

Green Trails

Guidelines for
environmentally
friendly trails



METRO

PEOPLE PLACES
OPEN SPACES

Acknowledgements

The efforts of numerous people during a span of many years inspired this project and brought it to the trailhead, so to speak. These people, from all walks of life and work, have supported the development of a regional trail network. They are community and business leaders, funding strategists, policy advisors, municipal staff to parks, members of Metro advisory committees, natural resource managers and technical specialists, municipal employees, teachers and citizens. They share a vision of a network of trails that winds like green ribbons through our communities and natural areas – trails that provide routes to a livable future for residents of the Portland metropolitan region.

Metro greenspaces trails advisory committee working group

Jennifer Budhabhatti, Ph.D., senior environmental planner; project manager

Don Baack, Southwest Trails Group, SW Neighborhoods Coalition, Portland, Ore.

Gregg Everhart, senior planner, Portland Parks and Recreation

Lisa Hamerlynck, natural resource coordinator, city of Lake Oswego

Mel Huie, senior planner, Metro Parks and Greenspaces Department

Sean Loughran, state trails planner, Oregon State Parks

Julie Reilly, natural resource specialist, Tualatin Hills Park and Recreation District

Jennifer Thompson, fish and wildlife biologist, U.S. Fish and Wildlife Service

Consultant

Marty Mitchell, CPESC, ClearWater West, Inc.

Publication team

Cathy Thomas, senior public affairs specialist, Metro

Teri S. Matias, associate graphic design specialist, Metro

Laura Pritchard, Laura Pritchard Graphic Design

Carey Cramer and Barbara Macomber, nature illustrations

Photos

Jennifer Budhabhatti, Ethan Cassidy, C. Bruce Forster, Mel Huie, Ron

Klein, Marty Mitchell and Lia Waiwaiole

Green Trails: An Overview

What is the Purpose of the Green Trails Handbook?

Many of this region's most important fish and wildlife areas are in our publicly owned natural areas. As the region grows and the desire for trails increases, there is a need to develop guidelines to plan, design, construct and maintain trails so that impacts on natural resources are kept to a minimum. In some parts of the region, existing trails need rehabilitation and maintenance because of poor drainage capability. In other areas, trails near seasonal wetlands, streams and other sensitive habitat could be moved or improved to better protect aquatic and wildlife resources.

This publication is intended to provide guidelines for environmentally friendly (or green) trails that support the goals of Metro's Greenspaces Master Plan. Those goals seek to promote an interconnected system of parks, natural areas, trails and greenways for fish, wildlife and people throughout the Portland metropolitan region while maintaining biodiversity and protecting water quality. These guidelines are not standards; they are recommendations to complement existing standards and guidelines adopted by local cities, counties, park providers and watershed groups in the region.

There is no single source of information that comprehensively addresses planning, construction and maintenance of environmentally friendly or "green trails" – trails that avoid or minimize impacts to water resources and fish and wildlife habitat. This guidebook fills that gap. It is a resource for citizens, trail



planners, designers, builders and maintenance staff. It focuses on trails in environmentally sensitive areas and recommends strategies for avoiding or limiting the impacts on wildlife, water quality and water quantity. It also provides an extensive bibliography of other sources that provide more specific guidelines for trail planning, design, construction and maintenance in a range of other settings. Readers of this book are encouraged to seek professional help in designing and implementing trail plans.

Table of Contents

Introduction

Chapter 1 Introduction

1.1	Trails and the quality of life	3
1.2	Where will the trails go?	3
1.3	Partnerships for regional trails and greenways	4
1.4	Planning trails with natural resource protection in mind	4

Planning

Chapter 2 Setting the stage for trail planning

We have an idea for a trail. What do we do first?

2.1	Introduction	9
2.2	Why have trails here?	10
2.3	What is the purpose of the trail?	10
2.4	Assess zoning and the review process	11
2.5	Plan a process to involve the interested and affected public	11
	• Identify stakeholders	11
	• Involve community stakeholders	11
	• Involve users of the trail	11
	• Distribute newsletters and surveys	11
	• Develop a plan	12
	• Integrate committees	12
2.6	Identify appropriate uses and intensity of use	12
2.7	Establish an interdisciplinary technical team	13
2.8	Identify natural resource opportunities and challenges	14
2.9	Identify access needs and constraints	14
2.10	Identify broad, tentative route possibilities	15
2.11	Identify the costs of building and maintaining trails	15
2.12	Long-term management	15

Chapter 3 Assessing natural resource conditions in urban and natural areas

What should we consider when planning the trail?

3.1	Site assessment in urban and natural areas	19
3.2	Site analysis	20
	• Existing site uses	20
	• Natural area management plans	20
	• Regional and municipal trail maps	21
	• Municipal zoning and comprehensive plans	21
	• Vegetation and wildlife habitats	22
	• Fish habitat	23
	• Water resources and hydrology	23
	• Soils and geology	24
	• Topography	26
3.3	Natural resource restoration	26
3.4	Cultural resources	27
3.5	Viewpoints and interpretive opportunities	27

Chapter 4 General principles for planning trails

How can the trail preserve sensitive natural resources?

4.1	Avoiding natural resource impacts	31
4.2	Vegetation and wildlife habitat	31
	• Keep trails to a minimum	31
	• Use existing disturbance corridors	31
	• Locate trails at habitat edges	32
	• Keep trails out of core habitat areas	32
	• Maintain habitat connectivity	32
	• Avoid small patches of high-quality connector habitat	33
	• Avoid habitat for threatened, endangered and sensitive species	33
4.3	Fish habitat	33
4.4	Water resources	33
	• Avoid crossing streams, wetlands and floodplains	33
4.5	Runoff and erosion	34
	• Avoid steep trail pitches	34
	• Encourage infiltration	34

- Don't let watercourses run down the trail 34
- Avoid long sustained grades 34
- Avoid flat ground and steep cross-slopes 34
- Avoid discharging trail runoff onto fill slopes and unprotected soils 34
- Avoid discharging trail runoff into streams and wetlands..... 34
- Avoid removing trees and shrubs at stream crossings 35
- Avoid stacking switchbacks and climbing turns .. 35

Chapter 5 Guidelines for minimizing the impact of trails on natural resources

What are some practices for minimizing the natural resource impacts of trails?

- 5.1 Minimizing natural resource impacts39
- 5.2 Protecting vegetation (wildlife habitat).....39
 - Techniques for limited access areas39
 - Vegetative screening39
 - Setbacks for threatened, endangered and sensitive species40
 - Trail closure40
- 5.3 Minimizing impacts to fish habitat.....40
 - Use appropriate setbacks for trails near fish bearing habitat40
 - Trail closure40
 - Work windows for threatened, endangered and sensitive species40
 - Stream crossings.....41
- 5.4 Protecting water resources (streams, wetlands, floodplains and riparian corridors).....42
 - Minimize stream corridor crossings.....42
 - Fords, bog bridges, causeways and boardwalks....43
- 5.5 Preventing erosion.....46
 - Techniques for the planning process.....46
 - Strategies for drainage design.....47
 - A note about drainage features and bicyclists.....51

- 5.6 Working with steep slopes.....52
 - Climbing turns52
 - Switchbacks53
 - Stairs.....54
 - A word about groundwater.....56

Implementation

Chapter 6 Environmental regulations and permits

What environmental permits will we need?

- 6.1 Introduction.....59
- 6.2 Municipal natural resource codes and standards.....59
 - Alternatives analysis.....59
- 6.3 State and federal environmental permitting.....59
 - Federal agencies and acts60
 - State agencies61
- 6.4 Application fees and turnaround times.....62
- 6.5 Useful contacts.....62

Chapter 7 Plotting trail routes at the site scale

How do you site a potential trail route?

- 7.1 Evaluate trail routes in natural areas and restricted urban corridors67
- 7.2 Set control points and plot test alignments.....67
 - Plot test grades for potential routes.....67
- 7.3 Identify existing and planned infrastructure68
- 7.4 Field-locate alternative alignments68
- 7.5 Identify areas where there are no alternatives.....69
- 7.6 Identify areas where users want to go70
- 7.7 Identify current and future public uses at the site70
- 7.8 Refine each test alignment.....71
- 7.9 Select the best route that avoids or minimizes impacts71
- 7.10 Re-evaluate goals for the trail use, scale, materials, connections or location71
- 7.11 Identify potential stewardship and maintenance partners for the alignment.....71

Chapter 8 Trail types, dimensions and materials

What resource-friendly trail materials are available?

8.1	Fitting the trail and materials to the setting.....	75
8.2	The Anatomy of trails	75
	• Constructed trails.....	75
	• Earthen trails	77
	• Drainage considerations	77
	• Geotextile fabrics	77
8.3	Preparing the ground	78
8.4	Resource-friendly materials.....	78
	• Natural and native trail surfaces	78
	• Hardeners for natural and native trail surfaces	80
	• Permeable surfaces	80
	• Recycled materials	81
	• Hard surfaces.....	82
8.5	A note about equestrian trails	84
8.6	Trail materials for wet areas and wetlands	84
	• Native local wood.....	84
	• Plastic lumber	85
	• Selection of trail materials in water resource areas	85
8.7	Summary: Choosing trail materials, widths and surface types.....	86

Chapter 9 Managing trail construction to protect natural resources

What are some resource-friendly construction techniques?

9.1	Introduction.....	91
9.2	Procurement.....	91
	• Identify natural resource protection measures as separate bid items	91
	• Provide descriptions of bid items for natural resource protection	91
	• Identify pre-qualified designers and contractors ...	91
	• Consider alternatives to the traditional design-bid process	92

	• Use a qualification-based selection process.....	93
	• Require pre-qualified construction equipment.....	93
	• Provide contingency rock and material quantities for the contractor to bill against	93
9.3	Communications.....	94
	• Construction drawings and specifications	94
	• Training for contract managers	94
	• Worker education	94
9.4	Construction staging and site management	94
	• Construction boundaries.....	95
	• Erosion control and water resource protection	95
	• Management of excavated and stockpiled soil and rock	96
	• Management of fuels and toxic materials.....	96
	• Management of treated-wood construction materials	96
	• Management of concrete in streams and lakes	96
9.5	Quality assurance and quality control.....	97
	• Construction observation and inspection	97
	• Observation and inspection records	97
	• Contractor's point person for natural resource protection	97
9.6	Schedule.....	97
	• Seasonal work windows.....	97
	• Duration, sequence and phasing.....	98
9.7	Post-construction monitoring and maintenance.....	98

Chapter 10 Trail maintenance

How should we take care of the trail?

10.1	The goals of resource-friendly trail maintenance.....	103
10.2	Administering a trail maintenance program	103
	• Develop an overview of maintenance activities.....	103
	• Develop a multi-year budget	104
	• Develop tracking methods.....	104

• Provide training for staff	104
• Develop a program of environmental improvements	104
• Develop resource-friendly contracting practices	105
10.3 Inspecting trails	
• A word about earthen and soft-surface trails ...	107
10.4 Maintaining trails	107
• Drainage features	107
• Trail-side vegetation	108
• Seasonally closed trails	110
• Unsurfaced gravel park roads	110
10.5 Evaluating existing trails	110
• Social trails	111
• Trails in wet meadow and wetlands	111
• Signs of erosion caused by runoff from trails ...	111
• Reshaping the trail template	112
10.6 Planning for trail upgrades	113
10.7 Using new trail alignments to accomplish natural area restoration	113
10.8 Integrated pest management	113
• Integrated pest management defined	114
• Strategies for avoiding risky pest controls	114
10.9 Strategies for minimizing risky pest controls	115
• Restore native plants	115
• Rethink turf and turf mixes	115
• Consider alternatives to aggressive non-natives in stormwater swale and erosion control plantings	115
• Use a zoned approach to pest control	116

References and Appendices

Glossary

Definitions of selected technical terminologies	119
---	-----

Selected references

Where to get more detailed information	125
--	-----

Appendix A

Regional trails map	139
---------------------------	-----

Appendix B

Sources of information for trail planning	145
---	-----

Appendix C

Ranges of functional riparian area widths for wildlife habitat, fish habitat and water quality, sensitive species list	151
--	-----

Appendix D

Environmental regulatory checklist	157
--	-----

Appendix E

Trails surface materials matrix	159
---------------------------------------	-----

Appendix F

Notes and best practices for the use of treated wood products	163
---	-----

Chapter summary

Introduction

Chapter 1 Purpose of this guidebook and the benefits of having trails in a community. Importance of regional trails in the Portland metropolitan area.

Planning

Chapter 2 First steps in planning a trail, including identifying the purpose and intensity of use, involving the public, researching opportunities and challenges, costs and long-term management options.

Chapter 3 What information should be gathered to determine if there would be an impact on natural resources when planning a trail. Includes plans, contact information and web site addresses of agencies that deal with natural area management plans, zoning, vegetation and wildlife habitats, fish habitat, water resources and hydrology, geology, topography, cultural resources, viewpoints and interpretive opportunities. Offers a short checklist for assessing natural resource information.

Chapter 4 Principles of planning for “green trails” and rules of thumb for avoiding impacts to natural resources, including vegetation and wildlife habitat, fish habitat, water resources and hydrology.

Chapter 5 Ways to minimize impacts to natural resources. Identifies planning guidelines, setbacks and seasonal windows for working in fish and wildlife habitats, as well as strategies for planning and designing drainage ways to avoid concentrated flows and decrease erosion.

Implementation

Chapter 6 Environmental permits and permitting processes that may be needed if a trail has an impact on natural resources. Web addresses and phone numbers assist the reader in getting additional information from agencies.

Chapter 7 Ways to plan a route on site, including refining test alignments and identifying trail stewards.

Chapter 8 Construction techniques, surface material and width of trail that could be used in sensitive areas.

Chapter 9 Procurement of services to construct “green trails.”

Chapter 10 Resource-friendly “green trail” maintenance program, including developing a schedule of activities, inspecting trails, maintaining drainage and vegetation and evaluating existing trails.