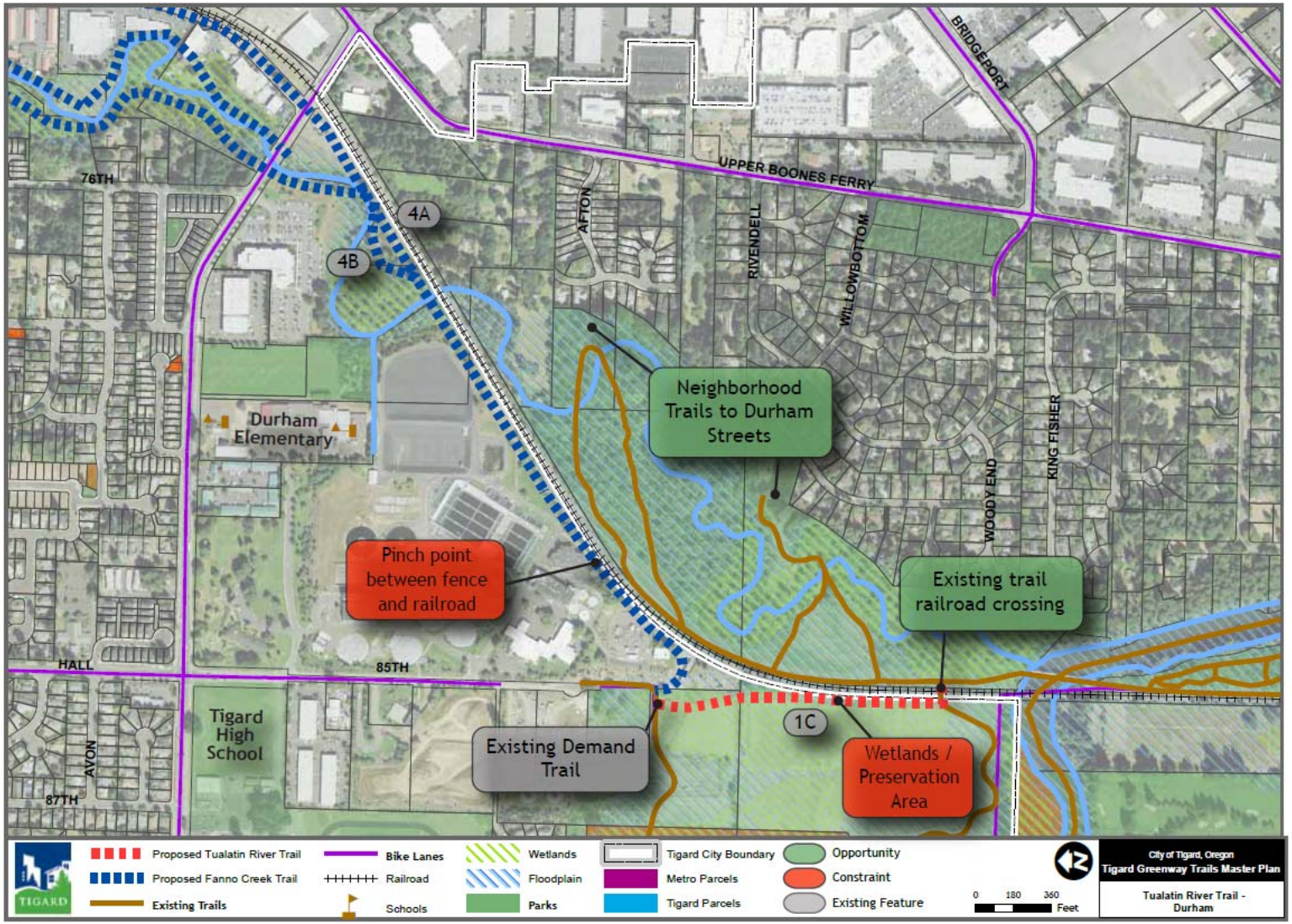
Entrance to Tualatin River Trail from 85th Avenue Trail.

Existing maintenance road/demand trail heading south from 85th Avenue Trail and the Tualatin River Trail.

View of Durham City segment of Tualatin River Trail opposite Clean Water Services property.

Cost Option	
Length: 1,473' (1,473' in wetlands) High Design Option: • Design: 12' boardwalk, lighting, fencing, permitting, acquisition • Planning-level cost: $ 2,095 ,000 Medium Design Option: • Design: 12' boardwalk, fencing, permitting, acquisition • Planning-level cost: $1,997 ,000 Low Design Option: • Design: 6' gravel, boardwalk, fencing, permitting, acquisition • Planning-level cost: $1,403,000	

Figure 2 Tualatin River Trail – 85th Avenue to Durham City Limits



Tualatin River Trail –85th Avenue to 108th Avenue | 2

Summary

This existing segment of the Tualatin River Trail consists of a 12-foot asphalt trail from 85th Avenue to Cook Park, soft surface nature trails within Cook Park, and a 4-8 foot asphalt trail from Cook Park to 108th Avenue. In several areas the asphalt trail surface is degraded and there are abrupt changes in trail surface, width, direction, and slope. This segment currently ends at a 90 degree turn and steep slope (approximately 20 percent grade) at 108th Avenue.

Recommendations for this segment include:

- Make a continuous asphalt trail link through Cook Park to improve access for cyclists and ADA accessibility
- Bring current alignment up to regional standards by repairing asphalt and adopting a uniform 10-12 foot section where possible.
- Add a stairway and/or obtain an easement to straighten the curve and lessen the grade of the 108th Avenue trail entrance.
- Extend mileage signs from Cook Park to the remainder of the trail.

Figure 3 shows opportunities and constraints for this segment of the Tualatin River Trail.

Opportunities

- Improve user experience and safety on an existing high use trail
- Enhance accessibility and connections to residential and recreational uses.
- Create separated bicycle and pedestrian trail routes through Cook Park.

Constraints

- Potential high cost and property issues related to improving 108th Avenue entrance (approximately 50 feet of proposed alignment is within a non-City-owned residential parcel)
- Trail widening/straightening may require removal of several large trees.

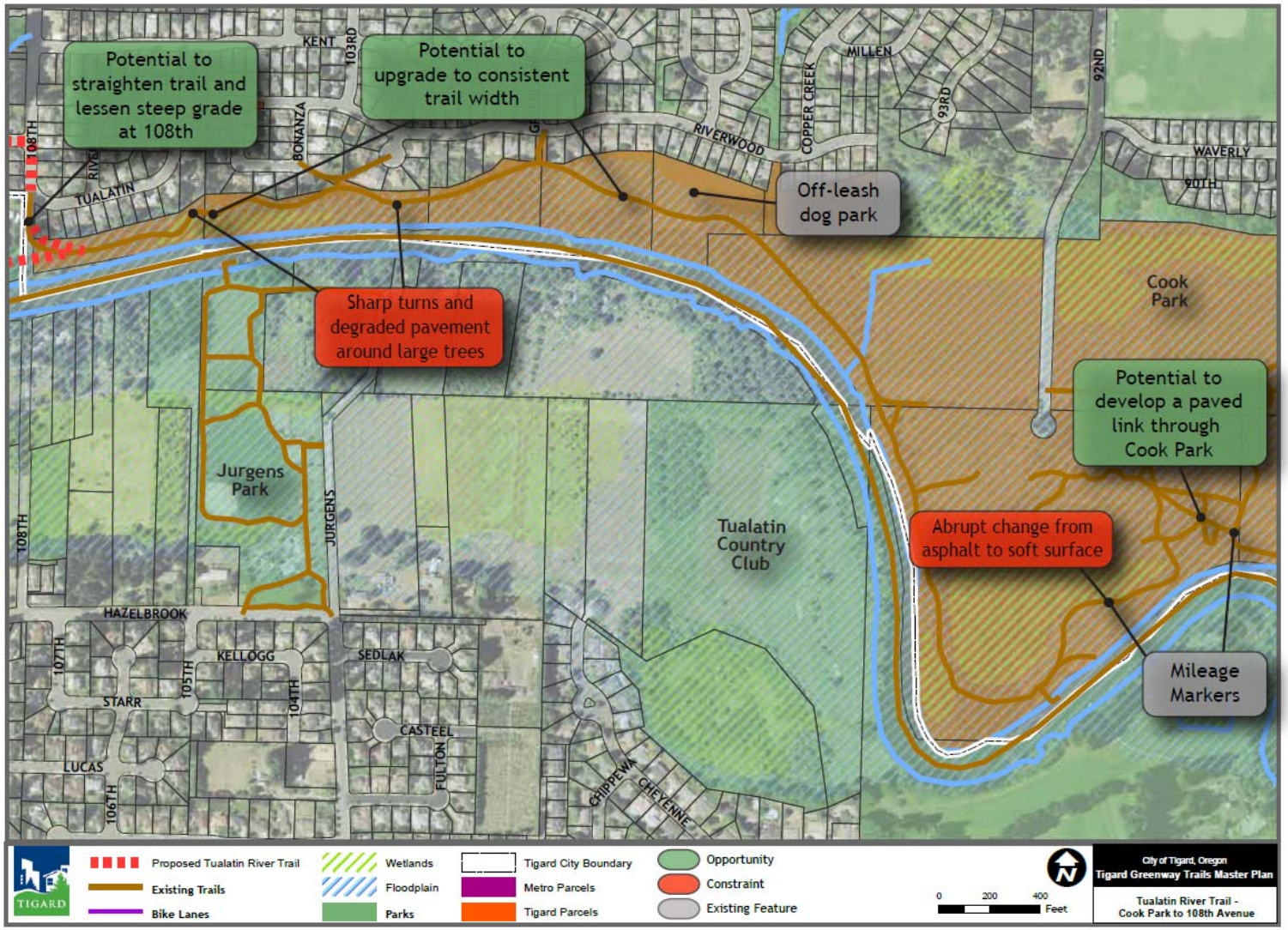
Abrupt change from asphalt to soft surface trail in Cook Park. Mileage posts indicate distance from the trailhead.

In several areas the Tualatin River Trail makes sharp turns and has abrupt changes in trail width.

The 108th Avenue entrance has a steep grade with a 90 degree turn at its base.

Cost Option	
Length • Spot improvements • 250′ for 108th entrance redesign • 220′ for Cook Park link High Design Option: • Design: signage, lighting, grading, 12′ permeable asphalt, acquisition, permitting • Planning-level cost: $126,000 Medium Design Option: • Design: signage, 10′ asphalt, acquisition, permitting • Planning-level cost: $65,000 Low Design Option: • Design: signage, 8′ asphalt patching • Planning-level cost: $12,000	

Figure 3 Tualatin River Trail – 85th Avenue to 108th Avenue



Tualatin River Trail – 108th Avenue to Highway 99W | 3

Summary

This segment would pass outside of Tigard city limits and intersect with Oregon 99W and the future Westside Trail extension. The two options for this segment are to follow the river along existing demand trails at the base of the 108th Avenue trail entrance (Alignment B) or to continue the trail from 108th Avenue through a wooded City-owned parcel (Alignment A). Multiple private properties abut the river and both potential alignments. Both alignments require a stream crossing in a steeply sloped area and are located primarily within the floodplain. An on-street alternative to this trail is not available south of Durham Road, which is over 0.5 miles north of the Tualatin River at Oregon 99W. Figure 4 shows the potential alignments for the Tualatin River Trail extension.

Opportunities

- Connects two regional trails (Tualatin and proposed Westside) (all)
- Provides a bicycle/pedestrian route where no on-street alternative is available (all)
- Connects to bike lanes on Oregon 99W (all)
- Extends one of the City's most popular recreation trails and increases its transportation function by connecting to neighborhoods west of Oregon 99W(all)

Constraints

- Close proximity to multiple private properties (2,960 feet of Alignment A passes through 11 non-City-owned residential parcels; 3,136 feet of Alignment B passes through 13 non-City-owned residential parcels) (all)
- Portion of trail in floodplain.
- Steep slopes require grading, bridging, and drainage (all)
- Outside of city limits (all)
- Requires stream crossing and Highway 99W underpass (all)
- Requires out of direction travel (A)

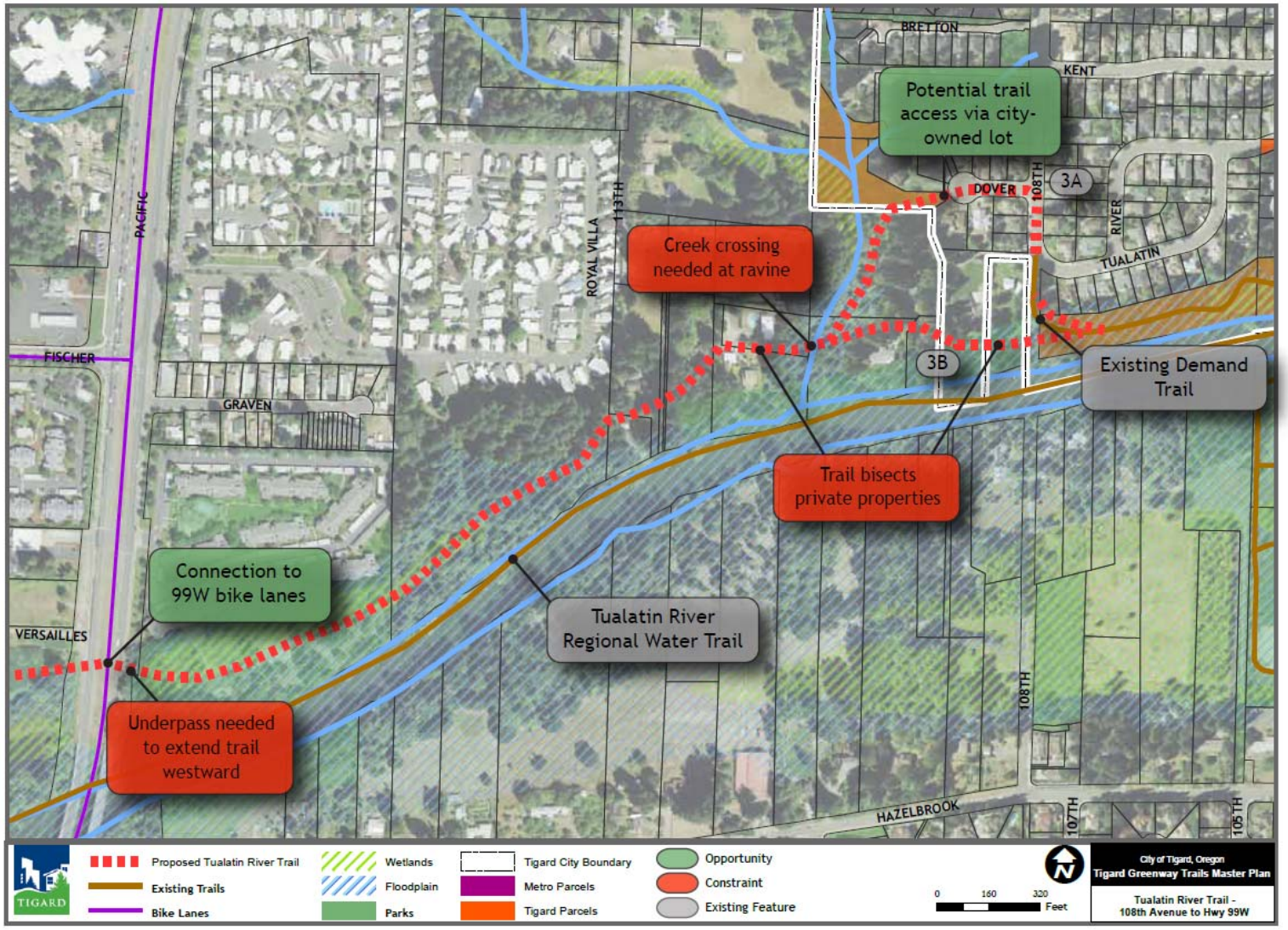
Demand trail extending from the 108th Avenue end of the Tualatin River Trail towards Highway 99.

Multiple private properties abut the river in this segment.

Trail would connect to existing bike lanes on Highway 99W and pass under the bridge to connect to the future Westside Trail.

Cost Option	
Length • 3,607′ Alignment A • 3,314′ Alignment B High Design Option: • Design: Alignment B, 12′ permeable asphalt, precast concrete bridge, undercrossing, permitting, acquisition • Planning-level cost: $2,354 ,000 Medium Design Option: • Design: Alignment B, 10′ asphalt, wood bridge, undercrossing, permitting, acquisition • Planning-level cost: $1,746,000 Low Design Option: • Design: Alignment A, 8′ asphalt, wood bridge, undercrossing, permitting, acquisition • Planning-level cost: $1,477,000	

Figure 4 Tualatin River Trail – 108th Avenue to Highway 99W



Pathfinder-Genesis Trail Extension and Improvements Feasibility

The Pathfinder-Genesis Trail is an existing community greenway trail that extends southwest from Walnut Street to 118th Street near Gaarde Street. Another fork of this "Y"-shaped trail extends south along Fairhaven Street. The existing trail consists of both paved and unpaved segments; the segment from Walnut Street to 115th Avenue is an 8-foot asphalt trail suitable for bicycles and pedestrians, whereas the segment from 115th Avenue to 118th Court is a 2-3 foot gravel nature trail that is not ADA accessible. The proposed extension of the trail would extend north of Walnut Street via the creek corridor or an on-street route and connect to the Fanno Creek Trail near Woodard City Park. A second proposed extension would make the short connection between the current trail end at 118th Street and Gaarde Street to the south.

The following subsections consider the feasibility of these extensions and address possibilities for improving existing segments of the trail to increase accessibility while preserving the corridor's high natural resource value. Three segments of the Pathfinder-Genesis Trail were analyzed:

1. Fanno Creek to 107th Court
2. 107th Court to 115th Avenue (& Fairhaven Street)
3. 115th Avenue to Gaarde Street

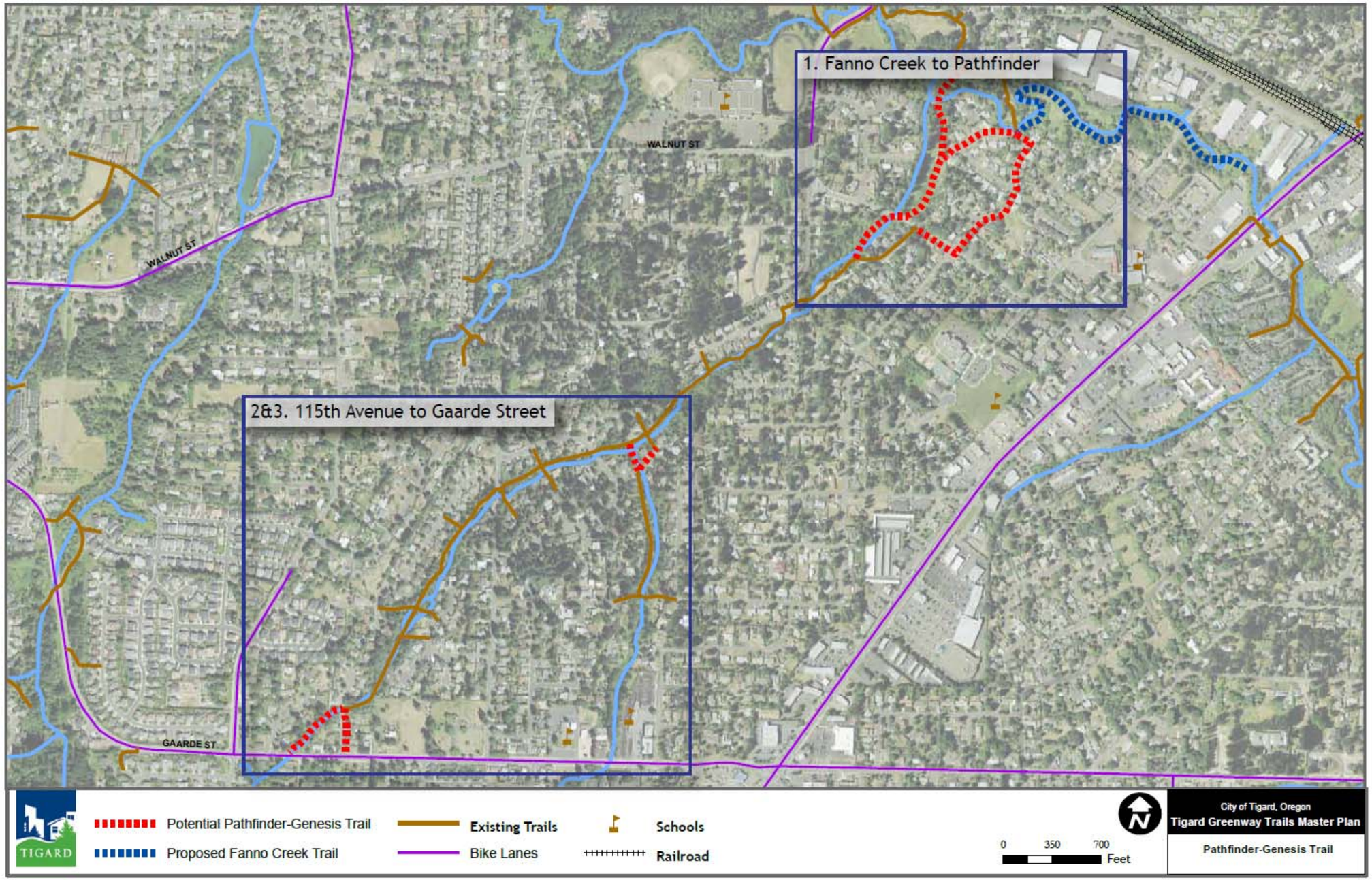
Evaluation

Figure 5 shows the trail segments that were analyzed and potential alignments for proposed Pathfinder-Genesis Trail extensions. Table 3 shows the analysis of the alignments.

Table 3. Pathfinder-Genesis Trail Evaluation of Alignments

Criteria	Fanno Creek to 107th Court			107th Court to 115th Avenue		115th Avenue to Gaarde Street	
	A	B	C	A	B	A	B
Connectivity	●	◑	◑	●	◑	●	◑
Safety and Security – Trail Users	●	◑	○	◑	◑	◑	◑
User Experience	●	◑	○	●	◑	●	◑
Topographical Constraints	◑	◑	●	◑	◑	○	◑
Environmental Impacts	○	○	●	◑	●	○	●
Cost	○	◑	●	●	●	●	●
Right-of-Way	○	○	●	●	●	○	●

Figure 5 Pathfinder-Genesis Trail Analysis Segments



A connection between the Fanno Creek Trail, Woodard Park, and the Pathfinder-Genesis Trail was supported by many residents that participated in a recent Tigard neighborhood trail survey. This area currently has few sidewalks and many residents expressed safety concerns when traveling between these popular destinations. These factors indicate that this segment of trail should be a priority for the City. However, a northern expansion of the Pathfinder-Genesis trail along the creek corridor (1A and 1B) could have significant property and/or environmental impacts.

The greenway corridor between Walnut Street and Pathfinder Way is narrow and the right-of-way between the creek and the private properties may be insufficient for a trail. In addition, an at-grade street crossing would be required at Walnut Street. An on-street bikeway and sidewalks along SW Brookside Avenue (1C) may be the preferred solution for the short-term, providing a connection between the two trails and addressing residents' requests for additional sidewalks in the area. This alignment would require users to travel along an existing sidewalk on Walnut Street for several hundred feet and would require crossing treatments and signage to encourage crossing at a single point. The existing sidewalk on Walnut Street may need to be widened to accommodate increased pedestrian traffic. The on-street alignment would also add shared use bicycle markings (i.e., sharrows), bicycle wayfinding, and a sidewalk to Brookside Avenue, a broad low-traffic street.

In several areas on the Pathfinder Way to 115th Avenue segment of the Pathfinder-Genesis Trail, the asphalt trail surface is degraded or being pushed up by tree roots, causing hazards for bicyclists and pedestrians. This segment is well-used and incorporated into surrounding private properties through landscaping, signage, and other features. Based on these existing conditions and responses to the neighborhood trails survey, the City should prioritize maintaining and improving this portion of the trail.

The gravel surface segment of the Pathfinder-Genesis trail between 115th Avenue and 118th Court is generally narrow and in poor condition. Steep slopes and wetlands in the narrow stream corridor, multiple areas with boardwalks and/or bridges, and community support for maintaining this segment of the trail as an unpaved nature trail suggest that the City should prioritize upgrades to this segment to reduce erosion, improve safety and accessibility, and protect the environmental resources in this corridor. Paving this segment of the trail is not recommended at this time, but should be reconsidered in the future if traffic on the trail increases.

The project team recommends improvements to the on-street link connecting the 118th Court trail entrance to Gaarde Street (3B) over continuing the trail along the narrow stream corridor (3A). Existing pedestrian access from the trail entrance to Gaarde Street is convenient using existing sidewalks on 118th Court, although crossing treatments on Gaarde should be considered to increase safety and accessibility.

Pathfinder-Genesis Trail – Fanno Creek to 107th Court | 1

Summary

The three options for this segment are to follow the creek north of Walnut Street to Fanno Creek Trail (Alignment A), to provide an on-street connection (Alignment C), or to provide a mixed streamside and on-street connection (Alignment B). All of Alignment A and the majority of Alignment B are located in wetlands. Several private properties also abut these alignments on both sides of the creek. All three alignments would require crossing improvements on Walnut Street. Alignment C would direct users to existing sidewalks on Walnut Street for several hundred feet and then onto Brookside Avenue, where there are currently no sidewalks. Improvements would include widening existing sidewalks on Walnut, wayfinding, bicycle boulevard treatments (e.g., bicycle wayfinding, shared lane pavement markings, etc.), and sidewalks on Brookside Avenue and Johnson Street. Figure 6 shows the potential alignments for this segment of the Pathfinder-Genesis Trail.

Opportunities

- Closes a gap between two existing trails (all)
- Connects to Woodard Park (all)
- Low volume street potential short-term alternative as bicycle boulevard (B and C)
- Increase sidewalk availability (B and C)

Constraints

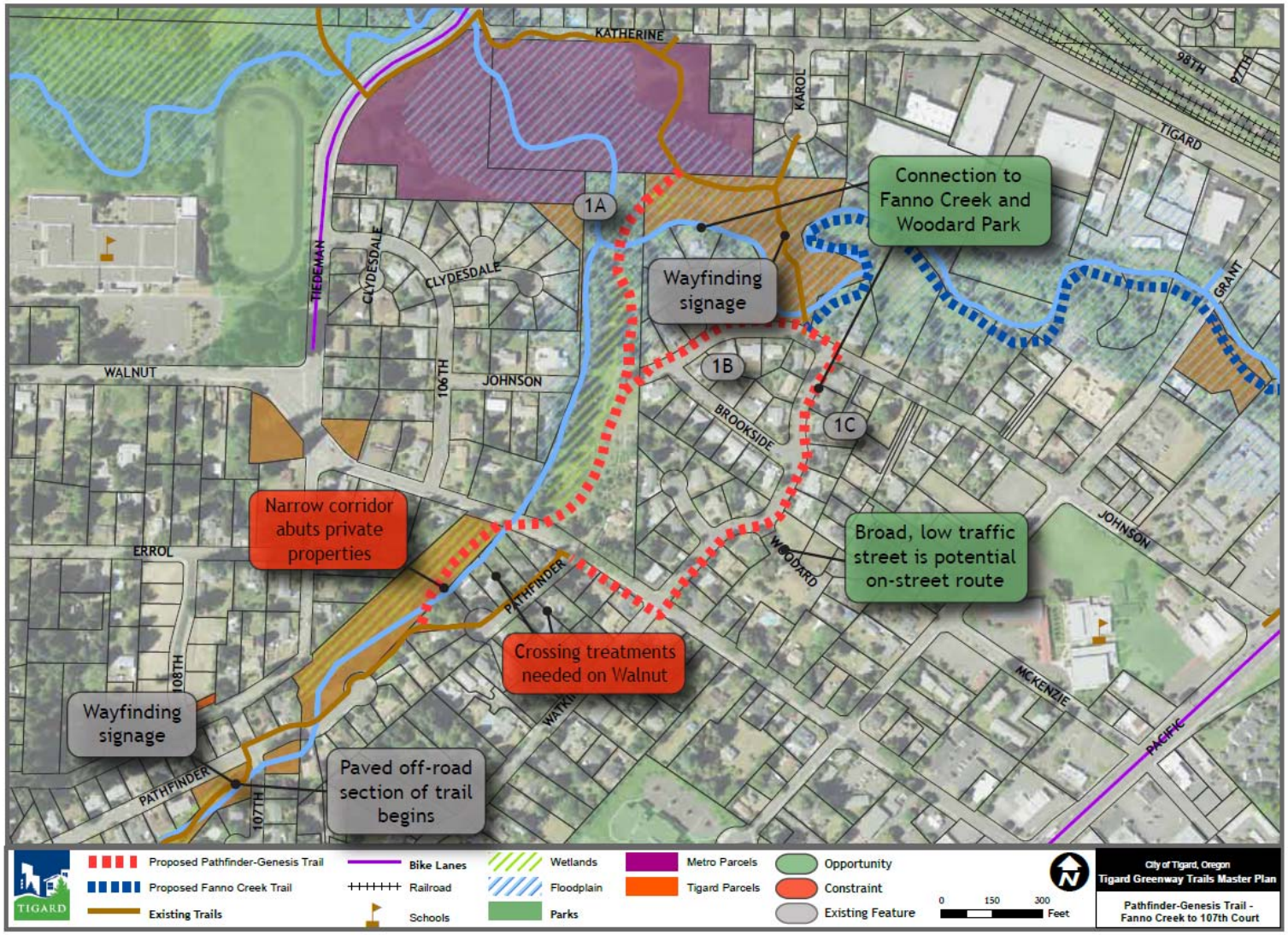
- Portions of (A) and (B) trail alignments are through wetlands
- Close proximity to multiple private properties (1,075 feet of Alignment A and 535 feet of Alignment B travel through one privately-owned residential parcel) (A and B)
- Requires out-of-direction travel (C)
- Less pleasant user experience (C)
- Sidewalks require narrowing street or coordination with property owners (B and C)

Brookside is a broad, low-traffic street connecting two trails that currently has no bicycle/pedestrian treatments.

Private properties and wetlands abut the trail alignment north of Walnut Street, a high traffic crossing.

Cost Option	
Length: • Alignment A: 1,783′ (420′ in wetland) • Alignment B: 1,609′(320′ in wetland) • Alignment C: 1,464′ High Design Option: Alignment A • Design: 12′ permeable asphalt, crosswalk and signage, lighting, signage, acquisition, permitting • Planning-level cost: $1,199,000 Medium Design Option: Alignment B • Design: 10′ asphalt, crosswalk and signage, acquisition, permitting • Planning-level cost: $731,000 Low Design Option: Alignment C • Design: crosswalk and signage, pavement markings • Planning-level cost: $16,000	

Figure 6 Pathfinder-Genesis Trail – Fanno Creek to 107th Court



Pathfinder-Genesis Trail – 107th Court to 115th Avenue | 2

Summary

This existing segment is an 8-foot paved asphalt trail suitable for pedestrian, cyclists, and individuals with disabilities. In several areas the asphalt is degraded and in need of repair to improve safety and accessibility. Other improvements include wayfinding, mileage markers, and safety improvements. An additional trail entrance and direct link to the southern "Y" of the Pathfinder-Genesis Trail could be constructed through a wooded City-owned parcel (2A) or on-street improvements could be implemented between existing access points (2B). Figure 7 shows the potential alignments for this segment of the Pathfinder-Genesis Trail.

Opportunities

- Improve user experience and safety on an existing community trail (all)
- Enhance accessibility and connections to neighborhood trails and residential and recreational uses (all)

Constraints

- Close proximity to two private properties (A)
- Requires new stream crossing (A)

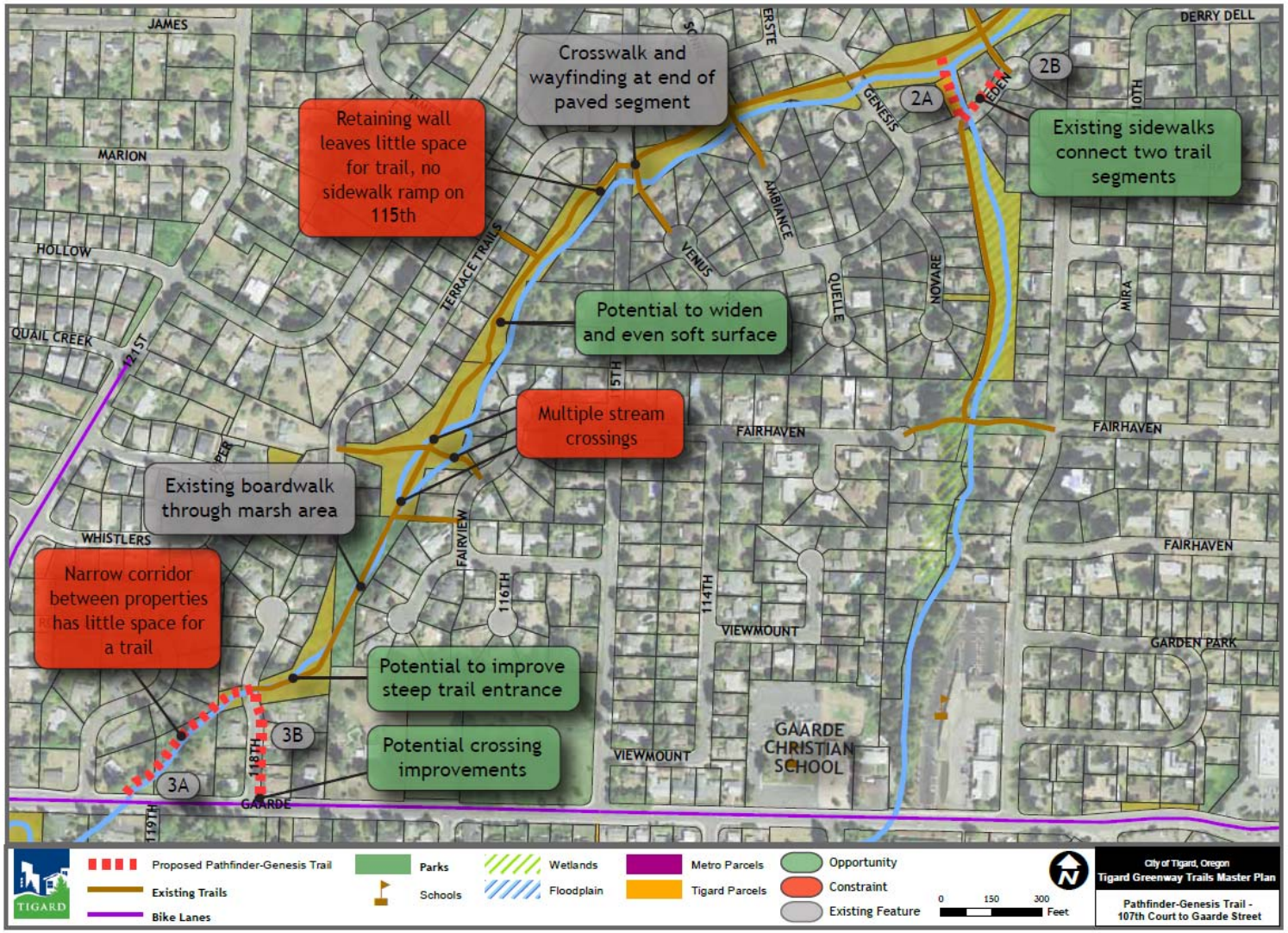
Bollard marking the entrance to the Pathfinder-Genesis Trail. Yellow paint indicates asphalt in need of repair.

Pathfinder-Genesis is an 8-foot asphalt trail through this segment.

Crosswalk treatment connecting the Pathfinder-Genesis Trail across 115th Avenue.

Cost Option	
Length • Spot treatments • Spot treatments • Alignment 2A – 205 feet • Alignment 2B – 205 feet High Design Option: Alignment 2A • Design: 8' asphalt patching, widen to 12', signage, lighting • Planning-level cost: $24,000 Medium Design Option: Alignment 2A • Design: 8' asphalt patching, widen to 10', signage • Planning-level cost: $12,000 Low Design Option: Alignment 2B • Design: pavement markings, signage • Planning-level cost: $1,000	

Figure 7 Pathfinder-Genesis Trail – 107th Court to Gaarde Street



Pathfinder-Genesis Trail – 115th Avenue to Gaarde Street | 3

Summary

This segment is an existing 2-4 foot gravel nature trail within a greenway corridor. The trail is backed by private residences and most entrances are located in narrow gaps between buildings. The existing trail crosses the stream four times and several areas require boardwalks. In some areas erosion, steep slopes, and retaining walls cut into the trail, limiting accessibility and causing safety concerns. The 118th Court trail entrance has a 7 percent grade and could benefit from installation of several shallow steps or terraces. Two alignment options to connect the 118th Court trail entrance to Gaarde Street are to follow the creek south (3A) or provide an on-street connection (3B). Figure 7 shows the potential alignments for this segment of the Pathfinder-Genesis Trail.

Opportunities

- Improve user experience and safety on an existing community trail (all)
- Improve trail accessibility for cyclists and ADA (B)
- Link to bike lanes on Gaarde (all)

Constraints

- Close proximity to multiple private properties (400 feet of Alignment A travels through four privately-owned residential parcels) (A)
- Neighborhood desire to keep trail unpaved
- Design required to address steep slopes, bridges, and boardwalk areas (A)

Pathfinder-Genesis is a gravel, 2-4 foot nature trail west of 115th Avenue.

Multiple bridges and boardwalks are necessary to cross the stream and wetlands.

Trail entrances are located in narrow gaps between private residences.

Cost Option	
Length • 1,982′ (existing 115th to 118th) • 505′ (Alignment A) • 327′ (Alignment B) High Design Option: Alignment 3A • Design: 8′ permeable asphalt, lighting, acquisition, permitting • Planning-level cost: $226,00 Medium Design Option: Alignment 3A • Design: 8′ gravel, acquisition, permitting • Planning-level cost: $165,000 Low Design Option: Alignment 3B • Design: pavement markings, signage • Planning-level cost: $1,000	

Washington Square Loop Trail Feasibility

The Washington Square Loop Trail is a proposed regional trail that will connect the Fanno Creek Trail in Tigard to planned trails in Portland and Beaverton. The trail will connect to the Fanno Creek Trail near North Dakota Street and extend northeast along Ash Creek, providing a bicycle/pedestrian link over Highway 217 and linking Washington Square, Metzger Park, and Tigard city limits. The trail is currently in the planning stage.

The following subsections consider the feasibility of this trail and potential short-term on-street options. Three segments of the proposed Washington Square Loop Trail were analyzed:

1. Fanno Creek to Highway 217
2. Highway 217 to Hall Boulevard
3. Hall Boulevard to 61st Avenue

Evaluation

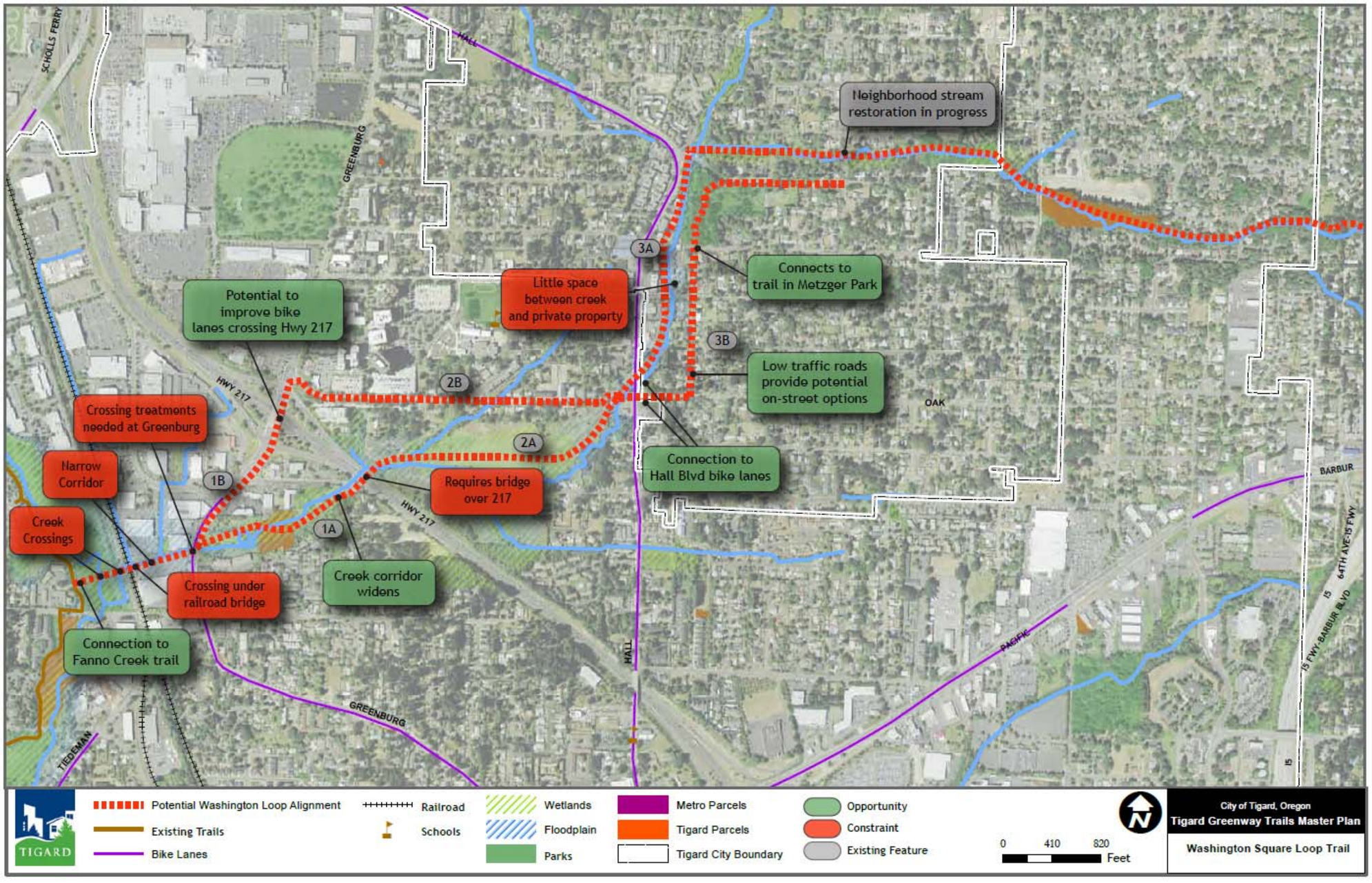
Significant barriers impact the feasibility of the Washington Square Loop Trail, particularly environmental constraints, private properties, and high costs related to developing a bicycle/pedestrian bridge over Highway 217. However, the proposed trail would provide a needed east/west connection in Tigard; connect several parks, neighborhoods, and trails; and provide recreation and transportation benefits. Washington Square Loop is also a regionally significant connection included in Metro's Greenway Trails Plan. Figure 8 shows the trail segments that were analyzed and potential alignments for the proposed Washington Square Loop Trail. Table 4 shows the analysis of the alignments.

Table 4. Washington Square Loop Trail Evaluation of Alignments

Criteria	Fanno Creek to Highway 217		Highway 217 to Hall Boulevard		Hall Boulevard to 61st Avenue	
	A	B	A	B	A	B
Connectivity	◑	◑	◑	●	◑	◑
Safety and Security – Trail Users	●	○	●	◑	●	◑
User Experience	●	◑	●	○	●	○
Topographical Constraints	●	●	●	◑	●	●
Environmental Impacts	○	◑	○	●	○	●
Cost	○	◑	○	◑	○	◑
Right-of-Way	○	◑	◑	●	○	●

Based on this analysis, the project team recommends that the City continue exploring the development of this trail, including on-street connections that could improve bicycle and pedestrian access and transportation options in this area over the short-term.

Figure 8 Washington Square Loop Trail



Washington Square Loop Trail – Fanno Creek to Highway 217 | 1

Summary

The two options for this segment are to follow the creek along the entire corridor (Alignment 1A) or to follow the creek to Greenburg Street and provide an on-street connection to Highway 217 (Alignment 1B). The majority of Alignment A is in a wetland. Several commercial properties are also directly adjacent to the creek along this alignment. The on-street Alignment B would make use of existing sidewalks and bike lanes on Greenburg. Improvements would include additional signage, pavement markings, and safety improvements. Both alignments would cross the creek multiple times, require boardwalks in some areas, and require crossing improvements at Greenburg Street. Figure 8 shows the potential alignments for this segment of the trail.

Opportunities

- Connects an existing trail to an existing bicycle route (B)
- Completes a link in a planned regional trail (all)

Constraints

- Majority of trail length travels through wetlands (A)
- Close proximity to multiple private commercial properties (A and B)
- Less pleasant user experience (B)

There is clearance for a trail to go under the existing railroad bridge.

Greenburg is high traffic and would need crossing improvements

Wetlands north of Greenburg. would require boardwalk and blackberry clearance.

Cost Option	
Length: • Alignment A: 2,810′ (1,780′ in wetlands, 2,087′ in six privately-owned parcels) • Alignment B: 2,740′ (1,735′ on-street; 405′ in wetlands, 1,005′ in four privately-owned parcels) High Design Option: Alignment A • Design: 12′ permeable asphalt/boardwalk, 2 precast concrete bridges, undercrossing, crosswalk and signage, acquisition, permitting • Planning-level cost: $3,856,000 Medium Design Option: Alignment A • Design: 8′ asphalt/boardwalk, 2 wooden bridges, undercrossing, crosswalk and signage, acquisition, permitting • Planning-level cost: $1,960,000 Low Design Option: Alignment B • Design: 8′ asphalt/boardwalk, 2 wooden bridges, undercrossing, bike lanes, signs • Planning-level cost: $772,000	

Washington Square Loop Trail – Highway 217 to Hall Boulevard | 2

Summary

The two options for this segment are to develop a bicycle/pedestrian bridge over Highway 217 and continue to follow the creek (Alignment 2A) or to continue the on-street connection on Greenburg and Oak Street (Alignment 2B). Similar to Alignment 1A, the majority of Alignment 2A is in a wetland. Figure 8 shows potential alignments for this segment of the trail.

Opportunities

- Provides a direct connection to Washington Square (B)
- Connects to an existing bicycle route (all)
- Low volume street potential short-term alternative as bicycle boulevard (B)
- Completes a link in a planned regional trail (all)

Constraints

- Majority of length through wetland (A)
- Less pleasant user experience (B)
- High cost of bicycle/pedestrian bridge over Highway 217 (A)
- Passes through eight privately-owned residential and undeveloped parcels (A)

Creek bed widens and clears near Highway 217

Crossing 217 near the stream would require a pedestrian bridge.

Existing bike lanes on Greenburg over Highway 217.

Cost Option	
Length • Alignment A: 2,254 (1,725' in wetlands; 2100' in private residential land) • Alignment B: 2,946' (1,520' of sidewalk missing on the north side of Oak and 2,150' between 95th and Hall on the south side of Oak). High Design Option: Alignment A • Design: bicycle/pedestrian bridge, 12' permeable asphalt/boardwalk, acquisition, permitting • Planning-level cost: $5,249 ,000 Medium Design Option: Alignment A • Design: bicycle/pedestrian bridge (approximately 250'), 8' asphalt/boardwalk, acquisition, permitting • Planning-level cost: $4,195 ,000 Low Design Option: Alignment B • Design: shared lane markings, signs, sidewalk • Planning-level cost: $666,000	

Washington Square Loop Trail – Hall Boulevard to 61st Avenue | 3

Summary

The two options for this segment are to follow the creek to the eastern Tigard city boundary (Alignment A) or to provide an on-street connection to Metzger Park (Alignment B). Alignment A passes through several wetlands north and east of Metzger Park. Multiple properties are also directly adjacent to the water on both sides of the creek. The on-street Alignment B would make use of low traffic residential streets where there are currently inconsistent sidewalks. Improvements would include wayfinding, bicycle boulevard treatments (e.g., bicycle wayfinding, shared lane pavement markings, etc.), and sidewalks. Figure 8 shows the potential alignments for this segment of the trail.

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Opportunities

- Connects to an existing bicycle route (all)
- Low volume street potential short-term alternative as bicycle boulevard (B)
- Completes a link in a planned regional trail (all)

Constraints

- Majority of length through wetland and floodplain (A)
- Close proximity to multiple private properties (6,733 feet of Alignment A travel through 49 non-City owned residential properties)(A)
- Outside of city limits (A)
- Less pleasant user experience (B)
- Conflicts with local creek restoration efforts (A)
- No existing sidewalks for most of length (B)

Bollards at the entrance to Metzger Park trail.

Multiple private properties directly abut the creek in this segment.

Low traffic streets can offer a short-term on-street option.

Cost Option	
Length • Alignment A: 8,838′ (1,630′ in wetlands) • Alignment B: 3,398′ High Design Option: Alignment A • Design: 12′ permeable asphalt/boardwalk, acquisition, permitting • Planning-level cost: $6,901,000 Medium Design Option: Alignment A • Design: 8′ asphalt/boardwalk, acquisition, permitting • Planning-level cost: $4,881,000 Low Design Option: Alignment B • Design: shared lane markings, signs, sidewalk • Planning-level cost: $1,325,000	

Tigard Street Trail Feasibility

The proposed Tigard Street Trail would follow an inactive railroad corridor extending from Tiedeman Avenue to Main Street. This former loop rail has been inactive for more than three years. Portland & Western Railroad (P&W) holds an exclusive freight easement over the corridor and the underlying land is owned by ODOT. City of Tigard staff has been actively working with ODOT Rail to obtain approval to improve this right-of-way as a trail for the past three years and progress is currently being made towards obtaining control of the corridor.

In August 2010, a project event was held under the Pacific Highway viaduct that "brought together a wide variety of movers and shakers to demonstrate support for the project." At this event, the P&W President and General Manager and the ODOT Rail Administer, each agreed to help facilitate trail use within the former rail corridor. In October 2010, P&W filed an application with the federal Surface Transportation Board to formally abandon service within the loop segment. This request is expected to be granted by December 2010. Concurrent with the abandonment process, TriMet, at its own expense, removed the remaining railroad ties in the corridor and smoothed out any holes created by the removal.

When the federal abandonment process is complete, ODOT will start the process to surplus the property; a process which ODOT expects will take no longer than 2 months. The City must have the property appraised by an approved appraiser before it can buy the property; there is no option to lease or obtain an easement. The method used to appraise rail right-of-way is called "across the fence", and is based on the contribution of the corridor to abutting properties. Although parks bond measure priorities have not yet been finalized, bond proceeds potentially could be used to finance the cost of acquiring the 4.2 acre corridor. No estimate is currently available for the cost of the property. The cost of a ten-foot wide concrete trail poured directly onto the existing ballast is estimated at $200,000. The cost of landscaping and other amenities is variable and depends on the design concept chosen. A land use permit is not required for the trail construction or related work.

The following subsections consider the feasibility of this trail and future rail-with-trail opportunities. Three segments of the Tigard Street Trail corridor were analyzed to address the following questions:

1. Fanno Creek to Tiedeman Avenue – Can the rail trail provide more convenient and direct bike/ped access to Fanno Creek Trail and other destinations?
2. Tiedeman Avenue to Tigard Transit Center – Are there any fatal flaws affecting the feasibility of this trail segment?

Evaluation

The Tigard Street Trail is a prime opportunity for the City of Tigard to increase trail connectivity and accessibility to key downtown destinations. If constructed, the Tigard Street Trail would provide connections to the Fanno Creek Trail, neighborhoods, downtown businesses, and the Tigard Transit Center. The proposed Tigard Street Trail would also extend the existing shared use

path between Tigard Transit Center and Hall Boulevard. Overall, the project's readiness and uniqueness as a gateway to the downtown and the WES station will make it a very competitive project in terms of grant funding

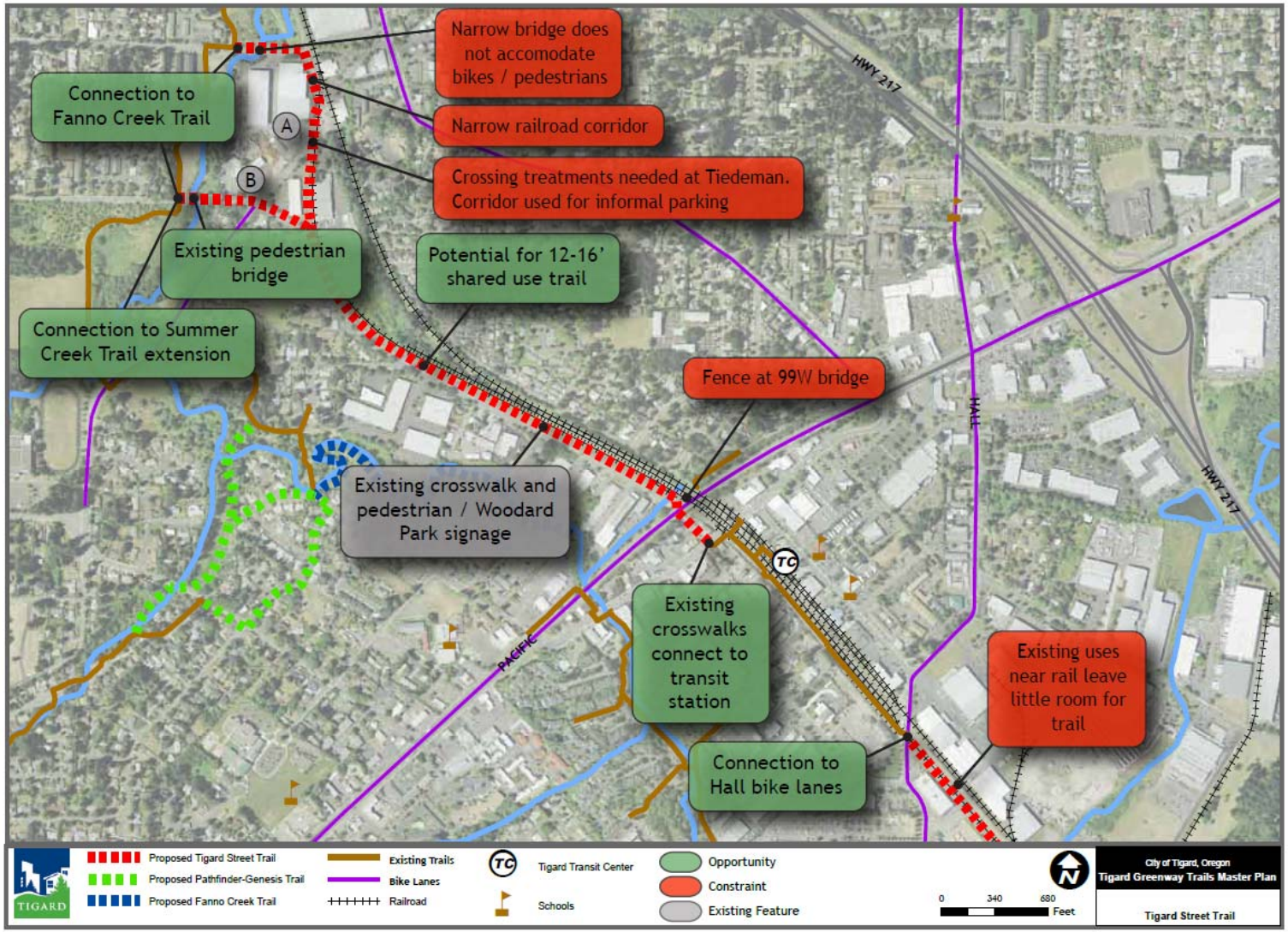
Major challenges related to developing the trail are establishing the appropriate connection to Fanno Creek Trail and crossing treatments on Main Street near the Tigard Transit Center. ODOT Rail will not allow a pedestrian crossing any closer to the WES tracks than the existing crossing on Tigard Street due to concerns that a crossing closer to the tracks may result in vehicles stopping on the tracks while waiting for bicyclists or pedestrians to cross. To address this concern ODOT has requested that a fence, or some other form of effective barrier, be placed along Main Street to prevent crossing any closer than the present crosswalk. ODOT has had no objection to improving the area next to the Chamber of Commerce as part of the trail development, as long as pedestrians and bicyclists are physically redirected to the existing Tigard Street crosswalk.

Figure 9 shows the trail segments that were analyzed and potential alignments for the proposed Tigard Street Trail. Table 5 shows the analysis of the alignments. Based on this analysis, the project team recommends that the City continue pursuing the development of this trail.

Table 5. Tigard Street Trail Evaluation of Alignments

Criteria	Fanno Creek to Tiedeman Avenue		Tiedeman Avenue to Tigard TC
	A	B	
Connectivity	◑	◑	●
Safety and Security – Trail Users	◑	◑	●
User Experience	○	◑	◑
Topographical Constraints	●	●	●
Environmental Impacts	◑	◑	●
Cost	◑	◑	◑
Right-of-Way	○	◑	◑

Figure 9 Tigard Street Trail



Tigard Street Trail – Fanno Creek to Tiedeman Avenue | 1

Summary

The two options for this segment are to follow the rail corridor to North Dakota Street and provide an on-street connection to the North Dakota Fanno Creek Trail entrance (Alignment A) or to diverge from the rail corridor south of Tiedeman Avenue and provide a sidepath connection to the Tigard Street Fanno Creek entrance (Alignment B). Alignment A would make use of the full length of the inactive rail corridor, but would require coordination with the railroad to obtain additional easements, coordination with local businesses that currently use the northern segment of the corridor for parking, and crossing and pedestrian improvements on Tiedeman Avenue and North Dakota Street. The North Dakota Street bridge currently has no shoulder or accommodations for cyclists or pedestrians. High vehicle volumes (approximately 4,300 per day) and low visibility over hills on North Dakota Street near the Fanno Creek Trail entrance create additional safety concerns. Alignment B would make use of existing sidewalks and a bicycle/pedestrian bridge on Tigard Street to connect to the Fanno Creek Trail and a proposed extension of the Summer Creek Trail. Improvements would include a sidepath on Tigard Street. Figure 9 shows the potential alignments for this segment of the Tigard Street Trail.

Opportunities

- Connects to Fanno Creek Park (all)
- Connects to proposed Summer Creek Park expansion (B)
- Connects to an existing bike/pedestrian bridge (B)
- Utilize full length of inactive rail corridor (A)

Constraints

- Proximity to multiple businesses, some using corridor for informal parking (A)
- Requires additional rail corridor easements (A)
- Requires travel on high-traffic streets without adequate existing bicycle pedestrian facilities (A)

Alignment A would require crossing treatment and additional railroad easements from Tiedeman to North Dakota.

Alignment B would utilize an existing bicycle/pedestrian bridge on Tigard Street.

The North Dakota Fanno Creek crossing is narrow, with no existing bicycle/pedestrian features.

Cost Option	
Length • Alignment A: 1,665′ (480′ on-street) • Alignment B: 933′ (850′ on-street; 686′ new sidewalk) High Design Option: Alignment A • Design: 10′ asphalt/bike lanes, precast concrete bridge, crosswalk and signage, fencing • Planning-level cost: $278,000 Medium Design Option: Alignment B • Design: 10′ asphalt side path, sidewalk, crosswalk and signage, lane markings • Planning-level cost: $255,000 Low Design Option: Alignment B • Design: 8′ asphalt side path, sidewalk, crosswalk and signage • Planning-level cost: $230,000	

Tigard Street Trail – Tiedeman Avenue to Tigard Transit Center | 2

Summary

This segment follows the inactive rail corridor along Tigard Street from Tiedeman Avenue to Main Street. These streets currently have no sidewalks or pedestrian amenities. The corridor is currently a 16-foot gravel path that could be developed to accommodate a variety of mixed use trail sections, depending on projected usage. The corridor may extend under the Highway 99W bridge to provide an entryway plaza treatment along Main, however, due to safety concerns trail users will be diverted to an existing crossing of Main Street at Tigard Street to access the Tigard Transit Center. Figure 9 shows the potential alignments for this segment of the Tigard Street Trail.

Opportunities

- Connects to a regional transit center
- Provides pedestrian amenities in a corridor with no sidewalks
- Wide right-of-way can accommodate multiple users and regional trail guidelines

Constraints

- Minor out of direction travel required to cross Main Street
- ODOT approval required to use corridor as a trail

16-foot gravel inactive rail corridor between Tiedeman Avenue and Main Street

The existing gravel corridor ends at a fence below 99W. Users will be diverted to Tigard Street to cross Main Street.

Existing Main Street crossing to the Tigard Transit Center.

Cost Option	
Length: 2,363' High Design Option: • Design: 16' permeable asphalt with separated bicycle/pedestrian lanes, crosswalk and signage • Planning-level cost: $689,000 Medium Design Option: • Design: 12' asphalt with pavement markings, crosswalk and signage • Planning-level cost: $515,000 Low Design Option: • Design: 8' asphalt with 4' bark chip running path, signage • Planning-level cost: $268,000	

Opportunities for Trail-With-Rail Projects

This section considers specific implementation questions regarding opportunities for integrated trail-with-rail projects in Tigard. Each subsection presents a brief overview of the proposed trail or gap, as well as opportunities and constraints associated with completing the segment.

The City of Tigard is aware of potential trail-with-rail opportunities between SW North Dakota Street and SW Tiedeman Avenue, SW Hall Boulevard and SW Bonita Road, and between SW Bonita Road and SW Durham Road. Additional trail-with-rail opportunities occur between SW Scholls Ferry Road and SW North Dakota Street and from SW Durham Road to the Tigard city limits. SW Scholls Ferry Road to SW Tiedeman will be evaluated as a potential extension to the planned Tigard Street Trail.

This section discusses trail-with-rail options that have not previously been discussed. Those options are:

- SW Scholls Ferry Road to SW Tiedeman Avenue
- SW Hall Boulevard to SW Bonita Road

Evaluation Criteria

This analysis considers constraints unique to trail-with-rail projects, including the presence of an active rail line and available right-of-way to locate a greenway trail. The analysis then considers constraints common to other greenways, connectivity, safety and security, and user experience. Please refer to the Task 3 Special Issues memo for a more complete description of each of these constraints.

None of the alignments considered in this analysis meet minimum setback requirements within the available right-of-way. The minimum setback (the distance between the paved edge of the rail-with-trail and the centerline of the closest active railroad) is between 10′ to 50′, depending on frequency and speed of the trains, fencing, and other considerations.[6]

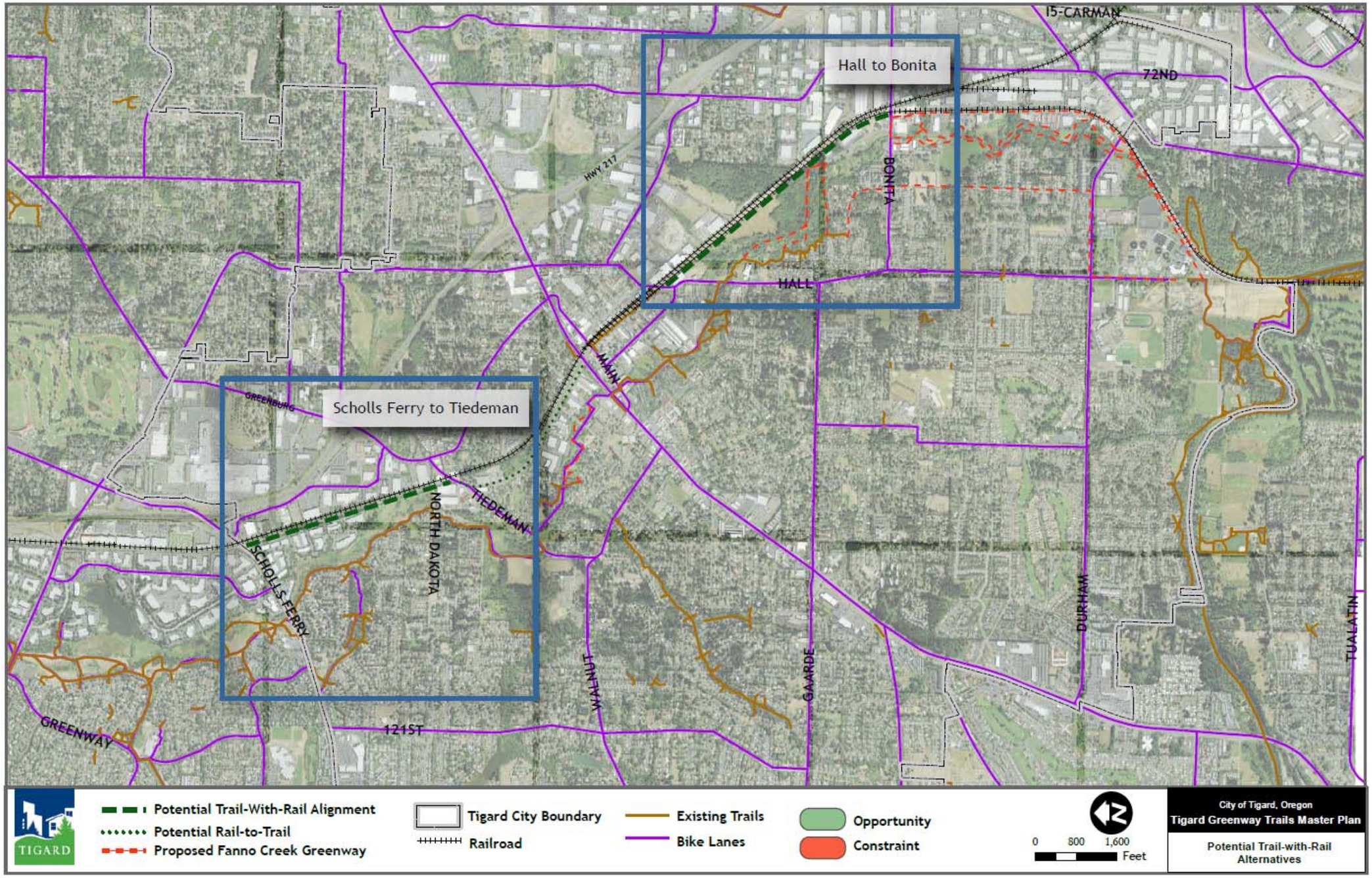
The proposed trail-with-rail alignment from SW Bonita Road to SW Durham Road is not considered a viable option because of lack of right-of-way following the installation of track for the Westside Express Service (WES). Alternatives to a trail-with-rail project between SW Bonita Road and SW Durham Road were evaluated and addressed in the Task 3 Special Issues memo. The connection from SW Durham Road to the Tigard city limit at the southern terminus of SW 85th Avenue was also evaluated and addressed in the Task 3 Special Issues memo

The proposed trail-with-rail alignment from SW North Dakota Street to Scholls Ferry Road is also not considered viable because of lack of right-of-way and lack of a northern connection to the Fanno Creek Trail. An alternative connection between the planned Tigard Street Trail and the Fanno Creek Trail is evaluated as alignment 1B in the Tigard Street Trail section of this report.

[6] U.S. Department of Transportation. (2002). *Rails-with-Trails: Lessons Learned.* http://www.fhwa.dot.gov/environment/rectrails/rwt/

Figure 10 shows the trail segments that were analyzed and potential alignments for trail-with-rail opportunities.

Figure 10 Trail-with-Rail Opportunities



Scholls Ferry Road to Tiedeman Avenue

Summary

This alignment is located west of an active rail line between Scholls Ferry Road and Tiedeman Avenue. South of Tiedeman Avenue an abandoned rail corridor connects to a Westside Express Service (WES) commuter park and ride. Bus service is available on Scholls Ferry Road and Tiedeman Avenue. Scholls Ferry Road and Tiedman Avenue are bike routes. The Fanno Creek Trail is less than 2,000 feet west of this alignment, providing a high-quality alternative route. Surrounding land uses are mostly commercial and business. Figure 10 shows the potential alignment for this trail.

Opportunities

- Abandoned rail track east of Tigard Street is being evaluated as a potential rail-to-trail project.
    - Direct connection between WES park and ride and Scholls Ferry Road

Constraints

- No existing trail-with-rail connection north of Scholls Ferry Road
- Insufficient setback distance between tracks and existing buildings between North Dakota Street and Tiedeman Avenue
- Improved crossings needed at SW North Dakota Street and Tiedeman Avenue
- Trail in floodplain; 1,000′ north of SW North Dakota Street

Cost Opinion

Length: 4,200′

High Design Option:

- Design: 12′ permeable asphalt trail, lighting, signage, centerline, permitting
- Planning-Level Cost: $1,176,000

Medium Design Option:

- Design: 10′ asphalt trail, signage, permitting
- Planning-Level Cost: $529,000

Low Design Option:

- Design: 8′ asphalt trail, signage, permitting
- Planning-Level Cost: $423,000

Hall Boulevard to Bonita Road | 1

Summary

This alignment is located west of an active rail line between Hall Boulevard and Bonita Road. North of Hall Boulevard a multi-use pathway along the rail corridor connects to a Westside Express Service (WES) commuter park and ride. Bus service is available on Hall Boulevard and east along Bonita Road on SW 72nd Street. Hall Boulevard and Bonita Road have striped bike lanes, although they have relatively high motor vehicle speeds and volumes that are uncomfortable for some cyclists.

The properties just south of Hall Boulevard have an access road adjacent to the railroad corridor, in a similar location to where the trail was provided accessing the WES station. An easement along the road would provide trail access. Along the Fields Property, the railroad corridor includes many tracks, and space is not available within the corridor for a trail. A potential easement could continue the trail within the private property. East of Milton Court, existing buildings are a fatal flaw to trail construction. However, the trail could connect to a potential extension of the Fanno Creek Trail in the Metro-owned Brown Property. Figure 10 shows the potential alignment for this trail.

Opportunities

- Direct connection between WES park and ride and Hall Boulevard
- Potential connection to Fanno Creek Trail and bike lanes on Hall Boulevard and Bonita Road

Constraints

- Trail-with-rail opportunity eliminated south of Bonita Road with construction of WES
- Insufficient setback distance between tracks and existing buildings east of Milton Court
- Improved crossing needed at Bonita Road and Hall Boulevard
- Easement required along length of segment

Narrow corridor between railroad and businesses south of Hall Boulevard.

Existing rail-with-trail path and signage between Main Street and Hall Boulevard.

Bollards at entrance to rail-with-trail from Transit Center parking lot to Hall Boulevard.

Cost Opinion	
Length: 5,600′ High Design Option: • Design: 12′ permeable asphalt trail, lighting, signage, centerline, crosswalk, permitting, acquisition • Planning-Level Cost: $1,347,000 Medium Design Option: • Design: 10′ asphalt trail, signage, crosswalk, permitting, acquisition • Planning-Level Cost: $785,000 Low Design Option: • Design: 8′ asphalt trail, signage, crosswalk, permitting, acquisition • Planning-Level Cost: $218,000	

Appendix A. Cost Estimates

Tualatin River Trail Feasibility

Updated December 2010

	Cost	Unit	1: Durham City Limits to 85th Avenue						2. 85th Avenue to 108th Avenue						3. 108th Avenue to Highway 99W					
			High		Medium		Low		High		Medium		Low		High; 3B		Medium, 3B		Low, 3A	
			1,473 ft		1,473 ft		1,473 ft		470 ft		470 ft		470 ft		3,607 ft		3,607 ft		3,314 ft	
Surfacing Options																				
12' Permeable Asphalt Trail	$105.00	LF		$ -		$ -		$ -	470	$ 49,350		$ -		$ -	3,607	$ 378,735		$ -		$ -
10' Asphalt Trail	$60.00	LF		$ -		$ -		$ -		$ -	470	$ 28,200		$ -		$ -	3,607	$ 216,420		$ -
8' Asphalt Trail	$48.00	LF		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	3,314	$ 159,072
8' Asphalt Patching	$12.00	LF		$ -		$ -		$ -		$ -		$ -	470	$ 5,640		$ -		$ -		$ -
Boardwalk (12')	$384.00	LF	1,473	$ 565,632	1,473	$ 565,632		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Boardwalk (6')	$192.00	LF		$ -		$ -	1,473	$ 282,816		$ -		$ -		$ -		$ -		$ -		$ -
Additional Elements																				
Riprap (parallel to stream)	$99.90	LF		$ -		$ -		$ -		$ -		$ -		$ -	3,607	$ 360,339	3,607	$ 360,339	3,314	$ 331,069
Wetland mitigation	$262.50	LF	1,473	$ 386,663	1,473	$ 386,663	1,473	$ 386,663		$ -		$ -		$ -		$ -		$ -		$ -
Bridge (precast concrete)	$1,225.00	LF		$ -		$ -		$ -		$ -		$ -		$ -	40	$ 49,000		$ -		$ -
Bridge (wood)	$980.00	LF		$ -		$ -		$ -		$ -		$ -		$ -		$ -	40	$ 39,200	40	$ 39,200
Underpass	$90,000.00	LF		$ -		$ -		$ -		$ -		$ -		$ -	1	$ 90,000	1	$ 90,000	1	$ 90,000
Amenities																				
Lighting	$3,500.00	EA	2	$ 7,000		$ -		$ -	2	$ 7,000		$ -		$ -	1	$ 3,500		$ -		$ -
Fencing	$25.00	LF	1,473	$ 36,825		$ -		$ -		$ -		$ -		$ -	3,607	$ 90,175		$ -		$ -
Mileage marker	$250.00	EA	1	$ 279		$ -		$ -	1	$ 250	1	$ 250		$ -	3	$ 683	3	$ 683		$ -
Directional sign	$250.00	EA	2	$ 500	2	$ 500		$ -	2	$ 500	2	$ 500	2	$ 500	2	$ 500	2	$ 500	2	$ 500
Trail etiquette sign	$250.00	EA	1	$ 250		$ -		$ -	1	$ 250	1	$ 250		$ -	1	$ 250		$ -		$ -
Informational kiosk	$500.00	EA		$ -		$ -		$ -	1	$ 500		$ -		$ -	1	$ 500		$ -		$ -
Trail centerline	$1.56	LF	1,473	$ 2,298		$ -		$ -		$ -		$ -		$ -	3,607	$ 5,627		$ -		$ -
Direct Construction Costs			**$ 999,446**		**$ 952,795**		**$ 669,479**		**$ 57,850**		**$ 29,200**		**$ 6,140**		**$ 979,309**		**$ 707,142**		**$ 619,841**	
Multipliers																				
Engineering/ Construction	20%			$ 199,889		$ 190,559		$ 133,896		$ 11,570		$ 5,840		$ 1,228		$ 195,862		$ 141,428		$ 123,968
Mobilization	15%			$ 149,917		$ 142,919		$ 100,422		$ 8,678		$ 4,380		$ 921		$ 146,896		$ 106,071		$ 92,976
A & E Fees	20%			$ 199,889		$ 190,559		$ 133,896		$ 11,570		$ 5,840		$ 1,228		$ 195,862		$ 141,428		$ 123,968
Contingency	40%			$ 399,779		$ 381,118		$ 267,791		$ 23,140		$ 11,680		$ 2,456		$ 391,724		$ 282,857		$ 247,936
Cost Opinion for Construction			**$ 1,948,921**		**$ 1,857,950**		**$ 1,305,484**		**$ 112,808**		**$ 56,941**		**$ 11,974**		**$ 1,909,654**		**$ 1,378,929**		**$ 1,208,690**	
Permitting and ROW																				
Permitting estimate	8%			$146,169		$139,346		$97,911		$8,461		$4,271				$143,224		$103,420		$90,652
Right-of-way acquisition Residential	$6.00	SF		$0		$0		$0	800	$4,800	700	$4,200		$0	50,176	$301,056	43,904	$263,424	29,600	$177,600
Cost Opinion			**$ 2,095,090**		**$ 1,997,296**		**$ 1,403,395**		**$ 126,069**		**$ 65,412**		**$ 11,974**		**$ 2,353,934**		**$ 1,745,772**		**$ 1,476,942**	

Pathfinder-Genesis Trail Feasibility

Updated December 2010

	Cost	Unit	1. Fanno Creek to 107th Court						2. 107th Court to Gaarde Street						3. 115th Avenue to Gaarde Street					
			High, 1A		Medium, 1B		Low, 1C		High, 2A		Medium, 2A		Low, 2B		High, 3A		Medium, 3A		Low, 3B	
			1,783 ft		1,609 ft		1,464 ft		205 ft		205 ft		205 ft		505 ft		505 ft		327 ft	
Surfacing Options																				
12' Permeable Asphalt Trail	$105.00	LF	1,363	$ 143,115		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
10' Asphalt Trail	$60.00	LF		$ -	1,289	$ 77,340		$ -		$ -		$ -		$ -		$ -		$ -		$ -
8' Permeable Asphalt Trail	$70.00	LF		$ -		$ -		$ -		$ -		$ -		$ -	505	$ 35,350		$ -		$ -
8' Asphalt Patching	$17.50	LF							205	$ 3,588	205	$ 3,588		$ -						
Asphalt widening	$6.00	SF							820	$ 4,920	410	$ 2,460		$ -						
8' Gravel Trail	$24.00	LF		$ -		$ -		$ -		$ -		$ -		$ -		$ -	505	$ 12,120		$ -
Boardwalk (12')	$384.00	LF	420	$ 161,280	320	$ 122,880		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Pavement marking	$60.00	EA		$ -		$ -	6	$ 351		$ -		$ -	2	$ 123		$ -		$ -	2	$ 120
Additional Elements																				
Riprap (parallel to stream)	$99.90	LF	420	$ 41,958	320	$ 31,968		$ -		$ -		$ -		$ -	505	$ 50,450	505	$ 50,450		$ -
Wetland mitigation	$262.50	LF	420	$ 110,250	320	$ 84,000		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Intersection Improvements																				
Curb ramp	$1,000.00	EA	2	$ 2,000	2	$ 2,000		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Bollard	$550.00	EA	2	$ 1,100	2	$ 1,100		$ -		$ -		$ -		$ -		$ -		$ -		$ -
High-visibility crosswalk	$7,465.00	EA	1	$ 7,465	1	$ 7,465	1	$ 7,465		$ -		$ -		$ -		$ -		$ -		$ -
Amenities																				
Lighting	$3,500.00	EA	2	$ 7,000		$ -		$ -	1	$ 3,500		$ -		$ -	1	$ 3,500		$ -		$ -
Fencing	$25.00	LF	1,783	$ 44,575		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Mileage marker	$250.00	EA	1	$ 338		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Directional sign	$250.00	EA	2	$ 500	2	$ 500	2	$ 500	1	$ 250	1	$ 250	1	$ 250	1	$ 250	1	$ 250	1	$ 250
Trail etiquette sign	$250.00	EA	1	$ 250		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Trail centerline	$1.56	LF	1,783	$ 2,781		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Direct Construction Costs			**$**	**522,612**	**$**	**327,253**	**$**	**8,316**	**$**	**12,258**	**$**	**6,298**	**$**	**373**	**$**	**89,550**	**$**	**62,820**	**$**	**370**
Multipliers																				
Engineering/ Construction	20%			$ 104,522		$ 65,451		$ 1,663		$ 2,452		$ 1,260		$ 75		$ 17,910		$ 12,564		$ 74
Mobilization	15%			$ 78,392		$ 49,088		$ 1,247		$ 1,839		$ 945		$ 56		$ 13,432		$ 9,423		$ 56
A & E Fees	20%			$ 104,522		$ 65,451		$ 1,663		$ 2,452		$ 1,260		$ 75		$ 17,910		$ 12,564		$ 74
Contingency	40%			$ 209,045		$ 130,901		$ 3,327		$ 4,903		$ 2,519		$ 149		$ 35,820		$ 25,128		$ 148
Cost Opinion for Construction			**$**	**1,019,095**	**$**	**638,144**	**$**	**16,218**	**$**	**23,903**	**$**	**12,281**	**$**	**728**	**$**	**174,622**	**$**	**122,499**	**$**	**722**
Permitting and ROW																				
Permitting estimate	8%			$76,432		$47,861				$0		$0				$13,097		$9,187		$54
Right-of-way acquisition Residential	$6.00	SF	17,200	$103,200	7,490	$44,940		$0		$0		$0		$0	6,400	$38,400	5,600	$33,600		$0
Cost Opinion			**$**	**1,198,727**	**$**	**730,945**	**$**	**16,218**	**$**	**23,903**	**$**	**12,281**	**$**	**728**	**$**	**226,119**	**$**	**165,286**	**$**	**777**

Washington Square Loop Trail Feasibility

Updated December 2010

	Cost	Unit	1: Fanno Creek to Highway 217						2. Highway 217 to Hall Boulevard						3. Hall Boulevard to 61st Avenue					
			High, 1A		Medium, 1A		Low, 1B		High, 2A		Medium, 2A		Low, 2B		High; 3A		Medium, 3A		Low, 3B	
			2,810 ft		2,810 ft		2,740 ft		2,254 ft		2,254 ft		2,946 ft		8,838 ft		8,838 ft		3,398 ft	
Surfacing Options																				
12' Permeable Asphalt Trail	$105.00	LF	1,030	$ 108,150		$ -		$ -	529	$ 55,545		$ -		$ -	7,208	$ 756,840		$ -		$ -
10' Asphalt Trail	$60.00	LF		$ -		$ -		$ -		$ -	529	$ 31,740		$ -		$ -	7,208	$ 432,480		$ -
8' Asphalt Trail	$48.00	LF		$ -	1,030	$ 49,440	600	$ 28,800		$ -		$ -		$ -		$ -		$ -		$ -
Boardwalk (12')	$384.00	LF	1,780	$ 683,520		$ -		$ -	1,725	$ 662,400		$ -		$ -	1,630	$ 625,920		$ -		$ -
Boardwalk (6')	$192.00	LF		$ -	1,780	$ 341,760	405	$ 77,760		$ -	1,725	$ 331,200		$ -		$ -	1,630	$ 312,960		$ -
Pavement marking	$60.00	EA		$ -		$ -		$ -		$ -		$ -	12	$ 707		$ -		$ -	14	$ 816
Bike Lane	$2.26	LF		$ -		$ -	1,735	$ 3,921		$ -		$ -		$ -						
Sidewalk	$92.78	LF		$ -		$ -		$ -		$ -		$ -	3,670	$ 340,504		$ -		$ -	6,796	$ 630,535
Additional Elements																				
Riprap (parallel to stream)	$99.90	LF	2,810	$ 280,719	2,810	$ 280,719		$ -	2,254	$ 225,175	2,254	$ 225,175		$ -	8,838	$ 882,916	8,838	$ 882,916		$ -
Wetland mitigation	$262.50	LF	1,780	$ 467,250	0	$ -	405	$ 106,313	1,725	$ 452,813	1,725	$ 452,813		$ -	1,630	$ 427,875	1,630	$ 427,875		$ -
Bridge over Highway 217	$250.00	SF							4,000	$ 1,000,000	3,500	$ 875,000								
Bridge (precast concrete)	$1,225.00	LF	80	$ 98,000		$ -		$ -		$ -		$ -		$ -	40	$ 49,000		$ -		$ -
Bridge (wood)	$980.00	LF		$ -	80	$ 78,400		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Underpass	$90,000.00	EA	1	$ 90,000	1	$ 90,000	1	$ 90,000		$ -		$ -		$ -		$ -		$ -		$ -
Intersection Improvements																				
Curb ramp	$1,000.00	EA	2	$ 2,000	2	$ 2,000	1	$ 1,000		$ -		$ -		$ -		$ -		$ -		$ -
Bollard	$550.00	EA	2	$ 1,100	2	$ 1,100	1	$ 550		$ -		$ -		$ -		$ -		$ -		$ -
High-visibility crosswalk	$7,465.00	EA	1	$ 7,465	1	$ 7,465	1	$ 7,465		$ -		$ -		$ -		$ -		$ -		$ -
Amenities																				
Lighting	$3,500.00	EA		$ -		$ -		$ -	2	$ 7,000		$ -		$ -	1	$ 3,500		$ -		$ -
Fencing	$25.00	LF		$ -		$ -		$ -		$ -		$ -		$ -	8,838	$ 220,950		$ -		$ -
Mileage marker	$250.00	EA	2	$ 532		$ -		$ -	1	$ 250	1	$ 250		$ -	7	$ 1,674	7	$ 1,674		$ -
Directional sign	$250.00	EA	2	$ 500	2	$ 500		$ -	2	$ 500	2	$ 500	2	$ 500	2	$ 500	2	$ 500	2	$ 500
Trail etiquette sign	$250.00	EA	1	$ 250		$ -		$ -	1	$ 250	1	$ 250		$ -	1	$ 250		$ -		$ -
Informational kiosk	$500.00	EA		$ -		$ -		$ -	1	$ 500		$ -		$ -	1	$ 500		$ -		$ -
Trail centerline	$1.56	LF	2,810	$ 4,384		$ -		$ -	2,254	$ 3,516		$ -		$ -	8,838	$ 13,787		$ -		$ -
Direct Construction Costs			$ 1,743,870		$ 851,384		$ 315,809		$ 2,407,948		$ 1,916,927		$ 341,711		$ 2,983,712		$ 2,058,405		$ 631,850	
Multipliers																				
Engineering/ Construction	20%			$ 348,774		$ 170,277		$ 63,162		$ 481,590		$ 383,385		$ 68,342		$ 596,742		$ 411,681		$ 126,370
Mobilization	15%			$ 261,580		$ 127,708		$ 47,371		$ 361,192		$ 287,539		$ 51,257		$ 447,557		$ 308,761		$ 94,778
A & E Fees	20%			$ 348,774		$ 170,277		$ 63,162		$ 481,590		$ 383,385		$ 68,342		$ 596,742		$ 411,681		$ 126,370
Contingency	40%			$ 697,548		$ 340,554		$ 126,323		$ 963,179		$ 766,771		$ 136,684		$ 1,193,485		$ 823,362		$ 252,740
Cost Opinion for Construction			$ 3,400,547		$ 1,660,200		$ 615,828		$ 4,695,500		$ 3,738,009		$ 666,337		$ 5,818,240		$ 4,013,891		$ 1,232,109	
Permitting and ROW																				
Permitting estimate	8%			$255,041		$124,515		$46,187		$352,163		$280,351				$436,368		$301,042		$92,408
Right-of-way acquisition																				
Residential	$6.00	SF	33,392	$200,352	29,218	$175,308	10,050	$60,300	33,600	$201,600	29,400	$176,400		$0	107,728	$646,368	94,262	$565,572		$0
Cost Opinion			$ 3,855,940		$ 1,960,023		$ 722,315		$ 5,249,263		$ 4,194,759		$ 666,337		$ 6,900,976		$ 4,880,505		$ 1,324,518	

Tigard Street Trail Feasibility

Updated December 2010

	Cost	Unit	1.Fanno Creek to Tiedeman Avenue						2. Tiedeman Avenue to Tigard Transit Center					
			High		Medium		Low		High		Medium		Low	
			1,665 ft		933 ft		933 ft		2,363 ft		2,363 ft		2,363 ft	
Surfacing Options														
16' Permeable Asphalt Trail	$140.00	LF		$ -		$ -		$ -	2,363	$ 330,820		$ -		$ -
12' Permeable Asphalt Trail	$105.00	LF		$ -		$ -		$ -		$ -	2,363	$ 248,115		$ -
10' Asphalt Trail	$60.00	LF		$ -	933	$ 55,980		$ -		$ -		$ -		$ -
8' Asphalt Trail	$48.00	LF		$ -		$ -	933	$ 44,784		$ -		$ -	2,363	$ 113,424
8' Concrete Tigard Street Trail (200')	$200,000.00	EA	1	$ 200,000		$ -		$ -						
4' Bark Chip	$10.00	LF		$ -		$ -		$ -		$ -		$ -	2,363	$ 23,630
Sidewalk	$93.00	LF		$ -	686	$ 63,798	686	$ 63,798		$ -		$ -		$ -
Bike Lane Markings	$2.26	LF		$ -		$ -		$ -						
Additional Elements														
Bridge (precast concrete)	$1,225.00	LF		$ -		$ -		$ -		$ -		$ -		$ -
Intersection Improvements														
Curb ramp	$1,000.00	EA		$ -	2	$ 2,000	1	$ 1,000	2	$ 2,000	2	$ 2,000		$ -
Bollard	$550.00	EA		$ -	2	$ 1,100	1	$ 550	2	$ 1,100	2	$ 1,100		$ -
High-visibility crosswalk	$7,465.00	EA		$ -	1	$ 7,465	1	$ 7,465	1	$ 7,465	1	$ 7,465		$ -
Amenities														
Lighting	$3,500.00	EA		$ -		$ -		$ -	2	$ 7,000		$ -		$ -
Mileage marker	$250.00	EA		$ -		$ -		$ -	1	$ 250	1	$ 250		$ -
Directional sign	$250.00	EA		$ -	2	$ 500	2	$ 500	2	$ 500	2	$ 500	2	$ 500
Trail etiquette sign	$250.00	EA		$ -		$ -		$ -	1	$ 250	1	$ 250		$ -
Informational kiosk	$500.00	EA		$ -		$ -		$ -	1	$ 500		$ -		$ -
Trail centerline	$1.56	LF		$ -		$ -		$ -	2,363	$ 3,686	2,363	$ 3,686		$ -
Direct Construction Costs			**$**	**200,000**	**$**	**130,843**	**$**	**118,097**	**$**	**353,571**	**$**	**263,366**	**$**	**137,554**
Multipliers														
Engineering/ Construction	20%			$ 40,000		$ 26,169		$ 23,619		$ 70,714		$ 52,673		$ 27,511
Mobilization	15%			$ 30,000		$ 19,626		$ 17,715		$ 53,036		$ 39,505		$ 20,633
A & E Fees	20%			$ 40,000		$ 26,169		$ 23,619		$ 70,714		$ 52,673		$ 27,511
Contingency	40%			$ 80,000		$ 52,337		$ 47,239		$ 141,429		$ 105,347		$ 55,022
Cost Opinion for Construction			**$**	**390,001**	**$**	**255,145**	**$**	**230,290**	**$**	**689,465**	**$**	**513,565**	**$**	**268,231**

Opportunities for Trail-with-Rail Projects

Updated December 2010

	Cost	Unit	Scholls Ferry Road to Tiedeman Avenue						Hall Boulevard to Bonita Road					
			High		Medium		Low		High		Medium		Low	
			4,200 ft		4,200 ft		4,200 ft		5,600 ft		5,600 ft		5,600 ft	
Surfacing Options														
12' Permeable Asphalt Trail	$105.00	LF	4,200	$ 441,000		$ -		$ -	5,600	$ 588,000		$ -		$ -
10' Asphalt Trail	$60.00	LF		$ -	4,200	$ 252,000		$ -		$ -	5,600	$ 336,000		$ -
8' Asphalt Trail	$48.00	LF		$ -		$ -	4,200	$ 201,600		$ -		$ -		$ -
8' Asphalt Patching	$12.00	LF		$ -		$ -		$ -		$ -		$ -	5,600	$ 67,200
Intersection Improvements														
Curb ramp	$1,000.00	EA	2	$ 2,000	2	$ 2,000		$ -	2	$ 2,000	2	$ 2,000	2	$ 2,000
Bollard	$550.00	EA	2	$ 1,100	2	$ 1,100		$ -	2	$ 1,100	2	$ 1,100		$ -
High-visibility crosswalk	$7,465.00	EA	1	$ 7,465	1	$ 7,465	1	$ 7,465	1	$ 7,465	1	$ 7,465	1	$ 7,465
Amenities														
Lighting	$3,500.00	EA	2	$ 7,000		$ -		$ -	2	$ 7,000		$ -		$ -
Fencing	$25.00	LF	4,200	$ 105,000		$ -		$ -		$ -		$ -		$ -
Mileage marker	$250.00	EA	3	$ 795		$ -		$ -	1	$ 250	1	$ 250		$ -
Directional sign	$250.00	EA	2	$ 500	2	$ 500	2	$ 500	2	$ 500	2	$ 500	2	$ 500
Trail etiquette sign	$250.00	EA	1	$ 250		$ -		$ -	1	$ 250	1	$ 250		$ -
Informational kiosk	$500.00	EA		$ -		$ -		$ -	1	$ 500		$ -		$ -
Trail centerline	$1.56	LF	4,200	$ 6,552		$ -		$ -	5,600	$ 8,736		$ -		$ -
Direct Construction Costs			**$**	**571,662**	**$**	**263,065**	**$**	**209,565**	**$**	**615,801**	**$**	**347,565**	**$**	**77,165**
Multipliers														
Engineering/ Construction	20%			$ 114,332		$ 52,613		$ 41,913		$ 123,160		$ 69,513		$ 15,433
Mobilization	15%			$ 85,749		$ 39,460		$ 31,435		$ 92,370		$ 52,135		$ 11,575
A & E Fees	20%			$ 114,332		$ 52,613		$ 41,913		$ 123,160		$ 69,513		$ 15,433
Contingency	40%			$ 228,665		$ 105,226		$ 83,826		$ 246,320		$ 139,026		$ 30,866
Cost Opinion for Construction			**$**	**1,114,743**	**$**	**512,978**	**$**	**408,653**	**$**	**1,200,813**	**$**	**677,753**	**$**	**150,473**
Permitting and ROW														
Permitting estimate	8%			$83,606		$38,473		$30,649		$90,061		$50,831		$11,285
Right-of-way acquisition														
Commercial	$10.00	SF		$0		$0		$0	5,600	$56,000	5,600	$56,000	5,600	$56,000
Cost Opinion			**$**	**1,198,348**	**$**	**551,451**	**$**	**439,302**	**$**	**1,346,874**	**$**	**784,584**	**$**	**217,758**

APPENDIX C. ENVIRONMENTAL ASSESSMENT

PLEASE NOTE: The documents contained in this appendix reflect the environmental assessment of initial trail alignments evaluated during development of the Tigard Greenway Trails System Master Plan. **These documents do not reflect the final alignments, analysis, recommendations, or cost estimates for greenway trail projects included in the final Tigard Greenway Trails System Master Plan**. They are provided only as background documentation. Additional environmental assessment will be required as part of the planning, design, and construction process of any greenway trail.

Environmental Report
for the
City of Tigard, Tigard Greenway Trail System Master Plan
Washington County, Oregon

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January 21, 2011

MB&G Project No. 010594

TABLE OF CONTENTS

1.0 INTRODUCTION..... 1

2.0 GENERAL PROJECT DESCRIPTION 1

2.1 Tualatin River Trail.....1
2.2 Pathfinder-Genesis Trail.....3
2.3 Fanno Creek Trail.....3
2.4 Tigard Street Trail.....5
2.5 Rail-with-Trail.....5
2.6 Washington Square Loop Trail.....5
2.7 Summer Creek Trail.....6
2.8 Krueger Creek Trail.....7

3.0 METHODS..... 7

4.0 RESULTS..... 9

5.0 APPLICABLE REGULATIONS..... 12

6.0 CONCLUSIONS..... 14

7.0 REFERENCES..... 16

TABLES

Table 1. Sensitive Species with the Potential to Occur within the Proposed Project 9
Table 2. Summary of Environmental Impacts for the City of Tigard, Tigard Greenway Trail System Master Plan.....10

FIGURES

Figure 1 Project Location and Vicinity Map 2

APPENDICES

Appendix A Detailed Segment and Alignment Discussion

1.0 INTRODUCTION

The purpose of the Tigard Greenway Trail System Plan for the City of Tigard is to coordinate the completion and upgrading of the mapped City of Tigard's (City) greenway trail system. This Plan is funded through the Oregon Department of Transportation's Transportation Growth Management (TGM) program. The Tigard greenway trail system includes portions of four regional trails and four City-identified trails. The Project's goal is to increase the number of people walking and biking in the City by providing pleasant, safe and uninterrupted trails for non-motorized modes of transportation.

In order to construct and operate the proposed updated trail system, impacts to sensitive species, their habitat, and sensitive water resources are possible. The purpose of this report is to identify potential environmental impacts at an early planning stage to assist in the alignment analysis and selection process. No "fatal flaws" were uncovered during the analysis process for issues covered under this report.

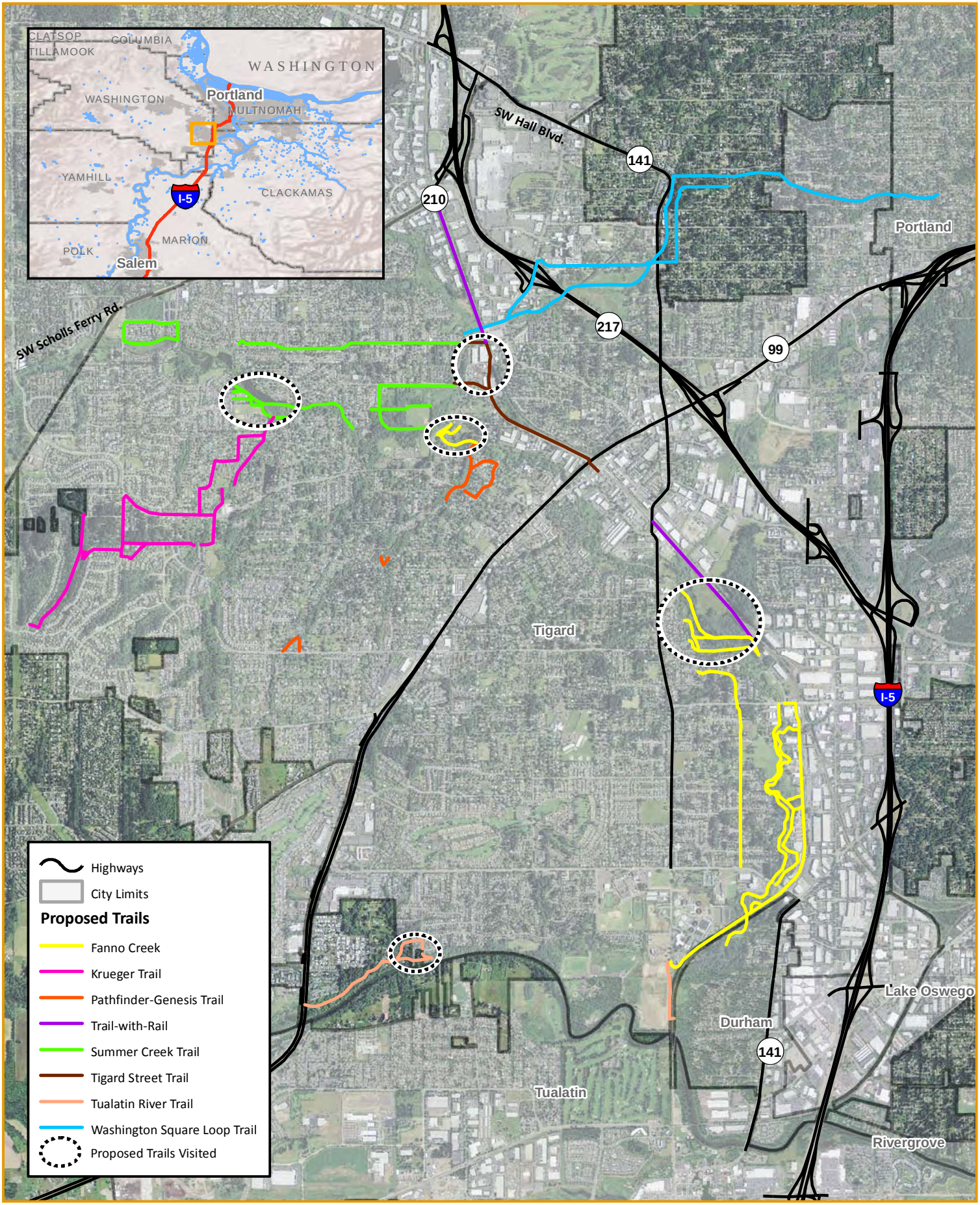
2.0 GENERAL PROJECT DESCRIPTION

There are eight trails located throughout the City that are being evaluated through the TGM planning process including the following trails: Tualatin River Trail, Pathfinder-Genesis Trail, Fanno Creek Trail, Tigard Street Trail, Trail-with-Rail, Washington Square Loop Trail, Summer Creek Trail and Krueger Trail (Figure 1). Each of these trails has been divided into segments for ease of discussion and many of the segments have multiple alignment alternatives, hereafter referred to as alignments. The following paragraphs describe each trail, segment and potential alignments. A complete discussion of each trail along with detailed maps depicting segments and alignments is available in the Specific Issues Report: Summer Creek, Krueger Creek, and Fanno Creek Trail Gaps and Opportunities (Kittelson 2010a) and Specific Issues Report: Tualatin River, Pathfinder-Genesis, Washington Square Loop, and Tigard Street Trail Gaps and Opportunities (Kittelson 2010b).

2.1 Tualatin River Trail

The Tualatin River Trail is an existing regional greenway trail consisting of a mixture of land and waterway trails. Extending the trail would provide additional connections to other regional trails and increase the trail's value as a transportation and recreational amenity through the City. There are three proposed segments to this trail that are described in detail below.

Segment 1 (SW 85th Avenue to the Durham City Limits) would create a loop trail by connecting the existing SW 85th Avenue, Tualatin River and City of Durham Trails. Segment 1 has three total alignments, with two alignments (Alignments 1A and 1B) being the same as the proposed Alignments 4A and 4B in the Fanno Creek Trail system (Segment 4), as described in the Fanno Creek Trail section below. Alignment 1C would create a new trail along the railroad and would utilize an existing trail railroad crossing.



Source: Aerial from NAIP, 2009. Highways and City Limits from ODOT. Proposed Trails from Kittleson. Hillshade from ESRI. Counties from ODOT. Waterbodies from US Census TIGER database.

Meters
0 400 800 1,600

Miles
0 0.25 0.5 1

Figure 1.
Project Location and Vicinity Map
City of Tigard, Tigard Greenway Trail System Master Plan
Washington County, Oregon

MB&G

Segment 2 (Tualatin River Trail –85th Avenue to 108th Avenue) would create improvements and upgrades to an existing trail from SW 85th Avenue to SW 108th Avenue.

Segment 3 (Tualatin River Trail – 108th Avenue to Pacific Highway) would extend the existing trail from SW 108th Avenue to Pacific Highway. Segment three has two alignments: Alignment 3A would follow the Tualatin River, making improvements to an unofficial, unimproved existing trail (demand trail); Alignment 3B would continue a new trail from SW 108th Avenue through a City-owned parcel.

2.2 Pathfinder-Genesis Trail

Pathfinder-Genesis Trail is an existing community greenway trail that extends south from Walnut Street to SW 118th Avenue near SW Gaarde Street. Proposed segments of Pathfinder-Genesis would extend this trail north of Walnut Street via a creek corridor or an on-street route and connect to Fanno Creek Trail near Woodard City Park. A second proposed extension would make a short connection between the existing trail at SW 118th Street and Gaarde Street to the south. There are three segments to Pathfinder-Genesis Trail which are described in detail below.

Segment 1 (Fanno Creek to Pathfinder Way) would travel from Fanno Creek to Pathfinder Way. There are three proposed alignments to this segment: Alignment 1A would provide a new trail to follow Fanno Creek north of Walnut Street to Fanno Creek Trail; Alignment 1B would provide a mix of on-street and new streamside trail connections from Walnut Street to the Fanno Creek Trail; Alignment 1C would improve on-street access for pedestrians and bicyclists by creating bicycle boulevards and side paths on Brookside Avenue and Johnson Street.

Segment 2 (Pathfinder Way to 115th Avenue (and Fairhaven Street) would improve the existing segment from SW 107th Court to SW 115th Avenue in addition to creating a new trail entrance to the southern portion of the trail. This portion of Segment 2 has two proposed alignments that address the new trail entrance: Alignment 2A would include a new trail constructed through a City-owned parcel; Alignment 2B would include improvements to the current on-street access points.

Segment 3 (115th Avenue to Gaarde Street) would also improve an existing trail segment from SW 115th Avenue to Gaarde Street with a new trail extension to connect the SW 118th Court trail entrance to Gaarde Street. This portion of Segment 3 has two proposed alignments that address the new trail entrance: Alignment 3A would provide a new trail following the creek south; Alignment 3B would provide an on-street connection.

2.3 Fanno Creek Trail

Fanno Creek Trail is an existing regional greenway trail. The proposed extension to this trail would complete the length of the trail in Tigard and connect it to the existing Tualatin River Trail. There are 5 segments to this trail which are described in detail below.

Segment 1 (Library/Fanno Creek Drive) has two proposed alignments: Alignment 1A would make improvements to a current trail alignment; Alignment 1B would provide an alternative to the current alignment by creating a new connection on the east side of Fanno Creek.

Segment 2 (Brown Property) has four proposed alignments: Alignment 2A is the longest new trail alignment within this segment, crossing Fanno Creek near the library and traveling along the east side of the creek and the north side of the Brown property; Alignment 2B would consist of a new trail that would run along the north side of the Brown property on City and Metro land after breaking off from the existing trail; Alignment 2C would consist of a new trail that would connect at the south end of the existing trail segment along the south side of Fanno Creek; Alignment 2D would travel along Fanno Creek Drive as a bicycle boulevard from the end of the existing trail to Bonita Road.

Segment 3 (Bonita/Durham Road) travels through an industrial district. This segment has five proposed alignments, with Alignments 3A and 3B having additional options. Alignment 3A is an on-street alignment along SW 74th Avenue; Option 3Ai includes a potential new trail segment within a Metro parcel which could include a viewing platform; Option 3Aii would be a new trail to provide a loop trail within parcels where development is limited due to wetlands and floodplains. Alignment 3B would consist of a new trail located on the east side of Fanno Creek along SW 74th Avenue which would connect to a streamside trail from SW 74th Avenue via a Metro-owned parcel; Option 3Bi would be a new trail loop from the Metro parcel to a parcel located in a floodplain/wetland area. Alignment 3C would consist of a new trail and would travel from the east side of Bonita Road, cross Fanno Creek, and continue along the west side of Fanno Creek. Alignment 3D would be a bicycle boulevard located along SW 79th Avenue. Alignment 3E is an alternative to Alignment 3A and would travel along SW 74th Avenue as a side path on the west side of the street.

Segment 4 (Durham Road/Durham City limits) would provide connections to the existing Tualatin River Trail. This segment has three proposed alignments, with Alignment 4A having one additional option: Alignment 4A would consist of a new trail that would travel between railroad tracks and Clean Water Services' (CWS) property; Option 4Ai would be the same route as Alignment 4A but it includes a new detour adjacent to the creek prior to its crossing. Alignment 4B would consist of a new trail that would travel along the north side of the creek and cross the creek three times; Alignment 4C would consist of improvements to the existing bicycle lanes on Durham Road and 85th Street. Alignments 4A and 4B are identical to Alignments 1A and 1B in the Tualatin River Trail system.

Segment 5 (Tiedeman Avenue Intersection) addresses concerns about the Fanno Creek Trail crossing Tiedeman Avenue. This segment has three alignments, with Alignment 5C having an additional option: Alignment 5A would cross Tiedeman Avenue and continue straight with a new trail, crossing Fanno Creek on the east side of Woodard City Park; Alignment 5B would cross Tiedeman Avenue and turn northeast along a new trail, connecting to the existing trail in

Woodard City Park after crossing Fanno Creek closer to Tiedeman Avenue than Alignment 5A; Alignment 5C would utilize the existing Tiedeman Avenue Bridge by making bicycle and pedestrian improvements to the bridge, with Alignment 5Ci widening the sidewalk on one side of the road to accommodate trail users.

2.4 Tigard Street Trail

Tigard Street Trail plans to follow an abandoned railroad corridor extending from Tiedeman Avenue to Main Street. The right-of-way on which this trail would be constructed likely will be City-owned property. If constructed, Tigard Street Trail would connect Fanno Creek Trail, neighborhoods, downtown businesses and the Tigard Transit Center. There are two proposed segments for Tigard Street Trail which are described in detail below.

Segment 1 (Fanno Creek to Tiedeman Avenue) aims to create a more convenient and direct bicycle and pedestrian path to Fanno Creek Trail. Segment 1 has two proposed alignments: Alignment 1A would follow the existing rail corridor to North Dakota Street and provide an on-street connection to Fanno Creek Trail entrance; Alignment 1B would diverge from the rail corridor south of Tiedeman Avenue and provide an on-street connection to Fanno Creek Trail at the Tigard Street entrance, utilize an existing pedestrian/bicycle bridge that crosses Fanno Creek, and connect to the proposed Summer Creek Trail.

Segment 2 (Tiedeman Avenue to Tigard Transit Center) would follow an abandoned rail corridor along Tigard Street to Main Street.

2.5 Trail-with-Rail

Two potential trail segments would create a trail along existing active rail lines. Segment 1 (SW Scholls Ferry Road to SW Tiedeman Avenue) would be located west of the rail line between Scholls Ferry Road and Tiedeman Avenue.

Segment 2 (SW Hall Boulevard to SW Bonita Road) would travel along the railroad corridor south of Hall Boulevard, connecting the existing Tigard Transit Center Trail to proposed expansions of Fanno Creek Trail.

2.6 Washington Square Loop Trail

The Washington Square Loop Trail is a proposed trail that would connect the Fanno Creek Trail in Tigard to planned trails in Beaverton and Portland. The Washington Square Loop Trail would provide a pedestrian and bicycle link over Highway 217 and link Washington Square, Metzger Park and Tigard City limits. It would also connect several parks, neighborhoods and trails, creating a high-demand east/west connection in Tigard. There are three proposed segments for the Washington Square Loop Trail which are described in detail below.

Segment 1 (Fanno Creek to Highway 217) would travel from the Fanno Creek Trail to Highway 217. This segment has two proposed alignments: Alignment 1A would create a new trail following Fanno Creek along the entire corridor; Alignment 1B would also create a new trail that

would follow Fanno Creek south to north until Greenburg Street and would then provide an on-street connection to Highway 217 using existing sidewalks and bicycle lanes.

Segment 2 (Highway 217 to Hall Boulevard) would cross Highway 217 and travel to Hall Boulevard. This segment has two proposed alignments: Alignment 2A would provide a new bicycle and pedestrian bridge over Highway 217 and continue to follow Fanno Creek along a new alignment; Alignment 2B would continue the Alignment 1B on-street connection from Greenburg Road.

Segment 3 (Hall Boulevard to 61st Avenue) would travel from Hall Boulevard to SW 61st Avenue connecting to an existing trail between SW 135th Avenue and Barrows Road as well as Summerlake Park Trails. This segment has two proposed alignments: Alignment 3A would follow Fanno Creek along a new alignment to the City's eastern limits; Alignment 3B would provide an on-street connection to Metzger Park, making use of existing sidewalks and bicycle lanes.

2.7 Summer Creek Trail

The Summer Creek Trail has been constructed in the vicinity of Summerlake Park, as well as short connections between Barrow Road and 135th Avenue and between Gallo Road to 114th Avenue. The proposed additions to this trail would connect parks, schools and other existing trails, providing recreation and transportation benefit. There are four proposed segments for this trail which are described in detail below.

Segment 1 (135th Avenue to Summerlake Park) would be a new trail that would link 135th Avenue to Summerlake Park. This segment has two proposed alignments: Alignment 1A would provide a new trail along Summer Creek and Alignment 1B would provide an on-street connection.

Segment 2 (Summerlake Park to 121st Avenue) links Summerlake Park to 121st Avenue. This segment has four proposed alignments: Alignment 2A would provide a new trail along the south side of Summer Creek; Alignment 2B would utilize an existing maintenance road and join up with Alignment 2A; Alignment 2C would create a new trail to connect to Winter Lake Drive via an easement from Mary Woodward Elementary School; Alignment 2D would utilize improvements along North Dakota Street.

Segment 3 (121st Avenue to 114th & Gallo Neighborhood Trail) links 121st Avenue to 135th and the Gallo Neighborhood Trail. This segment has two proposed alignments: Alignment 3A would be a new off-street trail that would connect to the existing Gallo Trail; Alignment 3B would be a continuation of Alignment 2D along North Dakota Street.

Segment 4 (Gallo Avenue Trail to Fanno Creek Trail) has four proposed alignments: Alignment 4A would be located on an existing soft surface nature trail; Alignment 4B would be a new trail through Fowler Middle School property north of the sports field; Alignment 4C would provide a

new side path along Tigard Street; Alignment 4D would be a continuation of Alignment 3B along North Dakota Street.

2.8 Krueger Creek Trail

Krueger Creek Trail would connect Summer Creek Trail to existing trails through Jack Park and to the existing Ascension Trail. There are four proposed segments to this trail which are described in detail below.

Segment 1 (Summer Creek to Walnut Street) has two proposed alignments: Alignment 1A would create a new trail adjacent to a creek corridor and connect to existing trails in Jack Park; Alignment 1B would be an on-street connection along SW 125th Avenue, SW Ann Circuit, SW 127th Avenue and SW 128th Avenue.

Segment 2 (Walnut Street to Broadmoor Place) is a steep route up Bull Mountain. This segment has two proposed alignments: Alignment 2A would create a new trail to cross a creek and pass between private properties. This new trail would then cross SW Gaarde Street and SW 132nd Terrace before connecting to existing stairs and a concrete trail that connects to Broadmoor Place. Alignment 2B would use existing bicycle lanes on SW Walnut Street and SW 135th Avenue.

Segment 3 is (Broadmoor Place to Ascension Trail) has two proposed alignments: Alignment 3A is a new off-road new connection trail through Tigard Water District property; Alignment 3B is an on-street connection that would travel along Broadmoor Place to Whitehall Lane, crossing 135th Avenue to Lauren Lane. Both alignments would then descend via existing switchbacks to the existing Ascension Trail.

Segment 4 (Ascension Trail Segment) has no proposed alignment alternatives and would consist of improving trail conditions to meet established design standards.

3.0 METHODS

The following sections of this report summarize the primary natural resources and potential impacts identified during an office-based review of available information. In addition, biologists from Mason, Bruce, and Girard, Inc. (MB&G) conducted a site visit to select locations on November 24, 2010.

The best available published resources were utilized to determine the presence of threatened, endangered, or candidate fish, wildlife and plant species within the project area including the following:

- U.S. Fish and Wildlife Service (USFWS) list of federally listed, proposed, candidate species and species of concern which may occur in Washington County (USFWS 2010);
- A project-specific Oregon Biodiversity Information Center (ORBIC) database search (ORBIC 2010);

- A StreamNet database search (StreamNet 2010);
- The Oregon Department of Agriculture (ODA) (Currin, pers. comm. 2010) list of state-listed threatened or endangered plant species which may occur in Washington County;
- City of Tigard "Significant Habitat Areas Map" (City of Tigard 2010).

Species presence/absence surveys or potential habitat surveys are beyond the scope of this report and are not discussed further in the sections below, although general habitat quality was observed in areas where site visits were conducted. Presence/absence surveys should be conducted and local experts should be consulted during the next phase of project planning to avoid or reduce impacts to sensitive species.

Potential jurisdictional wetlands and waters and number of creek crossings were reviewed using City of Tigard local wetland inventory (LWI) mapping (City of Tigard 2010).

LWI and significant habitat data was overlaid on the proposed locations of trails, segments, and alignments provided by Kittelson and Associates (Horning 2010) using Geographic Information System (GIS) software. The proposed trail was overlaid with the mapped LWI wetlands, significant habitat and creek crossings. This analysis was utilized to determine potential impacts for the proposed trail.

In most cases, the environmentally-preferred alignment could be easily differentiated. However, there were five instances where impacts were very similar based on the office-based review. MB&G biologists conducted a site visit on November 24, 2010 in order to review wetland and habitat quality and document noxious weed presence to further inform the alignment selection process for these five instances. The areas visited are listed below and are also shown on Figure 1 and discussed further in Section 4.0.

- Tigard Street Trail Segment 1, Alignments 1A and 1B.
- Fanno Creek Trail Segment 2, Alignments 2A, 2B, 2C.
- Fanno Creek Trail Segment 5, Alignments 5A, 5B, and 5C.
- Summer Creek Trail Segment 2, Alignment 2A, 2B, and 2C.
- Tualatin River Trail Segment 3, Alignments 3A and 3B.

All alignments were reviewed for their ability to comply with state, federal, and local permitting processes as part of a "fatal flaw" analysis. A "fatal flaw" is defined for the purposes of this report as any action that would not likely be permitted by the state, federal, and local agencies or departments, based on MB&G biologist's experience.

4.0 RESULTS

A list of threatened, endangered, or candidate wildlife, fisheries, and plant species with the potential to occur within the proposed project was compiled from the USFWS list of federally listed, proposed, candidate species and species of concern which may occur in Washington

County, the project-specific ORBIC database search (ORBIC 2010), the StreamNet database search (StreamNet 2010), and the ODA (Currin pers. comm. 2009) list of state-listed threatened or endangered plant species which may occur in Washington County. This list is included in Table 1 below.

Table 1. Sensitive Species with the Potential to Occur within the Proposed Project

Common Name	Scientific Name	Federal Listing Status	State Listing Status	Source
Fisheries				
Coho salmon (Lower Columbia River ESU)	*Oncorhynchus kisutch*	T	E	StreamNet, ORBIC
Steelhead (Upper Willamette River DPS, winter run)	*Oncorhynchus mykiss*	T	SC	StreamNet, ORBIC
Wildlife				
Bald eagle	*Haliaeetus leucocephalus*	N/A	T	ORBIC
Marbled murrelet	*Brachyramphus marmoratus*	T	T	USFWS
Northern spotted owl	*Strix occidentalis caurina*	T	T	USFWS
Plants				
Kincaid's lupine	*Lupinus kincaidii*	T	T	USFWS, ODA
Nelson's checkermallow	*Sidalcea nelsoniana*	T	T	USFWS, ODA
White rock larkspur	*Delphinium leucophaeum*	SOC	E	ODA, ORBIC
Willamette daisy	*Erigeron decumbens* var. *decumbens*	E	E	ODA

E= Listed Endangered; T= Listed Threatened C=Candidate; SOC=Species of Concern; SC=Sensitive Critical; ESU= Evolutionary Significant Unit; DPS=Distinct Population Segment.

From a regulatory standpoint, project impacts on species listed as threatened or endangered must be analyzed and minimized to the extent possible and these species are therefore the focus of this report. However, additional species not listed as threatened or endangered, including western pond turtle (*Actinemys marmorata*) and red-legged frog (*Rana aurora*), have the potential to occur within the proposed project. According to the ORBIC database search for the Project, there are two documented occurrences for the western pond turtle within the City of Tigard; however, neither of these occurrences is located within the proposed project. There are no documented ORBIC occurrences for the red-legged frog within the City of Tigard. However, there is anecdotal evidence that western pond turtles and red-legged frogs are present within the vicinity of the proposed project. Metro staff suspects that bark-dust-covered beds behind industrial buildings are likely important for turtles in the area (Elaine Stewart, pers. comm., Metro, January 12, 2011). Refer to Appendix A for location details.

Results from the GIS analysis for all trails, segments, and alignments for mapped wetland, creek, and significant habitat impacts are included in Table 2 below. Bold, blue highlighted text in Table 2 indicates the environmentally-preferred alignments based on the results of this analysis.

In addition, a thorough overview of the potential impacts and observations from the site visit for each segment and alignment are included in Appendix A.

Table 2. Summary of Environmental Impacts for the City of Tigard, Tigard Greenway Trail System Master Plan

	Mapped Wetland (linear feet)	Mapped Creek Crossings (# of crossings)	Significant Habitat (linear feet)	Rank[1]
Tualatin River Trail				
Segment 1 (85th Ave to Durham City Limits)	0	0	0	
Alignment 1A	**80**	**1**	**1,778**	**1**
Alignment 1B	492	1	2,141	2
Alignment 1C	891	1	1,473	3
Segment 2 (SW 85th Ave to SW 108th Ave)	**0**	**0**	**250**	
Segment 3 (SW 108th Ave to Pacific Highway)	924	1	2,235	
Alignment 3A	**0**	**0**	**530**	**1**
Alignment 3B	0	0	770	2
Pathfinder-Genesis Trail				
Segment 1 (Fanno Creek to Pathfinder Way)	211	2	973	
Alignment 1A	103	1	729	3
Alignment 1B	0	0	177	2
Alignment 1C	**0**	**0**	**0**	**1**
Segment 2 (107th Court to 115th Avenue)	0	0	0	
Alignment 2A	0	1	204	2
Alignment 2B	**0**	**1**	**81**	**1**
Segment 3 (115th Avenue to Gaarde Street)	0	0	0	
Alignment 3A	0	0	505	2
Alignment 3B	**0**	**1**	**53**	**1**
Fanno Creek Trail				
Segment 1 (Library/Fanno Creek Drive)	0	0	0	
Alignment 1A	**332**	**0**	**332**	**1**
Alignment 1B	868	1	868	2
Segment 2 (Brown Property)	0	0	0	
Alignment 2A	1,008	1	2,797	4
Alignment 2B	732	1	2,246	2
Alignment 2C	1,037	1	1,435	3
Alignment 2D	**0**	**1**	**105**	**1**
Segment 3 (Bonita Road to Durham Road)	0	0	0	
Alignment 3A	0	1	478	3
Alignment 3Ai	0	0	0	
Alignment 3Aii	327	0	383	

	Mapped Wetland (linear feet)	Mapped Creek Crossings (# of crossings)	Significant Habitat (linear feet)	Rank[1]
Alignment 3B	2,909	3	5,699	4
Alignment 3Bi	8	0	247	
Alignment 3C	3,193	0	5,028	5
Alignment 3D	0	0	173	2
Alignment 3E	**0**	**0**	**0**	**1**
Segment 4 (Durham Road to Durham City)	0	0	0	
Alignment 4A	80	1	1,778	2
Alignment 4Ai	99	0	425	
Alignment 4B	492	0	2,141	3
Alignment 4C	**0**	**0**	**0**	**1**
Segment 5 (Tiedeman Road Crossing)	0	0	0	
Alignment 5A	0	1	961	3
Alignment 5B	0	1	651	2
Alignment 5C	**0**	**1**	**343**	**1**
Alignment 5Ci	0	0	0	
Tigard Street Trail				
Segment 1 (Fanno Creek Trail to Tiedeman Street)	0	0	0	
Alignment 1A	0	1	334	2
Alignment 1B	**109**	**1**	**321**	**1**
Segment 2 (Tiedeman Avenue to Tigard Transit Center)	**0**	**2**	**0**	
Trail-with-Rail				
Segment 1 (SW Scholls Ferry Road to SW Tiedeman Road)	**0**	**1**	**2,003**	
Segment 2 (SW Hall Boulevard to SW Bonita Road)	**0**	**1**	**627**	
Washington Square Loop Trail				
Segment 1 (Fanno Creek to Highway 217)	209	1	1,118	
Alignment 1A	1,305	1	1,401	2
Alignment 1B	**0**	**0**	**148**	**1**
Segment 2 (Highway 217 to Hall Boulevard)	0	0	0	
Alignment 2A	1,701	1	2,476	2
Alignment 2B	**0**	**1**	**547**	**1**
Segment 3 (Hall Boulevard to 61st Avenue)	0	0	0	
Alignment 3A	1,559	2	8,280	2
Alignment 3B	**0**	**0**	**1,062**	**1**
Summer Creek Trail				
Segment 1 (135th Ave to Summerlake Park)	0	0	0	
Alignment 1A	1,322	0	1,334	2

	Mapped Wetland (linear feet)	Mapped Creek Crossings (# of crossings)	Significant Habitat (linear feet)	Rank[1]
Alignment 1B	**0**	**0**	**117**	**1**
Segment 2 (Summerlake Park to 121st Avenue)	0	0	0	
Alignment 2A	815	1	1,487	4
Alignment 2B	0	0	247	2
Alignment 2C	776	1	1,106	3
Alignment 2D	**0**	**0**	**0**	**1**
Segment 3 (121st Avenue to 114th & Gallo Neighborhood Trail)	0	0	0	
Alignment 3A	1,507	1	1,915	2
Alignment 3B	**0**	**0**	**0**	**1**
Segment 4 (Gallo Avenue Trail to Fanno Creek Trail)	0	0	0	
Alignment 4A	0	0	997	2
Alignment 4B	149	0	254	3
Alignment 4C	1,294	0	1,597	4
Alignment 4D	**0**	**0**	**0**	**1**
Krueger Creek Trail				
Segment 1 (Summer Creek to Walnut Street)	495	1	502	
Alignment 1A	1,252	1	1,402	2
Alignment 1B	**0**	**0**	**93**	**1**
Segment 2 (Walnut Street to Broadmoor Place)	0	0	0	
Alignment 2A	80	2	1,713	2
Alignment 2B	**0**	**1**	**86**	**1**
Segment 3 (Broadmoor Place to Ascension Trail)	0	1	711	
Alignment 3A	0	0	12	2
Alignment 3B	**0**	**0**	**9**	**1**
Segment 4 (Ascension Trail)	**0**	**1**	**3,081**	

[1] Only alignments were ranked. Segments and sub-alignments (e.g., Ai, Aii) do not have options and were therefore not included in the rankings.

5.0 APPLICABLE REGULATIONS

Impacts to state or federally-listed wildlife, fisheries, and/or plant species are possible for the proposed project. If impacts to listed species will occur, a Biological Assessment for U.S. Fish and Wildlife Department-jurisdictional species or Standard Local Operating Procedure for Endangered Species (SLOPES IV) Compliance Report for National Marine Fisheries Service-jurisdictional species should be prepared to provide Endangered Species Act (ESA) clearance. In order to utilize a SLOPES IV Compliance Report to document impacts to listed species, a permit from the U.S. Army Corps of Engineers (ACOE) is also required.

It is possible that native migratory fish currently or historically utilized creeks within the project. As such, coordination with the Oregon Department of Fish and Wildlife (ODFW) for all new or improved stream crossings would need to occur. If ODFW requires fish passage, then all creek crossings would need to be designed to provide fish passage in accordance with the Oregon Fish Passage Law and a Fish Passage Plan would be required.

The federal Migratory Bird Treaty Act (MBTA) of 1918 prohibits the "take" of native, migratory birds, their eggs, feathers, or nests. "Take" includes any attempt at hunting, pursuing, wounding, killing, possessing or transporting any migratory bird, nest, egg, or part thereof. Trail construction activities will likely require clearing of trees and shrubs within the project footprint. To remain in compliance with the MBTA, vegetation clearing should be conducting during the non-nesting season in the Portland area for native, migratory birds between September 1 and March 1.

If the proposed Project includes activities within creeks, these activities should be scheduled during ODFW-approved In-Water Work Window for the Tualatin River and its tributaries (July 15 through September 30) (ODFW 2008).

40 CFR Part 230.10, which provides guidance on implementation of Section 404 of the Clean Water Act, states that dredge or fill material within a Waters of the U.S. will be permitted only if a practicable alternative does not exist that would have a lesser impact on the aquatic ecosystem. This regulation should be utilized in the next planning phase of the Project to guide the alternative selection process as impacts to wetlands and waters are likely. In addition to Section 404 of the Clean Water Act, administered by the ACOE, the Removal Fill Law, administered by the Department of State Lands (DSL) and Water Quality Sensitive Areas and Vegetated Corridors, administered by Clean Water Services (CWS), will apply to the project.

If proposed wetland/waters impacts are less than 0.10 acre and do not involve impacts to wetlands, the ACOE will not require pre-construction notification (i.e., Joint Permit Application). Similarly, if proposed wetland/waters impacts are less than 50 cubic yards, the DSL will not require a permit for the proposed action. If proposed wetland/waters impacts are less than 0.5 acre, then the Project may qualify for the ACOE Nationwide Permit (NWP) #14, Linear Transportation Projects and the DSL General Permit (GP) for Certain Transportation-Related Structures. If the project requires greater than 0.5 acre of impacts, an individual permit (IP) will be required from the ACOE and DSL. A wetland/waters delineation and report will be required for the proposed project to determine accurate wetland/waters locations and dimensions. Trails that utilize boardwalks and allow natural hydrology movement within wetland areas will likely be looked upon more favorably by the DSL and ACOE than trails that use fill material (e.g. asphalt, concrete, gravel).

Impacts to wetlands/waters of the U.S. and State will require compensatory mitigation for both the ACOE and DSL. The Project is located within the Five Mile Lane In-lieu-fee Mitigation Bank service area; however, there is currently a waiting list for credits at this bank. The project is

also located within the Tualatin Valley Environmental Mitigation Bank. Currently, this does not have credits available for purchase. However, credits are expected to become available at this bank in 2011. If bank credits are unavailable during the permitting process, alternative forms of mitigation will need to be considered, including payment-in-lieu (for DSL-jurisdictional impacts only) or on- or off-site wetland creation, enhancement, or restoration. If on- or off-site mitigation is proposed, the DSL and ACOE will require a compensatory wetland mitigation plan.

CWS jurisdiction extends into the proposed project and follows the City of Tualatin boundary. All creeks and wetlands within the project would be considered water quality sensitive features (WQSA) under CWS's jurisdiction. Impacts within vegetated corridors surrounding these WQSAs would require a vegetated corridor assessment and report and a Service Provider Letter from CWS. Impacts to parcels that contain vegetated corridors will require vegetated corridor enhancement by CWS. CWS enhancement consists of removing noxious weeds and planting native trees and shrubs within the vegetated corridor. Enhancement and/or mitigation plans will be required if impacts to jurisdictional features are proposed for the project. In addition, impacts to vegetated corridors will require mitigation.

According to the City of Tigard's Sensitive Lands Code (18.775), significant fish and wildlife habitat areas designated on the City of Tigard "Significant Habitat Areas Map" are considered Sensitive Lands (City of Tigard 2009). Development within a significant habitat requires a Type II or III permit.

Metro's Green Trails Handbook includes guidelines to create an interconnected system of trails and greenways for fish, wildlife and people while maintaining biodiversity and protecting water quality. Chapters 4 and 5 of the handbook specifically address methods to preserve sensitive natural resources which include avoiding stream crossings, wetlands and floodplains, using existing disturbed corridors, keeping trails out of core habitat areas, and maintaining habitat connectivity (Metro, 2004). This guidance should be considered during the preferred alignment selection process.

6.0 CONCLUSIONS

MB&G Biologists evaluated 60 alignments within 26 segments for the eight trails analyzed in the City of Tigard, Tigard Greenway Trail System Management Plan project. Biologists utilized GIS technology and a site visit on November 24, 2010 to target areas to determine the potential environmental impacts for the project. Nearly all of the alignment options have a clear, preferred environmental option based on the fewest linear feet of wetland and significant habitat impact and fewest number of creek crossings. No "fatal flaws" were uncovered during the analysis process. However, construction of many of the non-preferred alignments would require significant mitigation for wetland, waters, vegetated corridor, and significant habitat impacts and should be considered during the selection process.

7.0 REFERENCES

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Appendix A
Detailed Segment and Alignment Discussion

City of Tigard, Tigard Greenway Trail System Master Plan
Washington County, Oregon

Name of Trail: Tualatin River Trail
Name of Segment: Segment 1 (85th Ave to Durham City Limits)

Summary

Three potential new trail alignments would connect Tualatin River Trail to a proposed extension of Fanno Creek Trail at Durham Road. Metro staff believes that western painted turtles (*Chrysemys picta bellii*) are present within this stretch of Fanno Creek between Durham Road and the Tualatin River (Elaine Stewart, pers. comm., Metro, January 12, 2011). Alignments 1A and 1B would run along a narrow corridor between Fanno Creek, railroad tracks and CWS property. Alignment 1C would connect Durham City Trail system at an existing railroad crossing and follow the railroad tracks north to SW 85th Avenue. Alignments 1A and 1B are the same as Fanno Creek Trail Segment 4 Alignments 4A and 4B.

Wetlands

- Alignment 1A: Travels through 80 feet of mapped wetland; one mapped creek crossing.
- Alignment 1B: Travels through 492 feet of mapped wetland; one mapped creek crossings.
- Alignment 1C: Travels through 891 feet of mapped wetland; one mapped creek crossing.

Wildlife and Significant Habitat

- Alignment 1A: Travels through 1,778 feet of significant habitat.
- Alignment 1B: Travels through 2,141 feet of significant habitat.
- Alignment 1C: Travels through 1,473 feet of significant habitat.

Analysis

Alignment 1A is the environmentally-preferred trail alignment. Although Alignment 1A travels through more significant habitat than Alignment 1C, it travels through the least amount of mapped wetland. In addition, Alignment 1A crosses Fanno Creek only one time thus creating a smaller overall environmental footprint.

Name of Trail: Tualatin River Trail
Name of Segment: Segment 2 (SW 85th Ave to SW 108th Ave)

Summary

Segment 2 is an existing portion of Tualatin River Trail that is in need of improvements and upgrades. No new alignments are proposed.

Wetlands

- No new impacts to mapped wetlands are anticipated.

Wildlife and Significant Habitat

- Segment 2: Travels through 250 feet of significant habitat.

Analysis

Segment 2 should have minor environmental impacts, since this portion consists of improvements to the existing trail.

Name of Trail: Tualatin River Trail
Name of Segment: Segment 3 (SW 108th Ave to Highway 99W)

Summary

Two potential alignments would pass outside Tigard city limits and intersect with Highway 99W and the future Westside Trail extension. Alignment 3A would upgrade and improve an unofficial, unimproved existing trail (demand trail) along the river connecting at the base of the SW 108th Avenue trail entrance. Alignment 3B would create a new trail from SW 108th Avenue through a city-owned parcel. The remainder of Segment 3 outside of the alignments would require a mapped creek crossing and is located in Tualatin River's floodplain. The remainder of Segment 3 would also require 924 feet of construction within a mapped wetland.

Wetlands

- Segment 3: Travels through 924 feet of mapped wetland; one mapped creek crossing.
- Alignment 3A: Travels through no mapped mapped wetlands; no mapped creek crossings; runs parallel to a mapped creek.
- Alignment 3B: Travels through no mapped mapped wetlands; no mapped creek crossings; runs parallel to the Tualatin River.

Wildlife and Significant Habitat

- Segment 3: Travels through 2,235 feet of significant habitat.
- Alignment 3A: Travels through 530 feet of significant habitat.
- Alignment 3B: Travels through 770 feet of significant habitat

Other—Vegetation Community and Noxious Weeds

- Alignment 3A: Tree cover is 50-60% and composed of Douglas-fir (*Pseduotsuga menziesii*), big-leaf maple (*Acer macrophyllum*) and red alder (*Alnus rubra*). Dense understory composed of English ivy (*Hedera helix*), English holly (*Ilex aquilinum*) and Himalayan blackberry (*Rubus armeniacus*). Alignment appears to pass though some maintained areas used as yards.
- Alignment 3B: Tree cover is 40% and composed of Oregon ash (*Fraxinus latifolia*), red alder, and Western redcedar (*Thuja plicata*). Understory is composed entirely of Himalayan blackberry.

Analysis

Alignment 3A is the environmentally-preferred option since it travels through fewer feet of significant habitat and mapped wetland. In addition, Alignment 3A currently has an existing demand trail. However, both alignments travel through degraded habitat, would require CWS mitigation and/or enhancement, and either area could be improved by removing noxious weeds during the trail construction.

Portions of Alignments 3A and 3B were visited by MB&G Biologists during the field visit.

Photos: Alignment 3A (left) and Alignment 3B (right)

Name of Trail: Pathfinder-Genesis Trail
Name of Segment: Segment 1 (Fanno Creek to Pathfinder Way)

Summary

Three proposed alignments would connect this existing community greenway trail to Fanno Creek Trail near Woodard City Park. After Alignments 1A and 1B converge, Segment 1 passes through mapped wetland and significant habitat. Alignment 1C is an on-street alternative to Segment 1 and Alignments 1A and 1B.

Wetlands

- Segment 1: Travels through 211 feet of mapped wetland; two mapped creek crossings.
- Alignment 1A: Travels through 103 feet of mapped wetland; one mapped creek crossing.
- Alignment 1B: No impacts to mapped wetlands.
- Alignment 1C: No impacts to mapped wetlands.

Wildlife and Significant Habitat

- Segment 1: Travels through 973 feet of significant habitat.
- Alignment 1A: Travels through 729 feet of significant habitat.
- Alignment 1B: Travels through 177 feet of significant habitat.
- Alignment 1C: No impacts to significant habitat are anticipated.

Analysis

Alignment 1C is the environmentally-preferred trail alignment because it is not expected to impact any mapped wetland or significant habitat since it would be entirely on existing roadways.

Name of Trail: Pathfinder-Genesis Trail
Name of Segment: Segment 2 (107th Court to 115th Avenue)

Summary

Segment 2 is an existing trail in need of maintenance and upgrades. In several areas the asphalt is degraded and requires repair to improve safety and accessibility. An additional trail entrance could be constructed through a City owned parcel (Alignment 2A) or by improving on-street existing access points (Alignment 2B).

Wetlands

- Alignment 2A: No mapped wetland impacts are anticipated; one mapped creek crossing.
- Alignment 2B: No mapped wetland impacts are anticipated; one mapped creek crossing.

Wildlife and Significant Habitat

- Alignment 2A: Travels through 204 feet of significant habitat.
- Alignment 2B: Travels through 81 feet of significant habitat.

Analysis

Alignment 2B is the environmentally-preferred trail alignment because it travels through fewer feet of significant habitat than Alignment 2A.

Name of Trail: Pathfinder-Genesis Trail
Name of Segment: Segment 3 (115th Avenue to Gaarde Street)

Summary

Two proposed alignment options would connect the 118th Court trail entrance to Gaarde Street. Alignment 3A would follow a mapped creek from Gaarde Street to the existing trail. Alignment 3B would provide an on-street connection.

Wetlands

- Alignment 3A: No mapped wetland impacts; proposed alignment runs parallel to a mapped creek.
- Alignment 3B: No mapped wetland impacts; one mapped creek crossing.

Wildlife and Significant Habitat

- Alignment 3A: Travels through 505 feet of significant habitat.
- Alignment 3B: Travels through 53 feet of significant habitat.

Analysis

Alignment 3B is the environmentally-preferred habitat because it is an on-street connection and would likely require less CWS mitigation and enhancement than 3A.

Name of Trail: Fanno Creek Trail
Name of Segment: Segment 1 (Library/Fanno Creek Drive)

Summary

The two proposed alignments would either improve the existing trail (Alignment 1A) or provide an alternative to the current alignment by creating a new connection on the east side of Fanno Creek (Alignment 1B). Both alignments travel through mapped wetlands and floodplain.

Wetlands

- Alignment 1A: Travels through 332 feet of mapped wetland.
- Alignment 1B: Travels through 868 feet of mapped wetland; one mapped creek crossing.

Wildlife and Significant Habitat

- Alignment 1A: Travels through 332 feet of significant habitat.
- Alignment 1B: Travels through 868 of significant habitat.

Analysis

Alignment 1A is the environmentally-preferred alignment because it makes use of an existing trail, travels through less mapped wetland and significant habitat, and does not require a new creek crossing.

Name of Trail: Fanno Creek Trail
Name of Segment: Segment 2 (Brown Property)

Summary

Segment 2 has four proposed alignments. Alignment 2A is the longest new trail segment, crossing Fanno Creek near the library and traveling along the east side of the mapped creek and the north side of the Brown property. Alignment 2B runs along the north side of the Brown property remaining in City and Metro land after breaking off from the existing trail. Metro staff have observed northwestern pond turtles (*Actinemys marmorata*) in the area of Alignments 2A and 2B (Elaine Stewart, pers. comm., Metro, January 12, 2011). Alignment 2C would connect at the south end of the existing trail segment, along the south side of Fanno Creek. Alignment 2D would travel along Fanno Creek Drive as a bicycle boulevard from the end of the existing trail to Bonita Road.

Wetlands

- Alignment 2A: Travels through 1,008 feet of mapped wetland; one mapped creek crossing (existing culvert).
- Alignment 2B: Travels through 732 feet of mapped wetland; one mapped creek crossing (existing culvert).
- Alignment 2C: Travels through 1,037 feet of mapped wetland; one mapped creek crossing (existing culvert).
- Alignment 2D: No mapped wetland impacts are anticipated; one mapped creek crossing on existing roadway.

Wildlife and Significant Habitat

- Alignment 2A: Travels through 2,797 feet of significant habitat.
- Alignment 2B: Travels through 2,246 feet of significant habitat.
- Alignment 2C: Travels through 1,435 feet of significant habitat.
- Alignment 2D: Travels through 105 feet of significant habitat.

Other—Noxious Weeds

- Alignments 2A, 2B and 2C: Low amounts of Canada thistle (*Cirsium arvense*), Himalayan blackberry, English ivy, English holly, English hawthorn (*Crataegus monogyna*), and old man's beard (*Clematis vitalba*) were observed in the vicinity of Alignments 2A, 2B, and 2C.

Analysis

Alignment 2D is the environmentally-preferred alignment because it is not anticipated to have any impacts to mapped wetlands, travels through the least amount of significant habitat, and utilizes an existing road, furthering reducing the environmental impact. If Alignment 2D becomes unfeasible, Alignment 2B is the second most viable option since it travels through the least amount of mapped wetland and significant habitat.

Portions of Alignments 2A, 2B, and 2C were visited by MB&G Biologists during the field visit.

Photos: Alignment 2A and 2B upland vegetation (left) and Fanno Creek with Alignments 2A and 2B.

Name of Trail: Fanno Creek Trail
Name of Segment: Segment 3 (Bonita Road to Durham Road)

Summary

Segment 3 has five proposed alignments, with Alignments 3A and 3B having additional options. Alignment 3A is an on-street option along SW 74th Avenue; Option 3Ai includes a potential trail segment within a Metro parcel, which could include a viewing platform; Option 3Aii would provide a loop trail within parcels where development is limited due to wetlands and floodplains. Alignment 3B is located on the east side of Fanno Creek along SW 74th Avenue connecting to a stream-side trail from SW 74th Avenue via a Metro-owned parcel; Option 3Bi would create a trail loop from the Metro parcel to a parcel located in a floodplain/wetland area. Alignment 3C would travel from the east side of Bonita Road, crossing Fanno Creek and continuing along the west side of Fanno Creek. Trail Alignments 3B—3C all follow the creek where Metro staff has observed western painted turtles (*Chrysemys picta bellii*) (Elaine Stewart, pers. comm., Metro, January 12, 2011). Alignment 3D would be a bicycle boulevard located along SW 79th Avenue. Alignment 3E is a second on-street option and would travel along SW 74th Avenue as a side path on the west side of the street, without crossing mapped creeks or mapped wetlands.

Wetlands

- Alignment 3A: No impacts to mapped wetlands; one mapped creek crossing.
- Alignment 3Ai: No impacts to mapped wetlands or mapped creeks.
- Alignment 3Aii: Travels through 327 feet of mapped wetland, no mapped creek crossings.
- Alignment 3B: Travels through 2,909 feet of mapped wetland; three mapped creek crossings.
- Alignment 3Bi: Travels through 8 feet of mapped wetland.
- Alignment 3C: Travels through 3,193 feet of mapped wetland.
- Alignment 3D: No impacts to mapped wetlands or mapped creeks.
- Alignment 3E: No impacts to mapped wetlands or mapped creeks.

Wildlife and Significant Habitat

- Alignment 3A: Travels through 478 feet of significant habitat.
- Alignment 3Ai: No impacts to significant habitat.
- Alignment 3Aii: Travels through 383 feet of significant habitat.
- Alignment 3B: Travels through 5,699 feet of significant habitat.
- Alignment 3Bi: Travels through 247 feet of significant habitat.
- Alignment 3C: Travels through 5,028 feet of significant habitat.
- Alignment 3D: Travels through 173 feet of significant habitat.
- Alignment 3E: No impacts to significant habitat.

Analysis

Alignment 3E is the environmentally-preferred trail alignment because it utilizes an existing roadway, minimizing environmental impacts. It does not travel through mapped wetlands and it is not anticipated to impact any significant habitat. If Alignment 3E becomes unfeasible, Alignment 3A is the second-most environmentally viable option. Although it crosses Fanno Creek twice, it is not located in mapped wetland areas and utilizes an existing roadway.

Name of Trail: Fanno Creek Trail
Name of Segment: Segment 4 (Durham Road to Durham City)

Summary

Segment 4 connects Fanno Creek Trail to Durham City limits and provides connections to the existing Tualatin River Trail. This segment has 3 proposed alignments, with Alignment 4A having one additional option: Alignment 4A travels between railroad tracks and CWS property; Option 4Ai would be the same route as Alignment 4A but it includes a detour adjacent to the mapped creek prior to its crossing. Alignment 4B would travel along the north side of the mapped creek, crossing it 3 times and crossing under the railroad. Alignments 4A and 4B are the same as Alignments 1A and 1B in the Tualatin River Trail system. Alignment 4C would be improvements to the existing bicycle lanes on Durham Road and 85th Street.

Wetlands

- Alignment 4A: Travels through 80 feet of mapped wetland; one mapped creek crossing.
- Alignment 4Ai: Travels through 99 feet of mapped wetland.
- Alignment 4B: Travels through 492 feet of mapped wetland; one mapped creek crossing.
- Alignment 4C: No mapped wetland impacts are anticipated.

Wildlife and Significant Habitat

- Alignment 4A: Travels through 1,778 feet of significant habitat.
- Alignment 4Ai: Travels through 425 feet of significant habitat.
- Alignment 4B: Travels through 2,141 feet of significant habitat.
- Alignment 4C: No impacts to significant habitat are anticipated.

Analysis

Alignment 4C is the environmentally-preferred trail alignment because no new impacts to the environment are anticipated. This alignment would make improvements to an existing roadway.

Name of Trail: Fanno Creek Trail
Name of Segment: Segment 5 (Tiedeman Road Crossing)

Summary—existing conditions

Segment 5 addresses concerns about Fanno Creek Trail crossing Tiedeman Avenue. This segment has 3 alignments, with Alignment 5C having an additional option: Alignment 5A would cross Tiedeman Avenue and continue straight, crossing Fanno Creek on the east side of Woodard City Park; Alignment 5B would cross Tiedeman Avenue and turn northeast, connecting to the existing trail in Woodard City Park after crossing Fanno Creek closer to Tiedeman Avenue than Alignment 5A; Alignment 5C would utilize the existing Tiedeman Avenue Bridge by making bicycle and pedestrian improvements to the bridge, with Alignment 5Ci widening the sidewalk on one side of the road to accommodate trail users.

Wetlands

- Alignment 5A: Travels near existing mapped wetland mitigation area; one mapped creek crossing.
- Alignment 5B: Travels near existing mapped wetland mitigation area; one mapped creek crossing.
- Alignment 5C: No new mapped wetland impacts are anticipated; one mapped creek crossing is on an existing roadway.
- Alignment 5Ci: No new mapped wetland impacts are anticipated.

Wildlife and Significant Habitat

- Alignment 5A: Travels through 961 feet of significant habitat.
- Alignment 5B: Travels through 651 feet of significant habitat.
- Alignment 5C: Travels through 343 feet of significant habitat.
- Alignment 5Ci: No impacts to significant habitat are anticipated.

Other—Noxious Weeds

- Alignments 5A and 5B: Presence of reed canarygrass, Himalayan blackberry and teasel (*Dipsacus* sp.).

Analysis

Alignment 5C is the most environmentally-preferred trail alignment because no new impacts to mapped wetlands are anticipated and it will utilize the existing roadway. The other two proposed alignments (5A and 5B) would require building a new trail near a current wetland mitigation site and a new mapped creek crossing.
Portions of Alignments 5A, 5B, and 5C were visited by MB&G Biologists during the field visit.

Photos: Intersection of Alignment 5B and the existing Fanno Creek Trail (left) and the approximate location of Alignment 5A (right)

Name of Trail: Tigard Street Trail
Name of Segment: Segment 1 (Fanno Creek Trail to Tiedeman Street)

Summary—existing conditions

The two proposed alignments of Segment 1 would create a more convenient and direct bicycle and pedestrian path to Fanno Creek Trail by following an unused railroad corridor. Alignment 1A would follow the rail corridor to North Dakota Street and provide an upgraded on-street connection to Fanno Creek Trail entrance. Alignment 1B would diverge from the rail corridor south of Tiedeman Avenue and provide an on-street connection to Fanno Creek Trail at the Tigard Street entrance, utilizing an existing pedestrian/bicycle bridge that crosses Fanno Creek.

Wetlands

- Alignment 1A: Travels near an existing mapped wetland improvement project; one mapped creek crossing over an existing roadway without sidewalks.
- Alignment 1B: Travels through 109 feet of mapped wetland; one mapped creek crossing utilizing an existing pedestrian/bicycle bridge.

Wildlife and Significant Habitat

- Alignment 1A: Travels through 334 feet of significant habitat.
- Alignment 1B: Travels through 321 feet of significant habitat.

Other—Noxious Weeds

- Alignment 1A: Presence of reed canarygrass and teasel (*Dipsacus* sp.)
- Alignment 1B: Presence of reed canarygrass and Himalayan blackberry.

Analysis

Alignment 1B is the environmentally-preferred trail alignment because it utilizes a current pedestrian/bicycle bridge across Fanno Creek and travels through the fewest feet of significant habitat. The current creek crossing at Alignment 1A may require additional construction of a new pedestrian/bicycle bridge or widening North Dakota Street, since the existing road bridge appears to be too narrow to safely support sidewalks and bicycle boulevards. This would have a larger impact on the surrounding riparian area and floodplain than the impact on upgrading Alignment 1B.

Portions of Alignments 1A and 1B were visited by MB&G Biologists during the field visit.

Photos: Alignment 1A (left) and 1B (right)

Name of Trail: Tigard Street Trail
Name of Segment: Segment 2 (Tiedeman Avenue to Tigard Transit Center)

Summary

Segment 2 follows an inactive rail corridor along Tigard Street from Tiedeman Avenue to Main Street. A 16-foot wide gravel path would be developed to accommodate a variety of mixed use trail sections, depending on projected usage. The corridor connects to Main Street to access the Tigard Transit Center.

Wetlands

- No new impacts to mapped wetlands are anticipated; two creek crossings.

Wildlife and Significant Habitat

- No new impacts to wildlife/significant habitat are anticipated.

Analysis

Segment 2 should have no new environmental impacts, since this segment consists of improvements to an existing corridor.

Name of Trail: Trail-with-Rail
Name of Segment: Segment 1 (SW Scholls Ferry Road to SW Tiedeman Road)

Summary

Segment 1 would be located west of an active rail line between Scholls Ferry Road and Tiedeman Avenue. An abandoned rail corridor south of Tiedeman Avenue would have a new trail that would connect to a Westside Express Service (WES) commuter park and ride.

Wetlands

- Travels near floodplain north of North Dakota Street; one mapped creek crossing.

Wildlife and Significant Habitat

- Travels through 2,003 feet of significant habitat.

Analysis

No alternative alignments are proposed for this segment at this time. The current proposed alignment would travel through significant habitat and floodplain. Mitigation may be required.

Name of Trail: Trail-with-Rail
Name of Segment: Segment 2 (SW Hall Boulevard to SW Bonita Road)

Summary

Segment 2 would travel along an active railroad corridor south of Hall Boulevard and connect to the existing Tigard Transit Center Trail and proposed expansions of Fanno Creek Trail. North of Hall Boulevard a newly-constructed multi-use pathway along the rail corridor would connect to a Westside Express Service WES commuter park and ride.

Wetlands

- No impacts to mapped wetlands are anticipated; one mapped creek crossing.

Wildlife and Significant Habitat

- Travels through 627 feet of significant habitat.

Analysis

No alternative alignments are proposed for this segment at this time. The current proposed alignment would travel through significant habitat. Mitigation may be required.

Name of Trail: Washington Square Loop Trail
Name of Segment: Segment 1 (Fanno Creek to Highway 217)

Summary

Two proposed alignments for Segment 1 would be to either follow the mapped creek along the entire corridor (Alignment 1A) or to follow the mapped creek to Greenburg Street and provide an on-street connection to Highway 217 (Alignment 1B). All of Alignment A is in a floodplain and a mapped wetland. The on-street Alignment B would make use of existing sidewalks and bike lanes on Greenburg Street. Both alignments would cross Fanno Creek, require boardwalks in some areas, and require crossing improvements at Greenburg Street.

Wetlands

- Segment 1: Travels through 209 feet of mapped wetland; 1 mapped creek crossing.
- Alignment 1A: Travels through 1,305 feet of mapped wetland; one mapped creek crossing.
- Alignment 1B: No impacts to mapped wetlands or creeks are anticipated.

Wildlife and Significant Habitat

- Segment 1: Travels through 1,118 feet of significant habitat.
- Alignment 1A: Travels through 1,401 feet of significant habitat.
- Alignment 1B: Travels through 148 feet of significant habitat.

Analysis

Alignment 1B is the environmentally-preferred trail alignment because it travels through fewer feet of mapped wetland and significant habitat, and avoids mapped creek crossings.

Name of Trail: Washington Square Loop Trail
Name of Segment: Segment 2 (Highway 217 to Hall Boulevard)

Summary

The two proposed alignments for Segment 2 would provide access across Highway 217. Alignment 2A would construct a new bicycle/pedestrian bridge over Highway 217 and continue to follow Fanno Creek from Alignment 1A. Alignment 2B would continue the on-street connection on Greenburg and Oak Street. Similar to Alignment 1A, all of Alignment 2A is in a floodplain and a mapped wetland.

Wetlands

- Alignment 2A: Travels through 1,701 feet of mapped wetland; one mapped creek crossing.
- Alignment 2B: No impacts to mapped wetlands are anticipated; one mapped creek crossing.

Wildlife and Significant Habitat

- Alignment 2A: Travels through 2,476 feet of significant habitat.
- Alignment 2B: Travels through 547 feet of significant habitat.

Analysis

Alignment 2B is the environmentally-preferred trail alignment because it is not anticipated to have any impacts to mapped wetlands and travels through fewer feet of significant habitat than Alignment 2A.

Name of Trail: Washington Square Loop Trail
Name of Segment: Segment 3 (Hall Boulevard to 61st Avenue)

Summary

Two proposed alignments of Segment 3 would either follow Fanno Creek to the eastern Tigard city boundary (Alignment 3A) or to provide an on-street connection to Metzger Park (Alignment 3B). All of Alignment 3A is in a floodplain and a mapped wetland. The on-street Alignment 3B would make use of existing completed sidewalks and a bike lane on SW 135th Avenue.

Wetlands

- Alignment 3A: Travels through 1,559 feet of mapped wetland; two mapped creek crossings.
- Alignment 3B: No impacts to mapped wetlands or mapped creek crossings are anticipated.

Wildlife and Significant Habitat

- Alignment 3A: Travels through 8,280 feet of significant habitat.
- Alignment 3B: Travels through 1,062 feet of significant habitat.

Analysis

Alignment 3B is the environmentally-preferred trail alignment because no impacts to mapped wetlands are anticipated and it travels through fewer feet of significant habitat than Alignment 3A.

Name of Trail: Summer Creek Trail
Name of Segment: Segment 1 (135th Ave to Summerlake Park)

Summary

The two proposed alignments of Segment 1 would create a new trail that would link 135th Avenue to Summerlake Park. Alignment 1A would provide a new trail within the floodplain along Summer Creek. Alignment 1B would provide an on-street connection using existing completed sidewalks and a bicycle lane.

Wetlands

- Alignment 1A: Travels through 1,322 feet of mapped wetland; no mapped creek crossings are anticipated.
- Alignment 1B: No impacts to mapped wetlands or mapped creeks are anticipated.

Wildlife and Significant Habitat

- Alignment 1A: Travels through 1,344 feet of significant habitat.
- Alignment 1B: Travels through 117 feet of significant habitat.

Analysis

Alignment 1B is the environmentally-preferred trail alignment because no impacts to mapped wetlands are anticipated and it travels through fewer feet of significant habitat than Alignment 1A. Although Alignment 1B travels through mapped significant habitat, it is not anticipated to impact this habitat because it will be an on-street connection.

Name of Trail: Summer Creek Trail
Name of Segment: Segment 2 (Summerlake Park to 121st Avenue)

Summary

Three proposed alignments for Segment 2 would connect Summerlake Park to 121st Avenue and one proposed alignment would provide an on-street connection on North Dakota Street. Alignment 2A would create a new trail along the south side of Summer Creek within a forested upland area and a current restoration area. Alignment 2B would utilize an existing maintenance road and connect with Alignment 2A along the shore of Summer Lake. Alignment 2C would create a new trail that would connect to Winter Lake Drive via an easement from Mary Woodward Elementary School. Alignment 2D would be an on-street alignment, with improvements being made along North Dakota Street.

Wetlands

- Alignment 2A: Travels through 815 feet of mapped wetlands; one mapped creek crossing.
- Alignment 2B: No impacts to mapped wetlands or creeks are anticipated.
- Alignment 2C: Travels through 776 of mapped wetland; one mapped creek crossing.
- Alignment 2D: No new impacts to mapped wetlands or creeks are anticipated.

Wildlife and Significant Habitat

- Alignment 2A: Travels through 1,487 feet of significant habitat.
- Alignment 2B: Travels through 247 feet of significant habitat.
- Alignment 2C: Travels through 1,106 feet of significant habitat.
- Alignment 2D: No impacts to significant habitat are anticipated.

Analysis

Alignment 2D is the environmentally-preferred trail alignment because it utilizes an on-street connection. Alignment 2D is not anticipated to impact any mapped wetlands or significant habitat. If Alignment 2D becomes unfeasible, Alignment 2B is the second most preferred alignment. Alignment 2B is not anticipated to impact any mapped wetlands and travels through the fewest feet of significant habitat.

Portions of Alignments 2A, 2B, and 2C were visited by MB&G Biologists during the field visit.

Photo: Alignment 2A along the south side of Summer Creek

Name of Trail: Summer Creek Trail
Name of Segment: Segment 3 (121st Avenue to 114th & Gallo Neighborhood Trail)

Summary

Segment 3 has two proposed alignments: Alignment 3A would be a new off-street trail that would connect to the existing Gallo Trail, crossing a mapped creek and traveling through a mapped wetland. Alignment 3B would be an on-street connection continuing Alignment 2D along North Dakota Street.

Wetlands

- Alignment 3A: Travels through 1,507 feet of mapped wetland; one mapped creek crossing.
- Alignment 3B: No impacts to mapped wetlands or creeks are anticipated.

Wildlife and Significant Habitat

- Alignment 3A: Travels through 1,915 feet of significant habitat.
- Alignment 3B: No impacts to significant habitat are anticipated.

Analysis

Alignment 3B is the environmentally-preferred trail alignment because it utilizes an existing roadway and is not anticipated to impact any mapped wetlands or significant habitat.

Name of Trail: Summer Creek Trail
Name of Segment: Segment 4 (Gallo Avenue Trail to Fanno Creek Trail)

Summary

The four proposed alignments of Segment 4 would connect Summer Creek Trail to other greenway trails. Alignment 4A would utilize an existing soft surface nature trail. Alignment 4B would be a new trail through Fowler Middle School property north of the sports field. Alignment 4C would provide a new side path along Tigard Street. Alignment 4D would be a continuation of Alignment 3B along North Dakota Street.

Wetlands

- Alignment 4A: No impacts to mapped wetlands or creeks are anticipated.
- Alignment 4B: Travels through 149 feet of mapped wetland; no creek crossings are anticipated.
- Alignment 4C: Travels through 1,294 feet of mapped wetland; no creek crossings are anticipated.
- Alignment 4D: No impacts to mapped wetlands or creeks are anticipated.

Wildlife and Significant Habitat

- Alignment 4A: Travels through 997 feet of significant habitat.
- Alignment 4B: Travels through 254 feet of significant habitat.
- Alignment 4C: Travels through 1,597 feet of significant habitat.
- Alignment 4D: No impacts to significant habitat are anticipated.

Analysis

Alignment 4D is the most environmentally-preferred trail alignment because no impacts to mapped wetlands or significant habitat are anticipated. If Alignment 4D becomes unfeasible, Alignment 4A is the second most-preferred alignment because it is not anticipated to impact any mapped wetlands.

Name of Trail: Krueger Creek Trail
Name of Segment: Segment 1 (Summer Creek to Walnut Street)

Summary

Segment 1 would connect to existing trails in Jack Park or provide an on-street connection along SW 125th Avenue. Segment 1 travels through a mapped wetland before diverging into two alignments. Alignment1A would create a new trail adjacent to a mapped creek corridor, connecting to existing trails in Jack Park. Alignment 1B would provide an on-street connection, improving existing roadways to accommodate pedestrians and bicyclists.

Wetlands

- Segment 1: Travels through 495 feet of mapped wetlands; one mapped creek crossing.
- Alignment 1A: Travels through 1,252 feet of mapped wetlands; one mapped creek crossing.
- Alignment 1B: No impacts to mapped wetlands or creeks are anticipated.

Wildlife and Significant Habitat

- Segment 1: Travels through 502 feet of significant habitat.
- Alignment 1A: Travels through 1,402 feet of significant habitat.
- Alignment 1B: Travels through 93 feet of significant habitat.

Analysis

Alignment 1B is the environmentally-preferred trail alignment because it is not anticipated to impact any mapped wetlands and travels through fewer feet of significant habitat. Mitigation may be required for Segment 1 before the two alignments diverge because it travels through both mapped wetland and significant habitat.

Name of Trail: Krueger Creek Trail
Name of Segment: Segment 2 (Walnut Street to Broadmoor Place)

Summary

The two alignments of Segment 2 would create a steep route up Bull Mountain. Alignment 2A would create a new trail that passes between private property and crosses a mapped creek. This new trail would then cross SW Gaarde Street and SW 132nd Terrace before connecting to existing stairs and a concrete trail that connects to Broadmoor Place. Alignment 2B would use existing bicycle lanes on SW Walnut Street and SW 135th Avenue.

Wetlands

- Alignment 2A: Travels through 80 feet of mapped wetlands; two mapped creek crossings.
- Alignment 2B: No mapped wetland impacts are anticipated; one mapped creek crossing.

Wildlife and Significant Habitat

- Alignment 2A: Travels through 1,713 feet of significant habitat.
- Alignment 2B: Travels through 86 feet of significant habitat.

Analysis

Alignment 2B is the environmentally-preferred trail alignment because it is not anticipated to impact any mapped wetland areas and travels through fewer feet of significant habitat than Alignment 2A.

Name of Trail: Krueger Creek Trail
Name of Segment: Segment 3 (Broadmoor Place to Ascension Trail)

Summary

The two alignments of Segment 3 would provide a connection to the existing Ascension Trail. Alignment 3A is an off-road, new connection trail through Tigard Water District property. Alignment 3B is an on-street connection that would travel along Broadmoor Place to Whitehall Lane, crossing 135th Avenue to Lauren Lane. Both alignments would then converge and descend via existing switchbacks to the existing Ascension Trail.

Wetlands

- Segment 3: No impacts to mapped wetlands are anticipated; one mapped creek crossing.
- Alignment 3A: No impacts to mapped wetlands or creeks are anticipated.
- Alignment 3B: No impacts to mapped wetlands or creeks are anticipated.

Wildlife and Significant Habitat

- Segment 3: Travels through 711 feet of significant habitat.
- Alignment 3A: Travels through 12 feet of significant habitat.
- Alignment 3B: Travels through 9 feet of significant habitat.

Analysis

Alignment 3B is the environmentally-preferred trail alignment due to the slightly lower significant habitat impacts that would be required. Both alignments 3A and 3B are not anticipated to impact any mapped wetland areas and only impact a small amount of significant habitat. Segment 3, after the two alignments diverge, may require mitigation due to impacts to significant habitat and a creek crossing.

Name of Trail: Krueger Creek Trail
Name of Segment: Segment 4 (Ascension Trail)

Summary

Segment 4 is an existing trail that is in need of maintenance and upgrades. No new alignments are proposed.

Wetlands

- No new impacts to mapped wetlands are anticipated; one mapped creek crossing with an existing bridge.

Wildlife and Significant Habitat

- Travels through 3,081 feet of significant habitat.

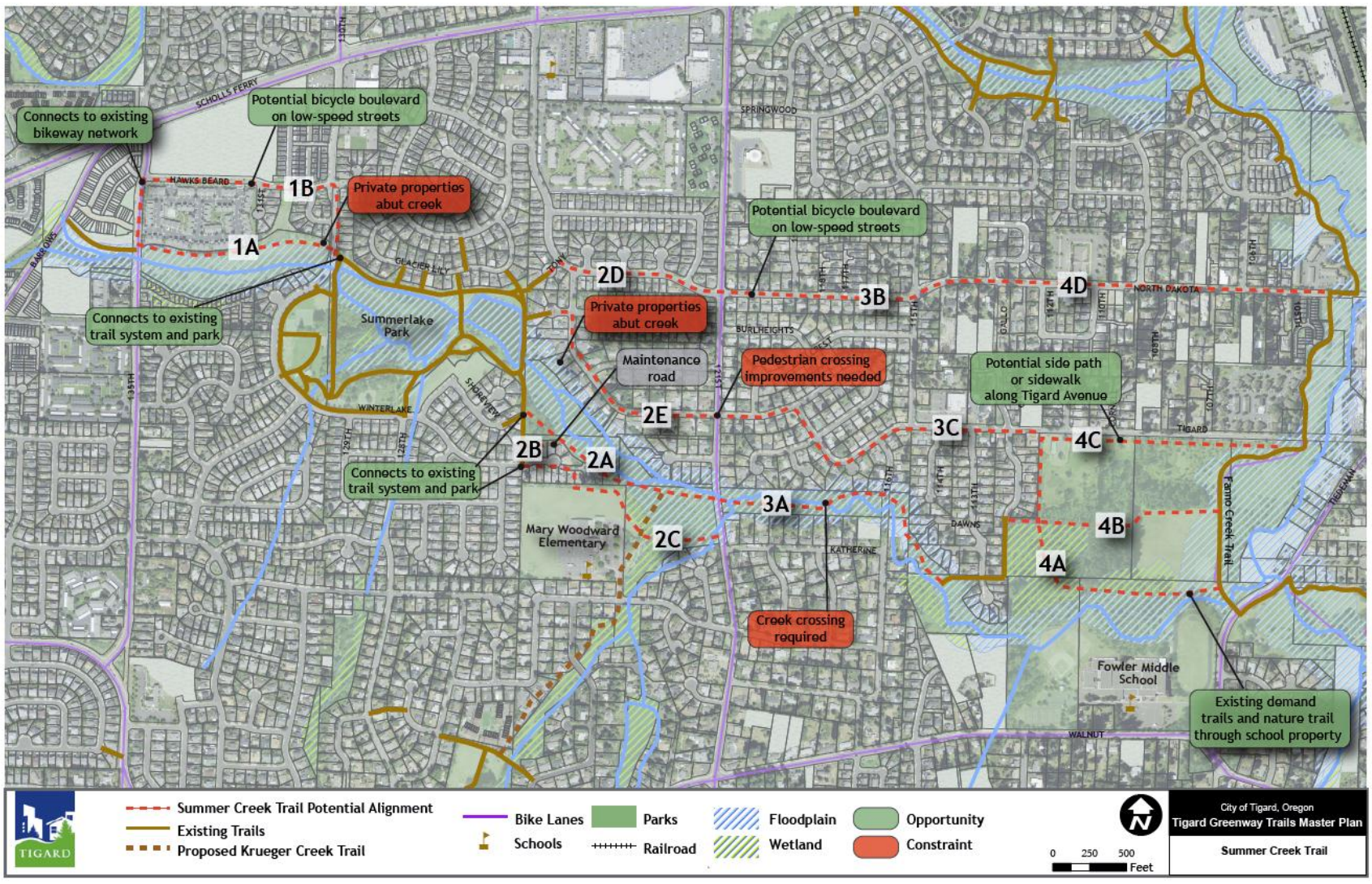
Analysis

Improvements made to Segment 4 could impact the surrounding significant habitat. Upgrades to the mapped creek crossing may require mitigation.

APPENDIX D. EVALUATION MATRIX

PLEASE NOTE: The documents contained in this appendix reflect the initial trail alignment options and evaluations conducted during development of the Tigard Greenway Trails System Master Plan. **These documents do not reflect the final alignments, analysis, recommendations, or cost estimates for greenway trail projects included in the final Tigard Greenway Trails System Master Plan**. They are provided only as background documentation to illustrate the breadth of alignments evaluated and the evaluation process used to develop the Plan.

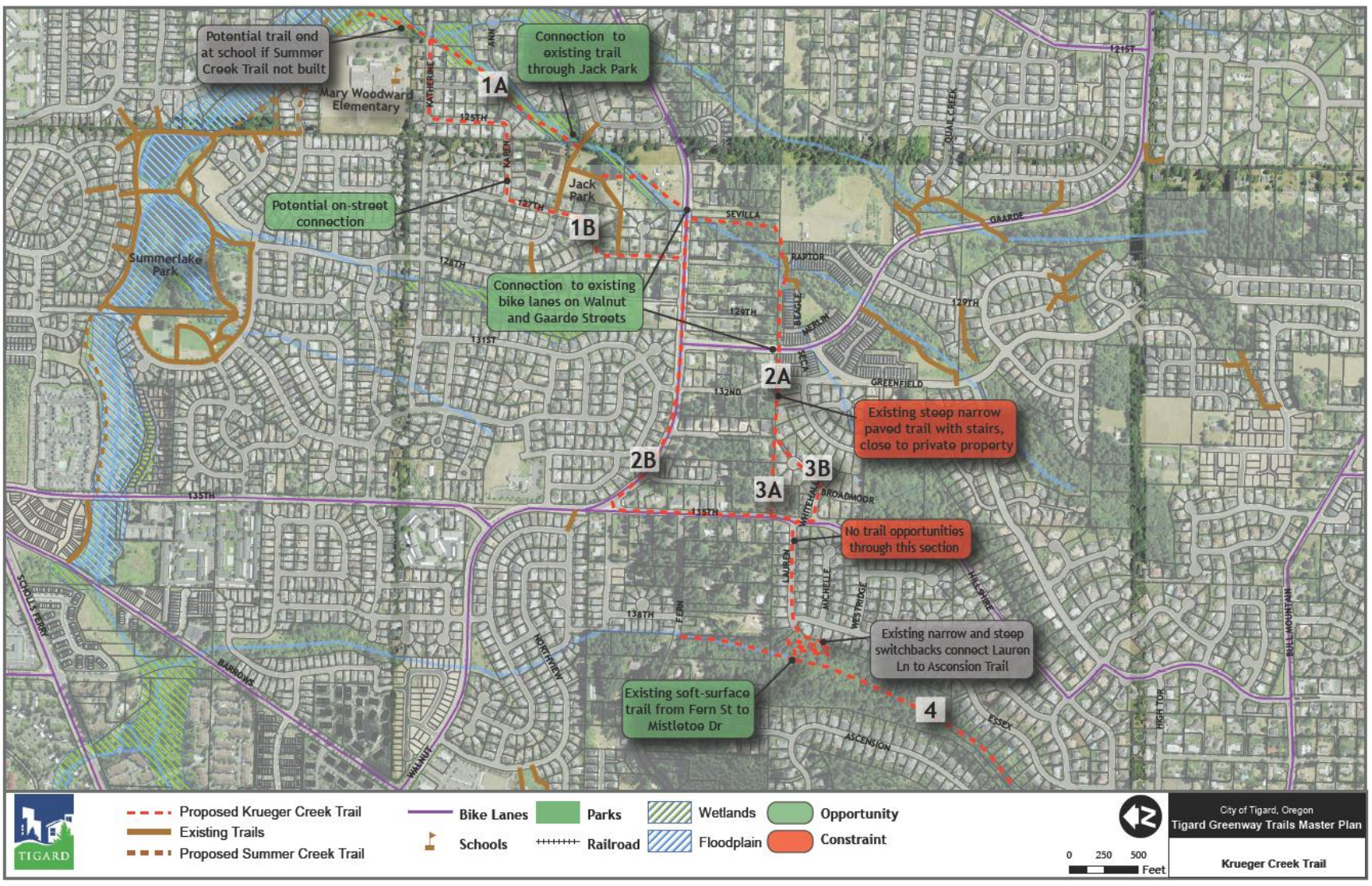
Summer Creek Trail



The above map shows the potential trail alignments evaluated. In the table below, a "●" indicates that the alignment fully satisfies the criteria, a "◑" means that the alignment somewhat satisfies the criteria, while a "○" indicates that the alignment does not satisfy the criteria. (See Table 1 for a detailed description of each criterion.) An asterisk (*) in the Environmental column indicates that the alignment was identified as the "environmentally preferred" option in the Tigard Greenway Trail System Master Plan Environmental Report.

	Evaluation Criteria								Prioritization			
	Connectivity	Safety & Security	User Experience	Topographical Constraints	Environmental Impacts	Cost	Right-of-Way	Public Input	Tier 1 (High)	Tier 2 (Medium)	Tier 3 (Low)	Not Recommended
135th Ave to Summerlake Park												
Alignment 1A	●	●	●	●	○	○	◑	○				X
Alignment 1B	◑	◑	◑	●	●*	●	●	●		X		
Summerlake Park to 121st Avenue												
Alignment 2A	◑	◑	●	●	○	○	◑	○				X
Alignment 2B	◑	◑	●	●	○	○	◑	○				X
Alignment 2C	●	◑	◑	●	○	◑	◑	○				X
Alignment 2D	◑	◑	◑	●	●*	●	●	●		X		
Alignment 2E	◑	◑	◑	●	●*	●	●	●	X			
121st Avenue to 114th & Gallo Neighborhood Trail												
Alignment 3A	◑	◑	●	●	○	○	○	○				X
Alignment 3B	◑	◑	◑	●	●*	●	●	●		X		
Alignment 3C	◑	◑	◑	●	●*	●	●	●	X			
Gallo Avenue Trail to Fanno Creek Trail												
Alignment 4A	●	◑	◑	●	○	◑	◑	○				X
Alignment 4B	●	◑	●	●	◑	◑	◑	○				X
Alignment 4C	●	○	◑	●	●	●	◑	◑	X			
Alignment 4D	◑	◑	◑	●	●*	●	●	●		X		

Krueger Creek Trail



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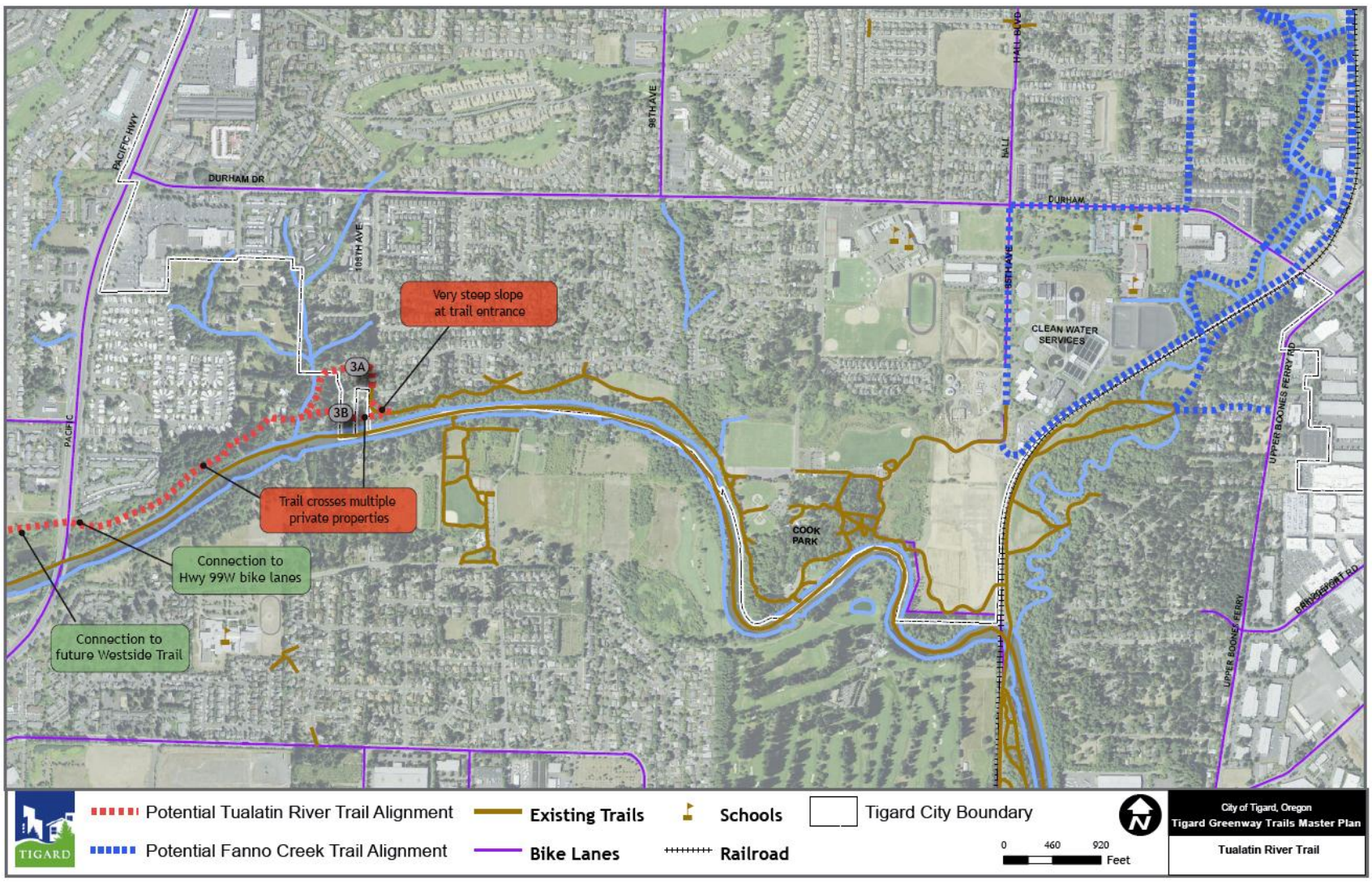
	Evaluation Criteria								Prioritization			
	Connectivity	Safety & Security	User Experience	Topographical Constraints	Environmental Impacts	Cost	Right-of-Way	Public Input	Tier 1 (High)	Tier 2 (Medium)	Tier 3 (Low)	Not Recommended
Summer Creek to Walnut Street												
Alignment 1A	●	●	◑	●	○	○	○	◑				X
Alignment 1B	●	◑	◑	●	●*	●	●	●	X			
Walnut Street to Broadmoor Place												
Alignment 1A	●	●	◑	◑	○	○	○	◑				X
Alignment 1B	◑	◑	◑	●	●*	●	●	●			X	
Broadmoor Place to Ascension Trail												
Alignment 3A	◑	◑	◑	○	◑	◑	◑	◑				X
Alignment 3B	◑	◑	◑	○	◑*	◑	◑	●			X	
Ascension Trail												
Alignment 4	●	●	●	◑	◑*	◑	●	◑			X	

Tualatin River Trail



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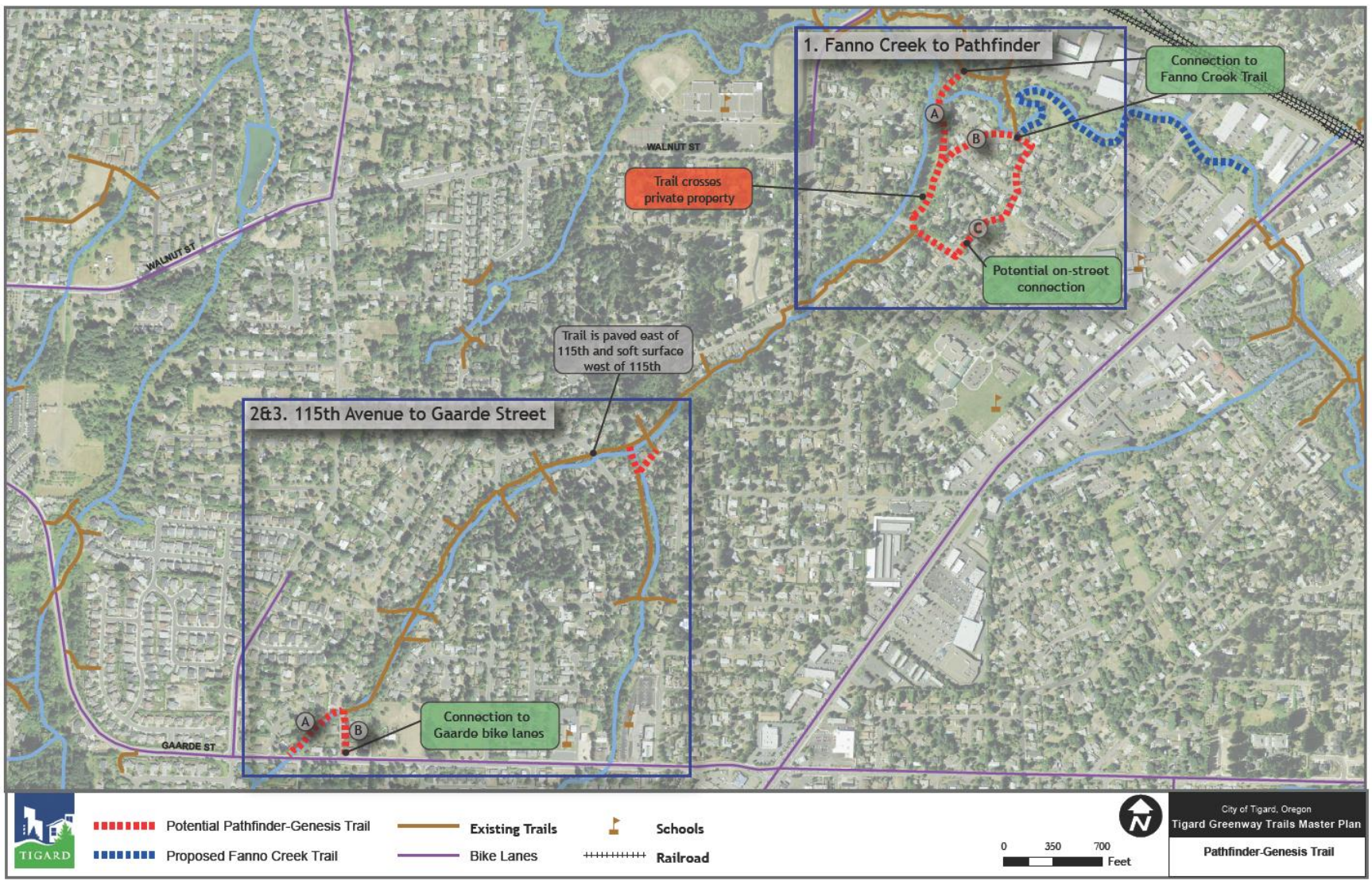
	Evaluation Criteria								Prioritization			
	Connectivity	Safety & Security	User Experience	Topographical Constraints	Environmental Impacts	Cost	Right-of-Way	Public Input	Tier 1 (High)	Tier 2 (Medium)	Tier 3 (Low)	Not Recommended
SW 85th Ave to SW 108th Ave												
108th Entrance & Existing Trail Improvements	●	◑	●	◑	◑*	◑	●	●		X		
SW 108th Ave to Pacific Highway												
Alignment 3A	◑	◑	◑	○	◑*	○	○	◑		X		
Alignment 3B	●	◑	●	◑	◑	○	○	◑				X

Pathfinder-Genesis Trail



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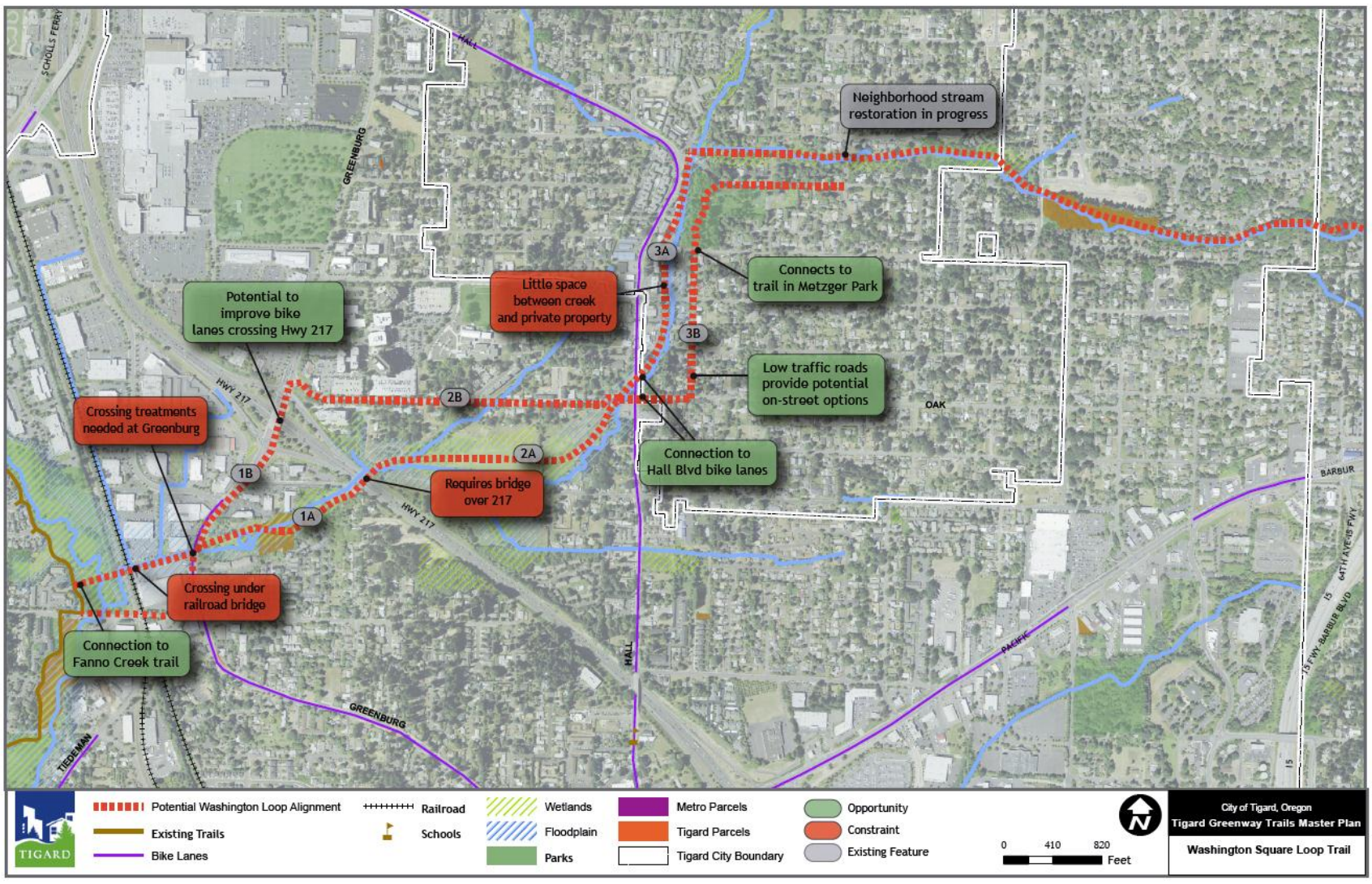
		Evaluation Criteria								Prioritization			
		Connectivity	Safety & Security	User Experience	Topographical Constraints	Environmental Impacts	Cost	Right-of-Way	Public Input	Tier 1 (High)	Tier 2 (Medium)	Tier 3 (Low)	Not Recommended
Segment 1 (Fanno Creek to Pathfinder Way)													
	Alignment 1A	●	●	●	◑	○	○	○	◑				X
	Alignment 1B	◑	◑	◑	◑	○	◑	○	◑			X	
	Alignment 1C	◑	○	○	●	●*	●	●	◑	X			
Segment 2 (107th Court to 115th Avenue)													
	Alignment 2A	●	◑	●	◑	◑	●	●	○				X
	Alignment 2B	◑	◑	◑	◑	●*	●	●	○				X
Segment 3 (115th Avenue to Gaarde Street)													
	Alignment 3A	●	◑	●	○	○	●	○	○				X
	Alignment 3B	◑	◑	◑	◑	●*	●	●	◑				X

Washington Square Loop Trail



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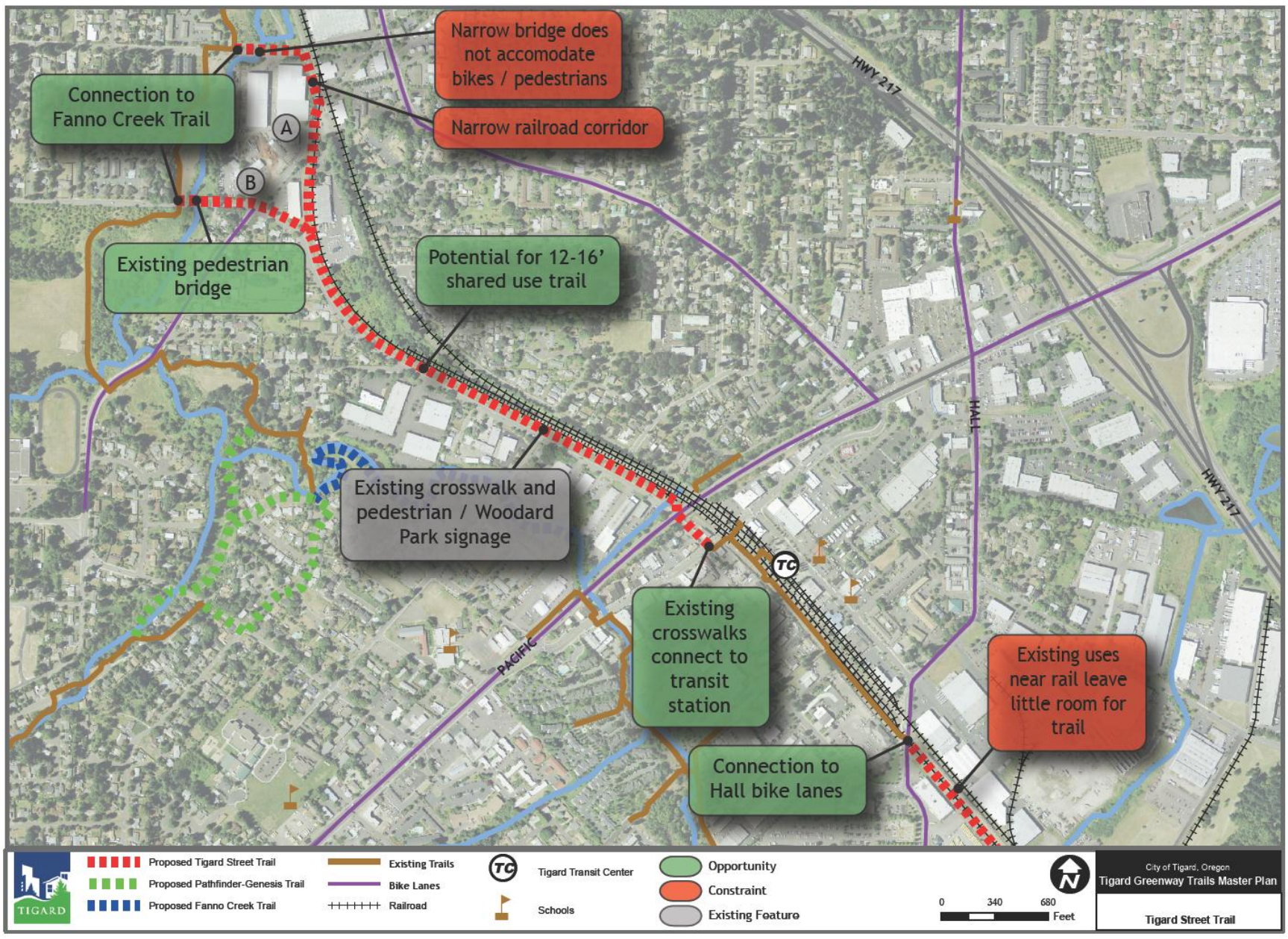
	Evaluation Criteria								Prioritization			
	Connectivity	Safety & Security	User Experience	Topographical Constraints	Environmental Impacts	Cost	Right-of-Way	Public Input	Tier 1 (High)	Tier 2 (Medium)	Tier 3 (Low)	Not Recommended
Segment 1 (Fanno Creek to Highway 217)												
Alignment 1A	◑	●	●	●	○	○	○					X
Alignment 1B	◑	○	◑	●	◑*	◑	◑			X		
Segment 2 (Highway 217 to Hall Boulevard)												
Alignment 2A	◑	●	●	●	○	○	◑					X
Alignment 2B	●	◑	○	◑	●*	◑	●				X	
Segment 3 (Hall Boulevard to 61st Avenue)												
Alignment 3A	◑	●	●	●	○	○	○					X
Alignment 3B	◑	◑	○	●	●*	◑	●					X

Tigard Street Trail



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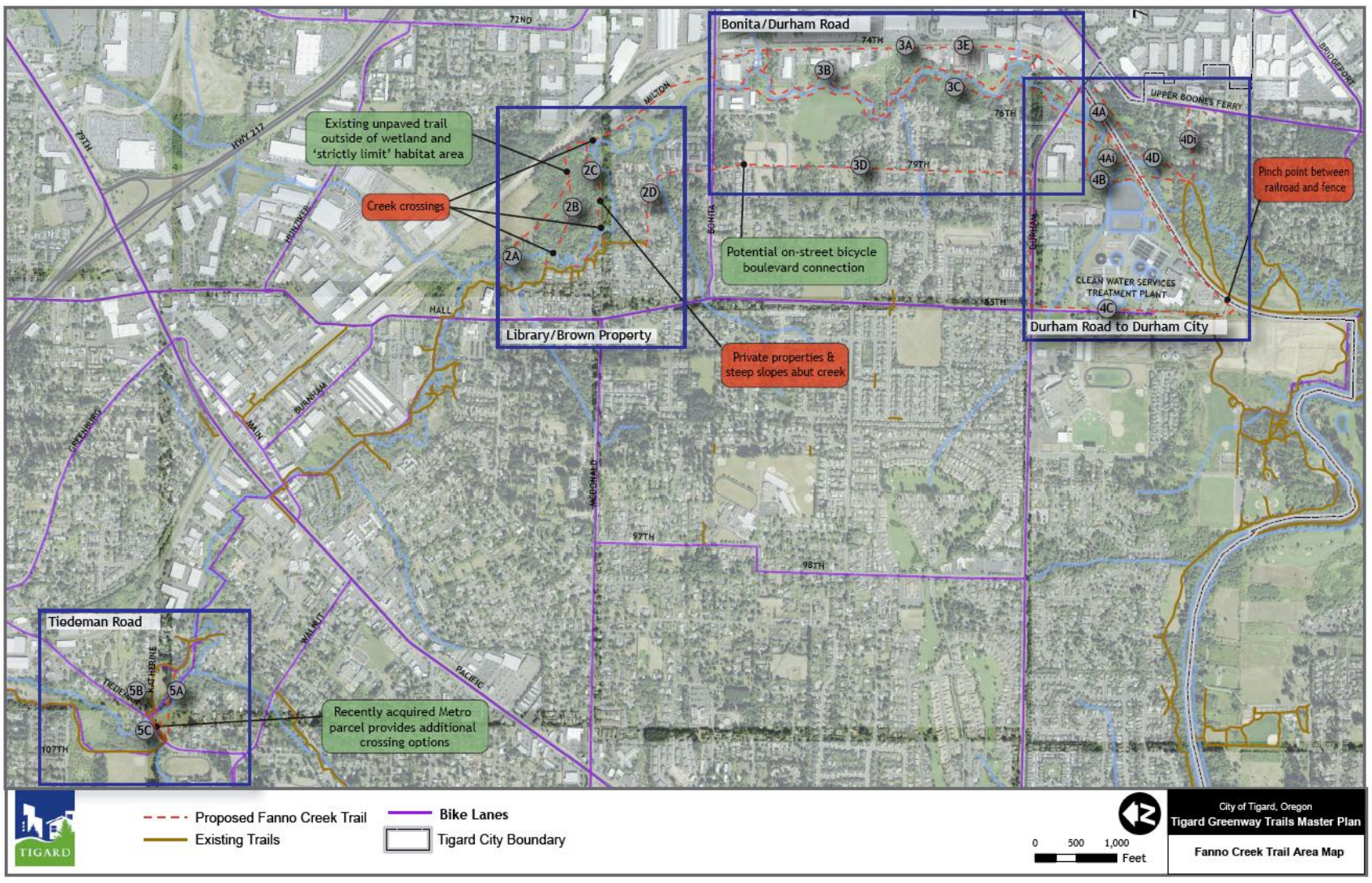
		Evaluation Criteria								Prioritization			
		Connectivity	Safety & Security	User Experience	Topographical Constraints	Environmental Impacts	Cost	Right-of-Way	Public Input	Tier 1 (High)	Tier 2 (Medium)	Tier 3 (Low)	Not Recommended
Segment 1 (Fanno Creek Trail to Tiedeman Street)													
	Alignment 1A	◑	◑	○	●	◑	◑	○			X		
	Alignment 1B	◑	◑	◑	●	◑*	◑	◑		X			
Segment 2 (Tiedeman Avenue to Tigard Transit Center)													
		●	●	◑	●	●*	◑	◑		X			

Fanno Creek Trail



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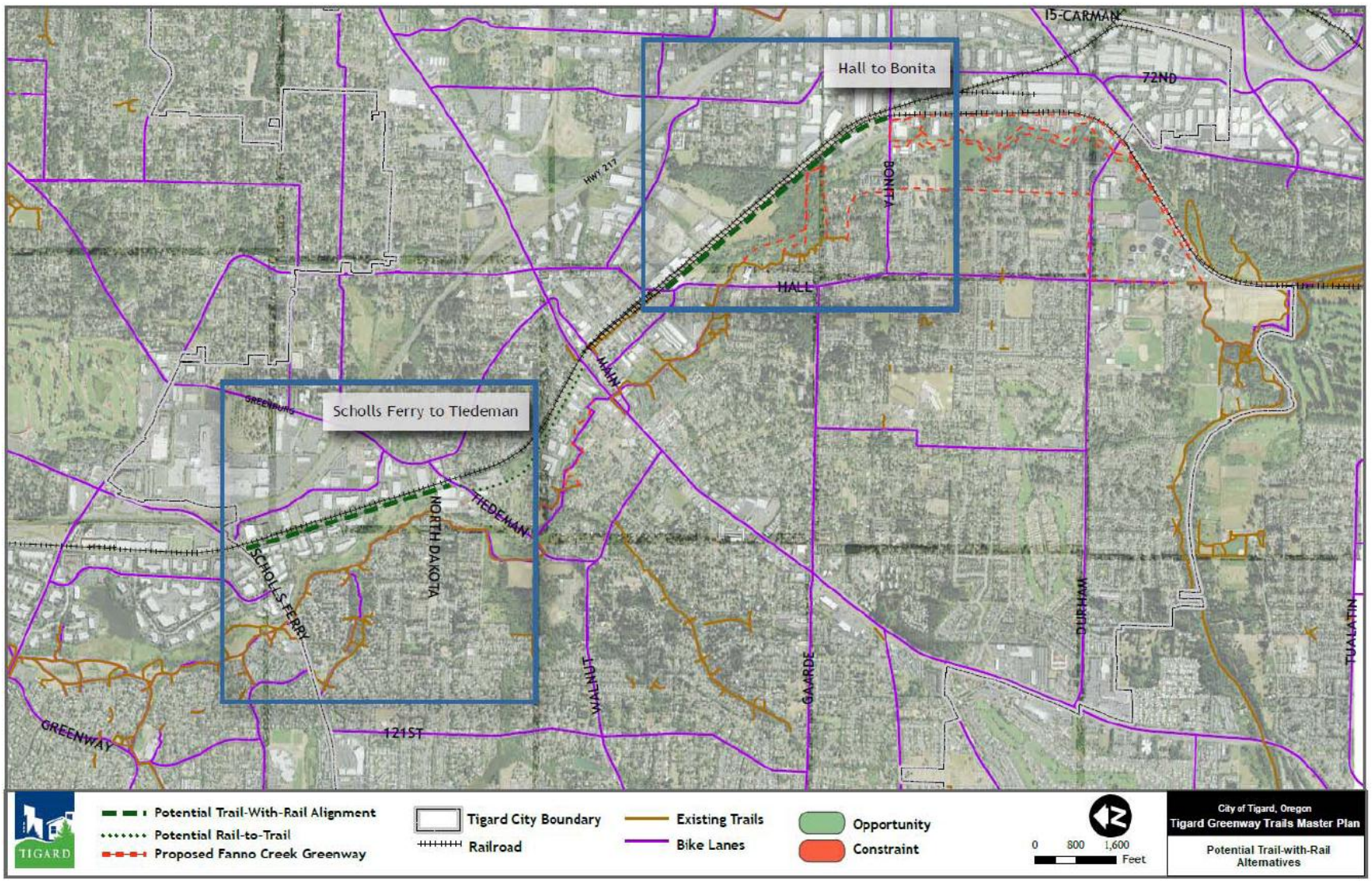
		Evaluation Criteria								Prioritization			
		Connectivity	Safety & Security	User Experience	Topographical Constraints	Environmental Impacts	Cost	Right-of-Way	Public Input	Tier 1 (High)	Tier 2 (Medium)	Tier 3 (Low)	Not Recommended
Segment 1 (Library/Fanno Creek Drive)													
	Alignment 1A	◑	◑	●	●	◑*	●	●	◑				X
	Alignment 1B	◑	●	●	●	○	○	◑	○				X
Segment 2 (Brown Property)													
	Alignment 2A	●	◑	●	○	○	○	○	○				X
	Alignment 2B	●	◑	●	◑	◑	◑	◑	◑	X			
	Alignment 2C	◑	◑	◑	○	○	○	○	◑				X
	Alignment 2D	◑	◑	○	●	●*	●	●	◑		X		
Segment 3 (Bonita Road to Durham Road)													
	Alignment 3A	●	◑	○	●	●	●	●	◑				X
	Alignment 3Ai	●	◑	◑	●	◑	◑	◑	●				X
	Alignment 3Aii	●	◑	◑	◑	◑	◑	◑	◑				X
	Alignment 3B	●	●	●	◑	○	○	○	◑				X
	Alignment 3Bi	●	●	●	◑	○	○	○	◑				X
	Alignment 3C	●	●	●	◑	○	○	○	○				X

Fanno Creek Trail (continued)

		Evaluation Criteria								Prioritization			
		Connectivity	Safety & Security	User Experience	Topographical Constraints	Environmental Impacts	Cost	Right-of-Way	Public Input	Tier 1 (High)	Tier 2 (Medium)	Tier 3 (Low)	Not Recommended
	Alignment 3D	○	◑	◑	●	●	●	●	◑		X		
	Alignment 3E	●	●	◑	●	●*	◑	◑	●	X			
Segment 4 (Durham Road to Durham City)													
	Alignment 4A	●	◑	◑	◑	●	◑	○	◑				X
	Alignment 4Ai	●	◑	●	◑	◑	◑	○	○				X
	Alignment 4B	●	◑	●	◑	◑	◑	○	◑				X
	Alignment 4C	●	◑	○	●	●*	●	●	◑		X		
	Alignment 4D	◑	◑	◑	●	◑	○	◑	◑			X	
	Alignment 4Di	○	◑	○	●	●	○	○	◑				X
Segment 5 (Tiedeman Road Crossing)													
	Alignment 5A	●	◑	●	●	◑	◑	◑	◑				X
	Alignment 5B	●	●	◑	●	◑	◑	◑	◑		X		
	Alignment 5C	●	●	◑	●	●*	●	●	●	X			
	Alignment 5Ci	●	●	●	●	●	◑	●	●				X

Trail-with-Rail Opportunities



The above map shows the potential trail alignments evaluated. In the table below, a "●" indicates that the alignment fully satisfies the criteria, a "◑" means that the alignment somewhat satisfies the criteria, while a "○" indicates that the alignment does not satisfy the criteria. (See Table 1 for a detailed description of each criterion.) An asterisk (*) in the Environmental column indicates that the alignment was identified as the "environmentally preferred" option in the Tigard Greenway Trail System Master Plan Environmental Report.

	Evaluation Criteria								Prioritization			
	Connectivity	Safety & Security	User Experience	Topographical Constraints	Environmental Impacts	Cost	Right-of-Way	Public Input	Tier 1 (High)	Tier 2 (Medium)	Tier 3 (Low)	Not Recommended
Segment 1 (SW Scholls Ferry Road to SW Tiedeman Road)												
Alignment 1	◑	◑	◑	◑	◑	○	○	◑				X
Segment 2 (SW Hall Boulevard to SW Bonita Road)												
Alignment 2	◑	◑	◑	◑	◑	○	○	◑				X