Water Quality Model Code and Guidebook

This document is a companion to the *Model Development Code and User's Guide for Small Cities, which can be obtained from The Department of Land Conservation and Development Urban Division (503-373-0050)*. Both Documents are available on the agency's web site, http://www.lcd.state.or.us/.

Department of Land Conservation and Development
Department of Environmental Quality

December, 2000

Acknowledgements

Advisory Committee

Rosemay Furfey, National Marine Fisheries Service
Carol Lewis, City of Sweet Home
Dennis Lewis, formerly City of Bandon
Bobbi Lindberg, Department of Environmental Quality
Judith Ingram Moore, Mid-Willamette Valley Council of Governments
Steve Oulman, Department of Land Conservation and Development
Brad Prior, Department of Environmental Quality
John Renz, Josephine County Planning
Cathy Tortorici, National Marine Fisheries Service
Greg Verret, formerly Tillamook County
Jan Wellman, City of Veneta

Project Managers

Amanda Punton, Department of Land Conservation and Development
Don Yon, Department of Environmental Quality

Consultant Team

Pacific Rim Resources
Jason Franklin, AICP, Project Manager and Principle Author
Jennifer Bradford
David Siegel, AICP
Kay Wiggins

Otak
Scot Siegel, AICP
Monty Edberg

External Reviewers

James Bassingthwaite, City of Toledo
Gloria Gardiner, Department of Land Conservation and Development
Gregory Geist, Oregon Department of Environmental Quality
Craig Harper, Rogue Valley Council of Governments
Corrinne Humphrey, J.D. White Company
Tom Lipton, City of Portland
Ranei Nomura, Oregon Department of Environmental Quality
Teena Reichgott, Environmental Protection Agency
Bob Rindy, Department of Land Conservation and Development
Patty Snow, Oregon Department of Fish and Wildlife

Credits

Various ordinances found in this guidebook were based on successful ordinances found in communities throughout Oregon and Washington
City of Lebanon – Riparian Protection Overlay
City of Veneta – Tree Preservation Ordinance
Clackamas County – Stormwater Management
City of Troutdale – Hillside Development
City of Medford – Wetland Protection Overlay
City of Olympia – Impervious Surface Alternative
City of Portland – Stormwater mitigation credits and facility design standards

Guidebook Funding

Financial assistance for preparation of this document was provided by the US Environmental Protection Agency and the Oregon Department of Environmental Quality through a grant under Section 319 of the Clean Water Act as amended in 1987, and by the National Oceanic and Atmospheric Administration through a grant under section 6217 of the Coastal Zone Management Act Reauthorization Amendments of 1990. The document was produced in a partnership with federal, state and local partners.

Important Notice:

This document contains summaries of state and federal laws. It is not an exact statement of planning or regulatory requirements. For precise information about a particular law or program, contact the appropriate state and federal agencies referenced in the book.

Table of Contents

5. Water Quality and Habitat Protection Resources

The purpose of this chapter is to provide a list of resources that local communities can use when updating their zoning code and comprehensive plan to protect and enhance water quality and aquatic habitat.

This chapter includes:

- A description of the eight tools of watershed protection
- Internet resources for watershed planning and water quality and habitat protection
- Educational fact sheets for use when updating the zoning code and/or comprehensive plan

5.1 The Eight Tools of Watershed Protection

The "Eight Tools of Watershed Protection" section describes a comprehensive approach to developing an urban water quality management plan. The challenge for local officials in Oregon is to coordinate between comprehensive planning efforts and the watershed planning efforts recommended by the Center for Watershed Protection.

The Center for Watershed Protection's *Rapid Watershed Planning Handbook* includes the following information about the eight tools that should be used to protect a stream within a community. This material is taken directly from the Handbook.

1. **Watershed Planning** is perhaps the most important because it involves decisions on the amount and location of development and impervious cover, and choices about appropriate land use management techniques.
2. **Land Conservation** involves choices about the types of land that should be conserved to protect a subwatershed.
3. **Aquatic Buffers** include choices on how to maintain integrity of streams, shorelines, and wetlands, and provide protection from disturbance.
4. **Better Site Design** seeks to design individual development projects with less impervious cover which will reduce impacts to local streams.
5. **Erosion and Sediment Control** deals with the clearing and grading stages in the development cycle, when runoff can carry high quantities of sediment into nearby waterways.
6. **Stormwater Best Management Practices** involves choices regarding how, when, and where to provide stormwater management within a subwatershed, and which combination of best management practices can best meet subwatershed and watershed objectives.
7. **Non-stormwater Discharges** involves controlling discharges from wastewater disposal systems and illicit connections to stormwater systems, and reducing pollution from household and industrial products.
8. **Watershed Stewardship Programs** involves careful choices about how to promote private and public stewardship to sustain watershed management.

This guidebook covers tools 1 through 6 in chapter 4. Tools 7 and 8 are touched on in this chapter. The good housekeeping ordinance is meant to help reduce pollution from household activities. The fact sheets found in this chapter assist in the public education effort needed to begin an effective watershed stewardship program.

5.2 Internet Resources

The following list includes a number of Internet resources containing a wide variety of information, from slide shows to checklists. A brief description of each site's content is included with the web address.

Oregon Association of Clean Water Agencies
http://www.oracwa.org/
The Oregon Association of Clean Water Agencies, ACWA, is an organization of local government agencies working to maintain and enhance the quality of lakes, rivers and streams in Oregon. They manage treatment of human and industrial wastes and the runoff of polluting waters.

This site includes a useful manual on the Endangered Species Act (ESA). Chapter 7 of the manual includes a checklist to diagnose stormwater issues. This checklist can be a valuable tool for determining possible zoning code and/or comprehensive plan changes to address the ESA and water quality.

Another valuable resource found at this site is a Municipal Stormwater Toolbox for Maintenance Practices found at www.oracwa.org/Pages/toolbox.htm. The toolbox provides quick and easy guidance for maintenance staff about ways to integrate water quality-friendly practices into routine everyday maintenance practices.

Oregon Department of Environmental Quality
http://www.deq.state.or.us/
Web site for DEQ includes information on water quality rules and regulations and a list of all water quality limited streams [the 303(d) list].

Oregon Department of Land Conservation and Development
http://www.lcd.state.or.us/
Includes information on the state land use planning program, including links to the state land use goals and implementing administrative rules.

The Oregon Department of Fish and Wildlife
http://www.dfw.state.or.us
Web site for ODF&W includes information on stream flow restoration priorities, habitat policy and policy changes and links to the Bull Trout program.

The Oregon Plan for Salmon and Watersheds
http://www.oregon-plan.org/
The goal of the Oregon Plan is to restore populations and fisheries to productive and sustainable levels that will provide substantial environmental, cultural, and economic benefits. The site includes information on salmon restoration efforts and watershed health.

Environmental Protection Agency - Nonpoint Source Pollution
http://www.epa.gov/owow/NPS/
Includes information on education, EPA programs, outreach and funding opportunities. Also includes links to other EPA web sites such as the NPDES Stormwater Phase I and II Program and the Drinking Water Protection Program.

National Marine Fisheries – Northwest Region
http://www.nwr.noaa.gov/
Latest information on endangered species listings, including 4(d) rules and *A Citizen's Guide to the 4(d) Rule For Threatened Salmon and Steelhead on the West Coast*, an excellent primer on the 4(d) rule.

US Fish and Wildlife Service
http://endangered.fws.gov
Direct link to the Endangered Species Program of USF&W.

Watershed Professionals Network
http://www.watershednet.com/
Watershed Professionals Network is an association of natural resource consultants in the Pacific Northwest. The web site includes a copy Oregon Watershed Enhancement Board's *Oregon Watershed Assessment Manual* (1999).

Nonpoint Education for Municipal Officials
http://www.lib.uconn.edu/CANR/ces/nemo/
NEMO is a University of Connecticut Cooperative Extension System project using innovative techniques to teach local officials about the sources and impacts of nonpoint source (NPS) pollution, how different land uses affect water quality, and what towns can do to protect water quality.

A slideshow explaining the land use and water quality connection is available for download for free at the site.

Terrene Institute
http://www.terrene.org/index.htm
Established in 1990 as a not-for-profit, nonadvocacy organization, the Terrene Institute works with business, government, academia and citizens to protect our environment and conserve our natural resources. Education and public outreach comprise the cornerstones of the Terrene Institute, which assembles the best minds and expertise to provide accurate information – and presents this information in attractive, understandable, usable formats.

Terrene has established a reputation for offering balanced, credible information in ways that inspire learning, the hallmark of excellence in communication.

This site provides a nonpoint source projects database, and extensive links to other water quality sites.

Center for Urban Water Resources Management at the University of Washington
http://depts.washington.edu/~cuwrm/
The Center for Urban Water Resources Management is an interdisciplinary research center at the University of Washington, whose mission is to develop new and more effective ways for managing the consequences of land development on the Pacific Northwest's water resources through applied research.

Center for Watershed Protection
http://www.cwp.org/
Founded in 1992, the Center for Watershed Protection works with local, state, and federal governmental agencies, environmental consulting firms, watershed organizations, and the general public to provide objective and scientifically sound information on effective techniques to protect and restore urban watersheds.

This site includes a zoning code worksheet to rate local development code for water quality provisions.

5.3 Fact Sheets Explaining Nonpoint Source Pollution and Water Quality

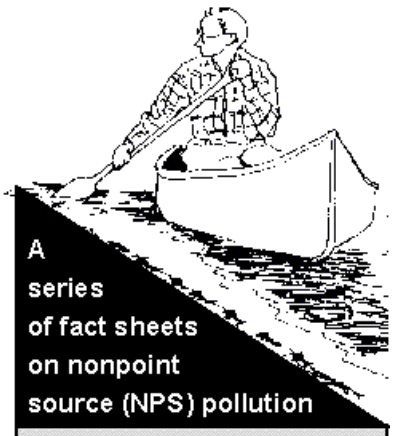
The following fact sheets are provided to assist with education efforts, when revising zoning codes and comprehensive plans to protect and enhance water quality. The fact sheets are included as text, so they can be altered and printed to fit a community's needs. The fact sheets cover the following topics:

- Nonpoint Source Pollution: The Nation's Largest Water Quality Problem
- Opportunities for Public Involvement in Nonpoint Source Control
- Managing Urban Runoff
- Managing Nonpoint Source Pollution from Households

The fact sheets were developed by the Environmental Protection Agency, and are part of a larger series of fact sheets.

Nonpoint Source Pollution: The Nation's Largest Water Quality Problem

Why is there still water that's too dirty for swimming, fishing or drinking? Why are native species of plants and animals disappearing from many rivers, lakes, and coastal waters?



Three Leading Sources of Water Quality Impairment

Rank	Rivers	Lakes	Estuaries
1	Agriculture	Agriculture	Urban runoff
2	Municipal point sources	Municipal point sources	Municipal point sources
3	Stream/ habitat changes	Urban runoff	Agriculture

Source: Water National Quality Inventory, 1994

NPS pollution occurs when water runs over land or through the ground, picks up pollutants, and deposits them in surface waters or introduces them into groundwater .

The United States has made tremendous advances in the past 25 years to clean up the aquatic environment by controlling pollution from industries and sewage treatment plants. Unfortunately, we did not do enough to control pollution from diffuse, or nonpoint, sources. Today, nonpoint source (NPS) pollution remains the Nation's largest source of water quality problems. It's the main reason that approximately 40 percent of our surveyed rivers, lakes, and estuaries are not clean enough to meet basic uses such as fishing or swimming.

NPS pollution occurs when rainfall, snowmelt, or irrigation runs over land or through the ground, picks up pollutants, and deposits them into rivers, lakes, and coastal waters or introduces them into ground water. Imagine the path taken by a drop of rain from the time it hits the ground to when it reaches a river, ground water, or the ocean. Any pollutant it picks up on its journey can become part of the NPS problem. NPS pollution also includes adverse changes to the vegetation, shape, and flow of streams and other aquatic systems.

NPS pollution is widespread because it can occur any time activities disturb the land or water. Agriculture, forestry, grazing, septic systems, recreational boating, urban runoff, construction, physical changes to stream channels, and habitat degradation are potential sources of NPS pollution. Careless or uninformed household management also contributes to NPS pollution problems.

The latest National Water Quality Inventory indicates that agriculture is the leading contributor to water quality impairments, degrading 60 percent of the impaired river miles and half of the impaired lake acreage surveyed by states, territories, and tribes. Runoff from urban areas is the largest source of water quality impairments to surveyed estuaries (areas near the coast where seawater mixes with freshwater).

The most common NPS pollutants are sediment and nutrients. These wash into water bodies from agricultural land, small and medium-sized animal feeding operations, construction sites, and other areas of disturbance. Other common NPS pollutants include pesticides, pathogens (bacteria and viruses), salts, oil, grease, toxic chemicals, and heavy metals. Beach closures, destroyed habitat, unsafe drinking water, fish kills, and many other severe environmental and human health problems result from NPS pollutants. The pollutants also ruin the beauty of healthy, clean water habitats. Each year the United States spends millions of dollars to restore and protect the areas damaged by NPS pollutants.

Progress

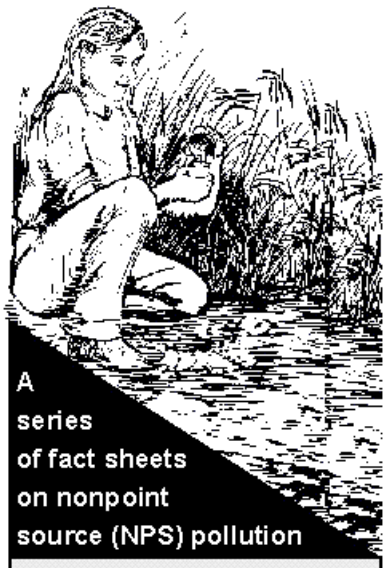
During the last 10 years, our country has made significant headway in addressing NPS pollution. At the federal level, recent NPS control programs include the Nonpoint Source Management Program established by the 1987 Clean Water Act Amendments, and the Coastal Nonpoint Pollution Program established by the 1990 Coastal Zone Act Reauthorization Amendments. Other recent federal programs, as well as state, territorial, tribal and local programs also tackle NPS problems.

In addition, public and private groups have developed and used pollution prevention and pollution reduction initiatives and NPS pollution controls, known as management measures, to clean up our water efficiently. Water quality monitoring and environmental education activities supported by government agencies, tribes, industry, volunteer groups, and schools have provided information about NPS pollution and have helped to determine the effectiveness of management techniques.

Also, use of the watershed approach has helped communities address water quality problems caused by NPS pollution. The watershed approach looks at not only a water body but also the entire area that drains into it. This allows communities to focus resources on a watersheds most serious environmental problems – which, in many instances, are caused by NPS pollution.

Just as important, more citizens are practicing water conservation and participating in stream walks, beach cleanups, and other environmental activities sponsored by community-based organizations. By helping out in such efforts, citizens address the Nation's largest water quality problem, and ensure that even more of our rivers, lakes, and coastal waters become safe for swimming, fishing, drinking, and aquatic life.

Opportunities for Public Involvement in Nonpoint Source Control



Did you know that volunteers often collect information on the health of water-ways and the extent of NPS pollution?

NPS pollution occurs when water runs over land or through the ground, picks up pollutants, and deposits them in surface waters or introduces them into groundwater.

Over the last 25 years, communities have played an important role in addressing nonpoint source (NPS) pollution, the Nation's leading source of water quality problems. When coordinated with federal, state, and local environmental programs and initiatives, community-based NPS control efforts can be highly successful. To learn about and help control NPS pollution, contact the community-based organizations and environmental agencies in your area. These groups often have information about how citizens can get involved in the following types of NPS control activities.

Volunteer Monitoring

Local groups organize volunteers of all skill levels to gather water quality data. This information can help government agencies understand the magnitude of NPS pollution. More than 500 active volunteer monitoring groups currently operate throughout the United States. Monitoring groups may also have information about other NPS pollution projects, such as beach cleanups, stream walks, and restoration activities.

Ecological Restoration

Ecological restoration provides opportunities for the public to help out with a wide variety of projects, such as tree planting and bank stabilization in both urban and rural areas. Restoration efforts focus on degraded waters or habitats that have significant economic or ecological value.

Educational Activities

Teachers can integrate NPS pollution curricula into their classroom activities. The U.S. Environmental Protection Agency (EPA), federal and state agencies, private groups, and nonprofit organizations offer teachers a wide variety of materials. Students can start on an NPS control project in the primary grades and carry their work through to the intermediate and secondary levels.

Water Conservation

Using technologies that limit water use in the bathroom, kitchen, laundry room, lawn, driveway, and garden can reduce the demand on existing water supplies and limit the amount of water runoff. More than 40 states now have some type of water conservation program to help citizens and businesses implement conservation practices. Government

agencies, utilities, and hardware stores have information about different products that help households conserve water.

Household Management

Learning to limit NPS pollution at the household level can reduce the overall impacts of NPS pollution on water quality. Households, for example, can irrigate during cooler hours of the day, limit fertilizer applications to lawns and gardens, and properly store chemicals to reduce runoff and keep runoff clean. Chemicals and oil should not be poured into sewers, where they can result in major water quality problems. Pet wastes, a significant source of nutrient contamination, should be disposed of properly. Households can also replace impervious surfaces with more porous materials.

Public Meetings and Hearings

Decisions made during public hearings on stormwater permitting and town planning can determine a community's capability to manage NPS pollution over the long term. Laws or regulations may require federal, state, or local agencies to hold public hearings when permits are issued or when town plans are formed. Notices about hearings often appear in the newspaper or in government office buildings.

Community Organizations

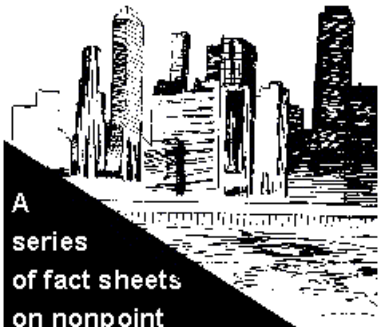
Many communities have formed groups to protect local natural resources. These community-based groups provide citizens with information about upcoming environmental events in their watershed, such as ecological restoration, volunteer monitoring, and public meetings. Watershed-level associations are particularly effective at addressing a wide range of NPS pollution problems.

Environmental Information on the Internet

Citizens can obtain a tremendous amount of environmental data and educational material with a computer linked to the World Wide Web. EPA's site (http://www.epa.gov) on the World Wide Web provides up-to-date information on Agency activities and enables citizens to find out about air and water quality data in specific communities.

Managing Urban Runoff

The most recent National Water Quality Inventory reports that runoff from urban areas is the leading source of impairments to surveyed estuaries and the third largest source of water quality impairments to surveyed lakes. In addition, population and development trends indicate that by 2010 more than half of the Nation will live in coastal towns and cities. Runoff from these rapidly growing urban areas will continue to degrade coastal waters.



A series of fact sheets on nonpoint source (NPS) pollution

Did you know that because of impervious surfaces such as pavement and rooftops, a typical city block generates 9 times more runoff than a woodland area of the same size?

NPS pollution occurs when water runs over land or through the ground, picks up pollutants, and deposits them in surface waters or introduces them into groundwater.

To protect surface water and ground water quality, urban development and household activities must be guided by plans that limit runoff and reduce pollutant loadings. To this end, communities can address urban water quality problems on both a local and watershed level and garner the institutional support to help address urban runoff problems.

How Urban Areas Affect Runoff

Increased Runoff. The porous and varied terrain of natural landscapes like forests, wetlands, and grasslands trap rainwater and snowmelt and allow it to slowly filter into the ground. Runoff tends to reach receiving waters gradually. In contrast, nonporous urban landscapes like roads, bridges, parking lots, and buildings don't let runoff slowly percolate into the ground. Water remains above the surface, accumulates, and runs off in large amounts.

Cities install storm sewer systems that quickly channel this runoff from roads and other impervious surfaces. Runoff gathers speed once it enters the storm sewer system. When it leaves the system and empties into a stream, large volumes of quickly flowing runoff erode streambanks, damage streamside vegetation, and widen stream channels. In turn, this will result in lower water depths during non-storm periods, higher than normal water levels during wet weather periods, increased sediment loads, and higher water temperatures. Native fish and other aquatic life cannot survive in urban streams severely impacted by urban runoff.

Increased Pollutant Loads. Urbanization also increases the variety and amount of pollutants transported to receiving waters. Sediment from development and new construction; oil, grease, and toxic chemicals from automobiles; nutrients and pesticides from turf management and gardening; viruses and bacteria from failing septic systems; road salts; and heavy metals are examples of pollutants generated in urban areas. Sediments and solids constitute the largest volume of pollutant loads to receiving waters in urban areas.

When runoff enters storm drains, it carries many of these pollutants with it. In older cities, this polluted runoff is often released directly into the water without any treatment. Increased pollutant loads can harm fish and wildlife populations, kill native vegetation, foul drinking water supplies, and make recreational areas unsafe.

Point and Nonpoint Distinctions

There are two different types of laws that help control urban runoff: one focusing on urban point sources and the other focusing on urban nonpoint sources. Urban point source pollution is addressed by the National Pollution Discharge Elimination System permit program of the Clean Water Act, which regulates stormwater discharges. Urban nonpoint source pollution is covered by nonpoint source management programs developed by states, territories, and tribes under the Clean Water Act. In states and territories with coastal zones, programs to protect coastal waters from nonpoint source pollution also are required by section 6217 of the Coastal Zone Act Reauthorization Amendments.

Measures to Manage Urban Runoff

Plans for New Development. New developments should attempt to maintain the volume of runoff at predevelopment levels by using structural controls and pollution prevention strategies. Plans for the management of runoff, sediment, toxics, and nutrients can establish guidelines to help achieve both goals. Management plans are designed to protect sensitive ecological areas, minimize land disturbances, and retain natural drainage and vegetation.

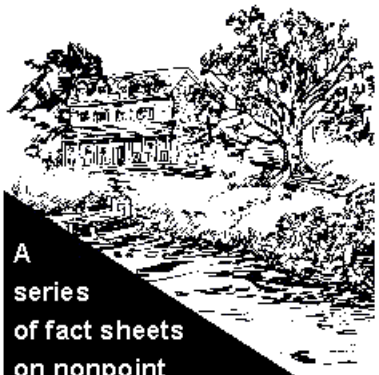
Plans for Existing Development. Controlling runoff from existing urban areas tends to be relatively expensive compared to managing runoff from new developments. However, existing urban areas can target their urban runoff control projects to make them more economical. Runoff management plans for existing areas can first identify priority pollutant reduction opportunities, then protect natural areas that help control runoff, and finally begin ecological restoration and retrofit activities to clean up degraded water bodies. Citizens can help prioritize the clean-up strategies, volunteer to become involved with restoration efforts, and help protect ecologically valuable areas.

Plans for Onsite Disposal Systems. The control of nutrient and pathogen loadings to surface waters can begin with the proper design, installation, and operation of onsite disposal systems (OSDSs). These septic systems should be situated away from open waters and sensitive resources such as wetlands and floodplains. They should also be inspected, pumped out, and repaired at regular time intervals. Household maintenance of septic systems can play a large role in preventing excessive system discharges.

Public Education. Schools can conduct education projects that teach students how to prevent pollution and keep water clean. In addition, educational outreach can target specific enterprises, such as service stations, that have opportunities to control runoff onsite. Many communities have implemented storm drain stenciling programs that discourage people from dumping trash directly into storm sewer systems.

Managing Nonpoint Source Pollution from Households

The well-known stories about environmental problems tend to focus on big, recognizable targets such as smoking industrial facilities, leaking toxic waste dumps, and messy oil spills. As a result, people often forget about water pollution caused by smaller nonpoint sources – especially pollution at the household level.



Did you know that homes with xeriscape landscapes use natural contours and native plants to conserve water, limit runoff, and reduce chemical use?

NPS pollution occurs when water runs over land or through the ground, picks up pollutants, and deposits them in surface waters or introduces them into groundwater.

However, nonpoint source (NPS) pollution is the Nation's leading source of water quality degradation. Although individual homes might contribute only minor amounts of NPS pollution, the combined effect of an entire neighborhood can be serious. These include eutrophication, sedimentation, and contamination with unwanted pollutants.

To prevent and control NPS pollution, households can learn about the causes of such pollution and take the appropriate (and often money-saving) steps to limit runoff and make sure runoff stays clean.

Limit Paved Surfaces

Urban and suburban landscapes are covered by paved surfaces like sidewalks, parking lots, roads, and driveways. They prevent water from percolating down into the ground, cause runoff to accumulate, and funnel into storm drains at high speeds. When quickly flowing runoff empties into receiving waters, it can severely erode streambanks. Paved surfaces also transfer heat to runoff, thereby increasing the temperature of receiving waters. Native species of fish and other aquatic life cannot survive in these warmer waters.

To limit NPS pollution from paved surfaces households can substitute alternatives to areas traditionally covered by nonporous surfaces. Grasses and natural ground cover, for example, can be attractive and practical substitutes for asphalt driveways, walkways, and patios. Some homes effectively incorporate a system of natural grasses, trees, and mulch to limit continuous impervious surface area. Wooden decks, gravel or brick paths, and rock gardens keep the natural ground cover intact and allow rainwater to slowly seep into the ground.

Landscape With Nature

Altering the natural contours of yards during landscaping and planting with non-native plants that need fertilizer and extra water can increase the potential for higher runoff volumes, increase erosion, and introduce chemicals into the path of runoff. In contrast,

xeriscape landscaping provides households with a framework that can dramatically reduce the potential for NPS pollution.

Xeriscape incorporates many environmental factors into landscape design – soil type, use of native plants, practical turf areas, proper irrigation, mulches, and appropriate maintenance schedules. By using native plants that are well-suited to a regions climate and pests, xeriscape drastically reduces the need for irrigation and chemical applications. Less irrigation results in less runoff, while less chemical application keeps runoff clean.

Proper Septic System Management

Malfunctioning or overflowing septic systems release bacteria and nutrients into the water cycle, contaminating nearby lakes, streams, and estuaries, and ground water. Septic systems must be built in the right place. Trampling ground above the system compacts soil and can cause the systems pipes to collapse. Also, septic systems should be located away from trees because tree roots can crack pipes or obstruct the flow of wastewater through drain lines. Proper septic system management is also important, and a system should be inspected and emptied every 3 to 5 years.

By maintaining water fixtures and by purchasing water-efficient showerheads, faucets, and toilets, households can limit wastewater levels, reducing the likelihood of septic system overflow. Most water conservation technologies provide long-term economic and environmental benefits.

Proper Chemical Use, Storage, and Disposal

Household cleaners, grease, oil, plastics, and some food or paper products should not be flushed down drains or washed down the street. Over time chemicals can corrode septic system pipes and might not be completely removed during the filtration process. Chemicals poured down the drain can also interfere with the chemical and biological breakdown of the wastes in the septic tank.

On household lawns and gardens, homeowners can try natural alternatives to chemical fertilizers and pesticides and apply no more than the recommended amounts. Natural predators like insects and bats, composting, and use of native plants can reduce or entirely negate the need for chemicals. Xeriscape can limit chemical applications to lawns and gardens.

If chemicals are needed around the home, they should be stored properly to prevent leaks and access by children. Most cities have designated sites for the proper disposal of used chemicals.

Model Fact Sheet on the Effects of Urban Development on Salmon and Trout
The following fact sheet can be tailored to explain the impacts of the listing of salmon and trout under the Endangered Species Act in your community and what can be done to mitigate activities that have a negative impact on these fish. This fact sheet also describes many of the model ordinances in this guidebook that are recommended for adoption. This fact sheet was developed by the City of Portland.

Urban Development
Its Effects on Salmon and Trout

In March 1998 the National Marine Fisheries Service (NMFS) listed lower [Columbia River steelhead (list other species as needed)] as a threatened species. The listing includes the [Willamette River and its tributaries below Willamette Falls (list the applicable waterbodies)]. In March 1999, NMFS listed [Chinook salmon] as a threatened species. In response, the [jurisdiction] is evaluating how all its activities and development regulations affect salmon and trout. The [jurisdiction] is also identifying how to avoid, minimize, or mitigate activities that have a negative impact on these fish.

Three Primary Impacts
Salmon and trout are very sensitive to any change in the stream environment and urban development can alter their habitat. Development activities can pollute water, degrade instream and riparian habitat, and alter the natural flow of rivers and streams.

Erosion
Erosion can put excessive amounts of sediment into rivers and streams, and can be lethal to salmon and trout. Both species need gravel and rocks to spawn and rear young. Erosion caused by construction introduces fine sediments that clog the spaces between rocks and gravel in streams, buries the eggs salmon and trout lay in these spaces, and prevents flowing water and oxygen from reaching the eggs and newly hatched fish.

Sedimentation can also fill in pools, which are an important part of fish habitat. Salmon and trout use pools for rearing and spawning, as resting areas during migration, and as a refuge to avoid temperature and flow extremes. Sediments in water can damage gills and decrease visibility, which can hamper the fish's ability to find food. Sediments also can carry and store toxic pollutants and nutrients that can poison habitat.

[jurisdiction] is developing a new system to track and respond to erosion problems. The [jurisdiction] is rewriting its erosion control regulations [and design manual] to improve construction site erosion control and stormwater management. And [jurisdiction] is exploring methods of improving enforcement of erosion control standards and responding to complaints more effectively.

Impervious Surfaces
Parking lots, roofs, roads, and other hard surfaces prevent water from soaking into the ground. As impervious surfaces increase, so do the volume and velocity of stormwater

runoff into rivers and streams. Increased volume and velocity cause more erosion and sedimentation, and disturbance to spawning and resting areas.

In undeveloped areas, stormwater can soak into the ground, allowing soil and vegetation to filter out some pollution. In urban areas, the dirt, oil, chemicals, and other pollutants that collect on roads and other hard surfaces wash directly into streams without the benefit of any natural treatment. Impervious surfaces "short circuit" natural watershed cleansing processes.

Research shows that when the percentage of impervious surfaces in a watershed exceeds 10 to 15 percent, streams degrade markedly. The diversity of fish and the aquatic insects they eat begins to decline. Sensitive species, such as salmon and trout, may be replaced by fish species that are more tolerant of degraded streams.

Good stormwater management can partially offset the impact of impervious surfaces. The amount of impervious surface in some Portland area watersheds far exceeds 15 percent. But damage to our rivers and streams can be reduced by restoring riparian vegetation, capturing and treating stormwater runoff, and controlling erosion. [Jurisdiction] is [developing an improved stormwater design manual] and strengthening stormwater drainage regulations to reduce stormwater impacts on rivers and streams.

Removal of Riparian Vegetation

The abundance of trees and shrubs that grow alongside stream banks may be the most important key to healthy salmon and trout habitat. Removing this riparian vegetation increases water temperatures, destabilizes stream banks, destroys fish habitat, degrades water quality, and diminishes the food supply.

Clearing away streamside trees and shrubs eliminates shade that cools the water. Water temperatures above 59 degrees Fahrenheit can harm salmon and trout by:

- Increasing physical stress,
- Decreasing their ability to compete for food and avoid predators,
- Decreasing oxygen levels in the water while increasing oxygen demand,
- Increasing the toxicity of many contaminants,
- Decreasing rearing habitat.

Water temperatures above 68 degrees Fahrenheit can be lethal to salmon and trout. High stream temperatures may allow carp, suckers, sunfish, and other temperature tolerant species to dominate at the expense of salmon and trout.

Riparian trees and branches regularly fall into streams. This large woody debris is extremely important to salmon and trout survival. It provides cover, protection from predators, resting areas, and important habitat for aquatic insects and small fish that salmon and trout eat. Debris dams help form pool areas that are essential to fish habitat.

[Jurisdiction] recognizes the importance of streamed trees and shrubs and the [jurisdiction] has environmental zoning regulations designed to protect riparian vegetation. Development

standards limit the number of trees that can be removed from sensitive areas, require replacement of trees illegally removed, and require new development to be set back from stream banks. [Jurisdiction] is reviewing these regulations and standards with an eye toward strengthening protection of salmon and trout.

What Developers Can Do

[Jurisdiction] can grow, and development can occur, without destroying salmon and trout habitat in the process. Development that minimizes impacts on fish habitat will help the recovery process. Some things developers can do to help preserve salmon and trout habitat are:

- Use state-of-the-art erosion control.
- Cover bare soil at the construction sites with gravel or straw.
- Don't disturb soil during the rainy season.
- Plant native plants, using compost as a soil amendment instead of fertilizing.
- Remove weeds manually rather than using herbicides
- Reduce the amount of impervious surface in new developments by using porous paving blocks or grass blocks where appropriate.
- Direct roof runoff to landscaped areas, detention ponds, or grassy swells.
- Plant native trees at the construction site.

Questions?

Call the [jurisdiction] at [xx-xxx-xxxx]

References

- National Marine Fisheries Service. 1996. Factors for Decline: A Supplement to the Notice of Determination for West Coast Steelhead Under the Endangered Species Act. NMFS Protected Species Branch, Portland, Oregon, and NMFS Protected Species Management Division, Long Beach, California.

- National Research Council. 1996. Upstream: salmon and society in the Pacific Northwest. National Academy Press, Washington, DC

- National Marine Fisheries Service. 1994. A Coarse Screening Process For Potential Application in ESA Consultations. Technical Report 94-4, NMFS, Portland, OR

- Spence, et al, 1996. An Ecosystem Approach to Salmonid Conservation. Man Tech.

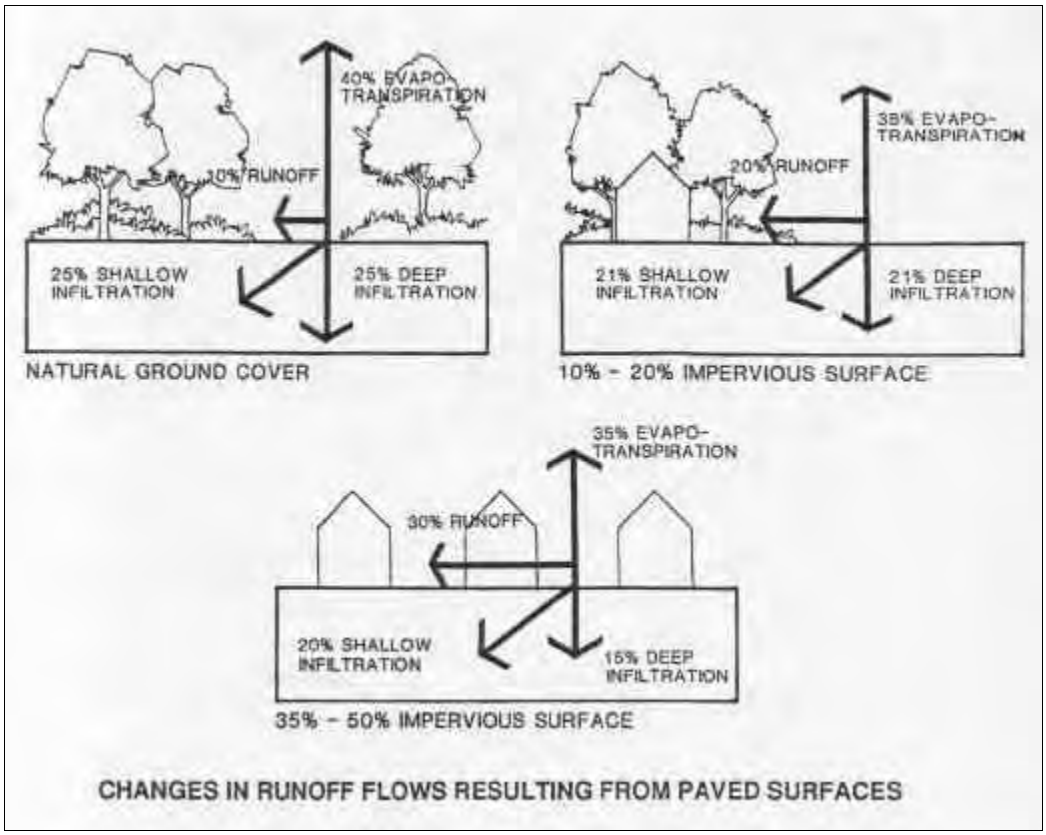
4.3 Zoning

4.3.1 Impervious Surfaces

Problem
Impervious surfaces, usually found in developed areas, can have a significant impact on water quality. Impervious surfaces increase the amount and rate of surface water runoff, leading to erosion of stream banks, degradation of habitat, and increased sediment loads in streams. Impervious surfaces can accumulate large amounts of pollutants that are then "flushed" into local water bodies during storms. Impervious surfaces also can interfere with recharge of ground water and the base flows to water bodies.

Examples of common impervious surfaces include roads, rooftops, buildings, parking lots, driveways, sidewalks and patios. Almost any contemporary urban land use produces over ten percent impervious coverage, with the most significant amount of that coverage coming from roads, driveways and parking lots. Degradation of water quality and loss of habitat value can occur as impervious surface coverage in a watershed approaches 10 percent. (That is not to say that an urban area should only have ten percent impervious surface, but that the urban area is an important consideration to the overall health of a watershed.) Greater impacts to water quality occur as impervious surfaces begin to dominate the landscape (see figure below).

Figure 4.1 Water Cycle Changes Associated with Urbanization



Objective
To infiltrate all, or almost all, rainfall on the site by minimizing the effective impervious surfaces. Effective impervious surface means that the necessary impervious surfaces, such as driveways and buildings, are buffered by pervious surfaces that provide the infiltration necessary to effectively eliminate the impact of the impervious surfaces.

Strategy
Implement the following model ordinance language in designated land use districts, and define "impervious cover" in the zoning ordinance.

Alternatively, implement the more stringent model ordinance in the Appendix. The model ordinance in the Appendix allows applicants to bypass certain code and engineering requirements, if they are able to show that their site design allows infiltration of all stormwater onsite.

Discussion
Impervious reduction can also be addressed through site-specific development requirements. Jurisdictions need to be mindful not to promote inefficient, low-intensity development by adopting impervious cover restrictions that require all development to be low density.

Impervious Surface Requirements – Sample Code Provisions

1. The impervious surface requirements apply to the following districts: [list districts – recommended that all districts outside of the downtown or town center be covered by this code provision].

2. Impervious cover [not mitigated by on-site vegetated swales, infiltration basins or other techniques approved by the [jurisdiction]] shall not exceed [X] percent of the total subject site area draining to each drainage discharge point.

3. Impervious cover defined. Impervious cover refers only to strictly impervious surfaces including roofs of buildings, specifically impervious asphalt and concrete pavements, and other specifically impervious pavement materials such as mortared masonry and gravel.

4.3.2 Residential Density and Building Size

Problem
Rigid residential density standards that require each development to adhere to minimum/maximum lot size and units per gross acre can make protecting and enhancing water quality difficult. Rigid standards make it difficult to preserve and/or work around site characteristics that are important for water quality such as steep slopes, natural drainage ways, wetlands, and significant natural vegetation. In addition, flexibility in

building design and housing types is often necessary to minimize impervious surfaces and allow for stormwater infiltration.

Objective
To provide alternatives to rigid lot area and density standards that conform to the Comprehensive Plan and aid in the protection and enhancement of water quality and aquatic habitat.

Strategy
Allow lot size averaging and density transfers, and use density bonuses to encourage creative design that protects and enhances water quality and aquatic habitat.

Discussion
These standards can be provided citywide "by definition", or they can be limited to specific districts. They are intended to provide a more flexible alternative to minimum lot size standards (e.g., 3,000 sq ft, 5,000 sq ft, and 7,500 sq ft.).

The residential density standards must be consistent with the Comprehensive Plan. Where sanitary sewer is not available, density standards must also be considerate of state on-site septic siting requirements. The Comprehensive Plan may need to be amended to allow density bonuses.

When approving a density transfer it is important to keep a record of how much density is transferred from the "sending" area to the "receiving" area. If a plat is recorded (i.e., for a land division), the "sending" area is usually identified as an open space tract with appropriate conditions and restrictions on use, development, etc. (e.g., through a conservation easement or dedication) which protects it from future development.

Residential Density Standards – Sample Code Provisions

Lot Size Averaging. Except as allowed through a planned unit development, new partitions and subdivisions shall achieve the following lot areas:

a. R-3 (attached/detached single family) zone - average lot area between 3,000-4,000 square feet. Minimum lot area is 2,000 - square feet;
b. R-5 (detached single family) zone - average lot area between 5,000-6,000 square feet. Minimum lot area is 4,000 square feet;
c. R-7.5 (detached single family) zone- average lot area between 7,500-9,000 square feet. Minimum lot area is 6,000 square feet.

(See "Model Development Code & User's Guide for Small Cities" Section 2.1.150 for residential density calculation and Section 2.1.130 for additional lot area standards.)

Density Bonus. A density bonus may be granted up to a total of [10-20] percent of the base density for the provision of the following public benefits:

a. Dedication of public park, greenway, supplemental wetlands and/or riparian buffers;

b. [other, such as dedication of upland forest areas, reducing development in steep slope areas]

Density Transfer. A density transfer is an equal transfer of allowable dwelling units from one portion of the site to another. Density transfers are allowed by right for the following areas (i.e., transfer density 'from'):

a. Area within the floodway and the floodway fringe;
b. Area over [X] percent slope;
c. Known landslide areas or areas shown to have potential for severe or moderate landslide hazard (e.g., on Department of Geology and Mineral Industries maps);
d. Streams, wetlands and natural areas and their associated buffers in excess of that required to satisfy Goal 5.
e. Areas constrained by monitoring wells and similar areas dedicated to associated buffers; remediation of contaminated soils or ground water; and
f. Areas similar to those in a-e above, as approved by the Planning Director, and subject to public notice for Type II Administrative Decisions.

4.3.3 Lot Coverage

Problem
Local zoning codes may include rigid lot coverage provisions that inhibit creative development, and reduce the developers ability to address impervious cover. This is especially problematic if the impervious surfaces provision described in 4.2.1 is implemented. Developers will need to find creative solutions to limit the amount of their parcel covered by the building and/or room for treatment and infiltration BMPs, while maintaining the density needed to meet state and local goals and a reasonable economic use. Instead of a lower lot coverage standard, a developer is usually better served by a higher lot coverage standard (in conjunction with an overall density standard – see 4.2.2), to maintain open space that can be used for on-site treatment on other portions of the property.

Objective
Allow flexible lot coverage standards to provide opportunities for creative development for both single lots and large master planning efforts.

Strategy
Provide flexible lot coverage standards based on building type and lot size, and define "lot coverage" in the zoning ordinance.

Discussion:
The lot coverage standard should be tailored to balance the local design context and the housing needs of the community with the need to protect and enhance water quality and aquatic habitat. The lot coverage standards should encourage creative site use by a developer to increase density while decreasing effective impervious surfaces. The

impervious surface requirement found in Section 4.3.1 should be coordinated with lot coverage requirements, so conflicting standards are not present in the development code. If a community chooses coverage standards less than presented above for the purposes of achieving more open space and permeable surfaces, there may be a conflict with applying "smart development" principles, as defined by the *Smart Development Code Handbook* published by the Transportation Growth Management Program, and achieving density goals.

Lot Coverage - Sample Code Provisions: (excerpted from Section 2.1.160 of the Model Development Code and User's Guide for Small Cities)

1. Maximum Lot Coverage. As applicable, the following standards shall apply in the [R-1 and R-2 zones / list appropriate zones]:
   a. Single Family Detached Housing – [30 - 50] percent
   b. Duplex and Triplex Buildings - [40 - 60] percent
   c. Single Family Attached Townhomes - [60 - 70] percent
   d. Multiple Family Housing Developments - [40 - 60] percent
   e. Neighborhood Commercial and Mixed Use Buildings - [70 - 90] percent

2. Lot Coverage Defined. "Lot Coverage" means all areas of a lot or parcel covered by buildings (as defined by foundation perimeters) and other structures with surfaces greater than 36 inches above the finished and natural grade; except for covered front porches, covered (non-enclosed) bicycle parking, pergolas, porticos, balconies, overhangs and similar architectural features placed on the front (e.g., street facing) elevation of a building.

4.3.4 Commercial Areas

Problem
Water quality impacts of commercial development in downtown and neighborhood center areas are just as important as those of residential development. Many local zoning codes lead to low intensity commercial development and the conversion of areas to surface parking lots. Higher-intensity commercial development in designated areas can prevent other areas of the local jurisdiction from becoming covered with impervious surfaces associated with auto-oriented commercial development.

Encouraging higher intensity downtown and/or neighborhood center development requires a fine level of analysis due to the many interrelated issues. Requiring two story development with minimum design standards in a historic downtown is probably important for community aesthetics, but in some jurisdictions it may result in more development along the fringes of town at easier-to-develop sites.

Objective
To require more efficient use of land in the downtown, and provide incentives for higher-intensity development.

Strategy
Establish incentives for development in downtown and/or neighborhood centers. For example, exempt parking requirements for development in downtown or allow height bonuses for certain types of development. A commercial model code for small cities is under development and should be available for use after June, 2001. Contact the Code Assistance Program at DLCD for more information.

Discussion
Without careful application, implementation of standards to concentrate development in a downtown or neighborhood district can increase lower intensity development in other less restrictive districts.

4.3.5 Building Setbacks

Problem:
Many local zoning codes may have very strict requirements that govern the front and side yard setbacks. These criteria can constrain or prevent developers from designing open space or cluster developments that can reduce impervious cover. Minimum setbacks and frontage distances can increase impervious cover in the following ways. Front yard setbacks, which dictate how far houses must be from the street, can extend driveway length. Large side setbacks directly influence the compactness of development, and can result in longer roads to service the neighborhood.

Objective
Relax side and front yard setback requirements to allow for more compact development and less overall site imperviousness while maintaining target densities. Relax front setback requirements to minimize driveway lengths and reduce overall lot imperviousness. Allow shared driveways and rear alleys or lanes to reduce the need for driveways on each lot.

Strategy
Implement the *Model Development Code and User's Guide for Small Cities* residential district setback provisions found in Section 2.1.120.

Discussion
While consideration of setbacks is important for the protection and enhancement of water quality, neighborhood compatibility also should be considered. Larger front yard setbacks could be used for infiltration if they are more compatible with community standards. Alleys can help reduce impervious surfaces when neighborhood street standards are reduced, alleys are paved with pervious surfaces (see Section 4.3 for examples), and the total paved area of a rear alley is less than the total paved area of individual driveways. Varying setbacks should not be used to decrease densities. Creative use of a site by a developer can actually increase density while decreasing effective impervious surface.

4.3.6 Permitted Uses

Problem
Certain uses can be detrimental to water quality but are typically allowed as an outright use in certain zoning districts (i.e., auto repair shops or businesses using known hazardous materials. These uses may occur without necessary water quality review or conditions placed on the use. The potential for impacts on water quality is a great concern, especially when the use occurs within a flood hazard area, near a stream, wetland, lake, pond or other waterbody, or wellhead protection area.

Objective
Identify allowed land uses that pose significant risk to water quality. Change the zoning code to place water quality conditions, such as material handling and storage or a spill response plan, on these uses through a Type II conditional use permit procedure as defined in the *Model Development Code & User's Guide for Small Cities*. (See water quality design guidelines in Section 4.4.1 of this guidebook for example conditions.)

Strategy
List uses and reference to water quality development conditions:

- Automobile body/repair shop;
- Gas station;
- Fleet/trucking;
- Dry cleaner;
- Electrical/electronic manufacturing facility;
- Machine shop;
- Metal plating/finishing/fabricating facility;
- Chemical processing/storage facility;
- Wood preserving/treating facility;
- Junk/scrap/salvage yard;
- Mines/gravel pit (unless zoned EFU and permitted under ORS 215.248);
- Irrigated nursery/greenhouse stock (unless zoned EFU);
- Confined animal feeding operations (unless zoned EFU);
- Land divisions resulting in high density (>1/acre) septic systems;
- Equipment maintenance/fueling areas;
- Injection wells/dry wells/sumps;
- Underground storage tanks, (except those with spill, overfill, and corrosion protection requirements in place;
- All other facilities involving the collection, handling, manufacture, use, storage, transfer or disposal of any solid or liquid material or waste having potentially harmful impact on groundwater or surface water quality;
- All uses not permitted or not permitted as special exceptions.

Discussion
The permitted uses in this section of code should be coordinated with restrictions on uses in other sections of the development code, including those found in Section 4.3.8(a)(i) - The Additional Protection Measures for the model Riparian Protection Overlay.

4.3.7 Agriculture, Horticulture and Livestock Uses

Problem
Many smaller towns and rural residential areas have agriculture uses that are allowed throughout the community. Some of these uses can have detrimental impacts on water quality. For example, concentrated animal pasturing or storage of fertilizer or pesticides.

Objective
Protect and enhance water quality by managing agriculture, horticulture and livestock uses.

Strategy
Implement Section 2.1.200(H) of the *Model Development Code and User's Guide for Small Cities* with the following changes.

Agriculture, Horticulture and Livestock – Sample Code Provisions

The [jurisdiction] allows for agriculture, horticulture and livestock uses, subject to the following standards which are intended to provide buffering between these uses and residences and to protect and enhance water quality and aquatic habitat.

1. Prohibited Areas. Livestock shall not be kept within any of the following areas, as applicable, due to the higher intensity living environments of these areas or the potential impact on water quality.
   a. Multi-family sub-district
   b. Manufactured housing park sub-district
   c. Neighborhood commercial sub-district
   d. Within a riparian protection overlay

2. Minimum Lot Size. No livestock shall be kept on any lot less than one acre in area.

3. Density. No more than [two] head of livestock over the age of six months may be maintained per acre. No more than [X] swine and/or fowl may be maintained per acre.

4. Farm Structures. New barns, stables, and other buildings or structures used to house livestock shall not be developed closer than [X] feet of the property line.

5. Storage of fertilizer, pesticide herbicide, or animal waste. Fertilizer, pesticide and/or herbicide or other similar farm chemicals shall be covered and stored at an elevation one foot higher than the 100 year flood. Animal waste that is collected, shall also be stored at an elevation one foot higher than the 100 year flood.

4.3.8 Specific Area Plan District (Section 2.5 in the *Model Development Code*)

Problem
Some areas within a jurisdiction include significant natural resources that are important to water quality and aquatic habitat. A jurisdiction may feel that such an area requires a greater level of planning detail than is normally found in the comprehensive plan, zone map or public facilities plan to ensure protection of the natural resources.

Objective
To protect significant natural features with a detailed plan district which requires specific goals to be met.

Strategy
Implement Chapter 2.5 – Specific Area Plan Districts of the Model Development Code.

4.3.9 Overlay Districts (Section 2.6 in the *Model Code and User's Guide for Small Cities*)

Overlay districts add requirements to the overlay area that are in addition to base district requirements where special conditions warrant extra care. Overlay districts are excellent tools to protect and enhance water quality and aquatic habitat. The underlying zoning pattern can be maintained, while the overlay district identifies the physical outline of a riparian area (or other designated areas), and attaches special conditions to activities occurring in the watershed area. Density transfers and hardship variances can be used to maintain the economic viability of a site, while maintaining density goals.

Perhaps the most common overlay districts to protect and enhance water quality and aquatic habitat are the riparian districts required by Goal 5. Other water quality overlay districts included in this guide book are:

- drinking water protection overlays to protect drinking water resources;
- hillside or steep slopes overlays to prevent or restrict development on slopes of X percent or more;
- floodway and floodplain overlays to prevent all development in the floodway and severely restrict development in floodplains; and
- wetland protection overlay.

4.2.9(a) Riparian Protection Overlay to Meet Goal 5 Safe Harbor Provisions, TMDL Management Plan Requirements and ESA Liability Concerns

Problem
Local jurisdictions must address their riparian and wetland resources per Goal 5 requirements. In addition, the presence of a stream on DEQ's 303(d) list, or liability concerns resulting from an ESA listing may necessitate more stringent riparian protection (see Chapter 2 for more details). In some cases the riparian buffer required by the Goal 5 safe harbor provision may be adequate to address the water quality impact issues that led to

a 303(d) listing. In other cases, such as when temperature is a factor, a Goal 5 buffer, especially the safe harbor buffer, may not provide enough protection for the riparian area.

Objective
Promote stream health and protect and enhance water quality by establishing riparian protection areas along streams that have been identified through a Goal 5 process, are listed on DEQ's 303(d) list, or are within a watershed effected by an ESA listing for an aquatic species.

Strategy
Implement the following safe harbor model ordinance for Goal 5. If a larger protection area is required to meet other water quality regulations as per Goal 6, implement the supplemental provisions found after the safe harbor model code.

Discussion
The implementation of this ordinance requires the identification and mapping of water bodies within the jurisdiction that qualify as Goal 5 resources. In addition, a determination of the stream flow in cubic feet per second must be made to determine the proper overlay required for each stream. This ordinance will meet the requirements of Goal 5, but may not meet requirements of a TMDL management plan or fully address liability concerns resulting from an ESA listing (see Chapter 2 for more information). When the riparian protection area is established using the Goal 5 rule, any deviation from the safe harbor protection area widths must be done through an ESEE analysis. However, if a jurisdiction makes a finding that a riparian protection overlay is needed to meet state and federal water quality regulations, appropriate riparian corridor widths may be established under the Goal 6 rule.

RIPARIAN PROTECTION OVERLAY (RP)

In an riparian protection overlay the following restrictions shall apply:

(1) Purpose
The primary purposes for the creation of the Riparian Protection Overlay along the [list stream and waterways that apply] corridors are to: protect and enhance water quality; prevent property damage during floods and storms; limit development activity in designated riparian corridors; protect native plant species; maintain and enhance fish and wildlife habitats; and conserve scenic and recreational values of riparian areas.

(2) Establishment of the Riparian Corridor or Overlay Boundary
The riparian protection overlay consist of two component areas: the area within the channel banks, and the protective overlay zone. Areas developed prior to adoption of this section of the [Municipal Code] are acknowledged as pre-existing conditions and are allowed to be maintained in their status at the time of adoption of this section.

For the purposes of this section, development means buildings and any other development requiring a building permit, or any alteration of in the overlay by grading or construction of an impervious surface, including paved or gravel parking areas or paths and any land clearing activity such as removal of trees or other vegetation.

The two components of the riparian protection overlay are defined as:

a. The area within the channel limits of a water feature (from top of one bank to top of the opposite bank) identified in (b) of this subsection. For a given stream, river, or channel the top of bank is the same as the "bankfull stage." The "bankfull stage" is defined as the stage or elevation at which water overflows the natural banks of streams or other waters of this state and begins to inundate the upland.

b. The overlay zones measured horizontally upland from the top of bank are as follows:

   i. Overlay zone from top of bank: In Cubic Feet Per Second (CFS)

Stream Flow (CFS)	Overlay Zone	Water Body
1,000 CFS or more	75 feet	[list water bodies]
Less than 1,000 CFS	50 feet	[list water bodies]

   ii. The provisions of the riparian protection sub-zone do not exempt persons or property from state or federal laws that regulate protected lands, water, wetland, or habitat areas. In addition to the restrictions and requirements of this Section, all proposed development activities within any jurisdictional wetland are also subject to applicable state and federal agency standards, permits and approval.

(3) Limitations on Use

In addition to the requirements of the underlying zone, the following limitations and exceptions shall apply:

a. Removal of Vegetation:
   The removal of vegetation from the RP Overlay is prohibited, except for the following uses after [Planning Official] approval:
   i. Replacement of vegetation with native riparian species as is necessary for restoration activities;
   ii. Removal of non-native vegetation and replacement with native plant species;
   iii. For the development of water-related or water-dependent uses, provided they are designed and constructed to minimize impact on the existing riparian vegetation;
   iv. Removal of emergent in-channel vegetation which has the potential to cause flooding;

b. Building, Paving, and Grading Activities:
Within the RP Overlay, the placement of structures or impervious surfaces, including grading and the placement of fill, is prohibited except as stated below. Exceptions to the RP Overlay restrictions may be made for the following uses, provided they are designed and constructed to minimize adverse impacts to the riparian area:

i. Replacement of existing structures with structures located on the original building footprint which do not disturb additional riparian surface area;
ii. Streets, roads, and paths which are included in the [jurisdiction's] Transportation System Plan;
iii. Water-related and water-dependent uses, including the drainage facilities, water and sewer utilities, flood control projects, and drainage pumps;
iv. Routine maintenance or replacement of existing public facilities projects and public emergencies, including emergency repairs to public facilities;
v. In-channel erosion or flood control measures that have been approved by the Oregon Division of State Lands (DSL), the U.S. Army Corps of Engineers or an other state or federal regulatory agency, and that utilize bio-engineering methods (rather than rip rap).

c. Land Partitions and Property Line Adjustments
Property boundary amendments which would create parcels that cannot be developed in conformance with Riparian Protection Overlay regulations are prohibited.

d. Site Maintenance
The limitations imposed by this section do not preclude the routine maintenance of structures. Maintenance of lawns, planted vegetation and landscaping shall be kept to a minimum and not include the spraying of pesticides or herbicides. Vegetation shall be replanted with native species. Maintenance trimming of existing trees shall be kept at a minimum and under no circumstances can the trimming maintenance be so severe as to compromise the tree's health, longevity, and resource functions. Vegetation within utility easements shall be kept in a natural state and replanted when necessary with native plant species.

e. Hazardous Tree Removal
Hazardous trees are those that pose an obvious and immediate health, safety, or welfare threat to persons or property. Hazardous tree removal, except in emergency circumstances, is required to be reviewed by [jurisdiction] staff. Any trees removed are required to be replaced by like native species or alternate approved native species.

(4) Procedures
The procedure for reviewing any development within the RP Overlay is as follows:

a. Any development or vegetation removal proposal within the RP Overlay shall be submitted to the Planning Official. [The proposal will be reviewed through a Type III procedure as defined in Section 4.1.5 of the *Model Development Code and User's Guide for Small Cities.*]

b. The applicant shall be responsible for the preparation of a professional quality map showing the precise location of the top-of-bank, 100-year flood elevation, wetland edge (if present), riparian setback, significant vegetation, site improvements or other relevant primary features. The application also shall include:

   i. Grading Site Plan. The grading plan shall include information on terrain, drainage, location of proposed and existing structures, and finished elevations.
   ii. Vegetation Report. This report shall consist of a survey of existing native vegetation and proposed alterations. Where the removal of native vegetation is proposed, measures for re-vegetation and enhancement with native plant species will be included. The [jurisdiction] shall have and maintain a list of native vegetation species.

(5) Hardship Variances

For any existing lot or parcel demonstrated to have been rendered not buildable by application of this ordinance and/or when a riparian corridor overlay map error has been verified, the property owner may apply for a hardship variance for waiver of land development restrictions and prohibitions found under subsection (3) of this section. A decision regarding hardship variances will follow the procedures and standards of Article [list appropriate reference to variances] of this ordinance.

(6) Restoration and Enhancement Exceptions

Permanent alteration of the riparian area by placement of structures or impervious surfaces may be permitted upon demonstration that equal or better protection for the remaining on-site Riparian Protection Overlay area will be ensured through restoration of riparian areas, enhanced buffer treatment or similar measures. In no case shall such alterations occupy more than 50% of the width of the riparian area measured from the upland edge of the corridor.

(7) Appeals

[Planning Commission] decisions can be appealed to the [City Council/County Commission] using the procedures described in Section [X] of this Ordinance.

(8) Enforcement

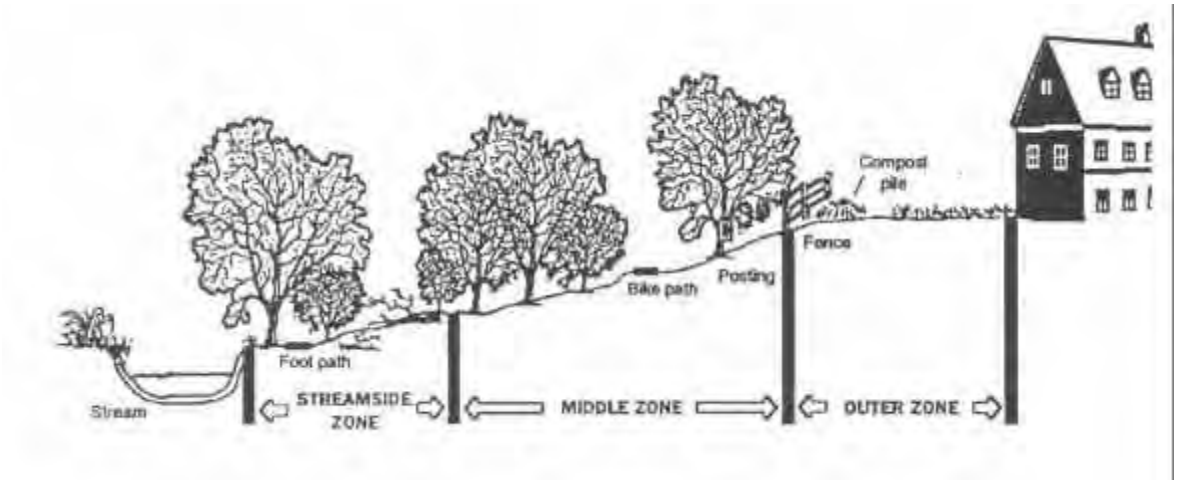
This ordinance shall be enforced in accordance with the procedures cited in the [jurisdiction] Municipal Code Section [X].

4.3.9(b) Additional Protection Measures for Model Buffer Ordinance

If a community determines that a greater amount of riparian protection is needed, based on Goal 6 findings the following ordinance language can be used. The ordinance language in the next few pages replaces Section 2a through Section 2b of the Safe Harbor model ordinance above. The diagram below describes the three zones implemented by the additional language.

Discussion

There are a number of items within the following ordinance language that must be customized to meet the needs of a local jurisdiction. Those items include the minimum width of the protection area, the adjustment for slope and the list of water pollution hazards. (See the drinking water protection ordinance in the next section for a more restrictive list of pollution hazards.) The model language, including the recommended buffer widths, is modified from a model ordinance created by the Center for Watershed Protection based in Ellicott City MD.



Source: *Better Site Design: A Handbook for Changing Development Rules in Your Community*. Center for Watershed Protection, Ellicott City MD.

(Replace Section 2b of safe harbor ordinance.)

b. The required width for all water quality protection overlays (i.e., the base width) shall be a minimum of [100] feet. The water quality overlay will be expanded using the following conditions and criteria.
   i. In streams with over 1,000 CFS, [25] feet shall be added to the base width of the water quality protection overlay. (Alternatively protection thresholds could be based on the watershed area rather than stream flow.)

   ii. The water quality protection overlay width shall be modified if steep slopes are within [200 feet] of the stream and drain into the stream system. In those cases, the water quality protection overlay width shall be adjusted as follows:

Percent Slope	Width of Buffer
15%-17%	add 10 feet
18%-20%	add 30 feet
21%-23%	add 50 feet
24%-25%	add 60 feet

iii. Water quality protection overlays shall be extended to encompass the entire 100-year floodplain.
iv. When a wetland extends beyond the edge of the overlay required by other provisions in this section, the overlay shall be adjusted to include the full extent of the wetland plus a[25]-foot zone extending beyond the wetland edge. (Check that this wetland buffer is no less than wetland buffers provided in wetland overlay zone.)

(Add Section 2c to safe harbor ordinance.)

c. Water Pollution Hazards. The following land uses and/or activities are designated as potential water pollution hazards and must be set back from any stream or waterbody by the distance indicated below:
   i. Outside storage of hazardous substances or materials [150] feet
   ii. Aboveground or underground petroleum storage facilities [150] feet
   iii. Solid waste landfills or junkyards [300] feet
   iv. Confined animal feedlot operations and other livestock areas [250] feet
   v. Land application of biosolids [100] feet (Shall be a minimum of 30 feet by DEQ regulations)

   (Larger buffers are needed when water table next to a stream is high.)

   (The following provisions give more specific direction for allowed and prohibited uses within the protection overly by dividing the protected area into three zones. Use the following code language to replace Section 3 of the safe harbor ordinance, or integrate the concept of a three zone protection area with the limitations listed in the safe harbor ordinance.)

(3) Limitations on Use

The water quality protection overlay shall be composed of three distinct zones, with each zone having its own set of allowable uses and vegetative targets as specified in this ordinance. In addition to the requirements of the underlying zone, the following limitations and exceptions shall apply:

a. Zone 1: Streamside Zone. The goal for the Streamside Zone is undisturbed native vegetation and is regulated as follows:
   (i) Protects the physical and ecological integrity of the stream ecosystem.
   (ii) Begins at the edge of the stream bank of the active channel and extends a minimum of [25] feet from the top of the bank.
   (iii) Allowable uses within this zone are highly restricted to
      1. Flood control structures
      2. Unpaved footpaths
      3. Road crossings, where permitted
      4. Utility rights of way as part of allowed road crossings

b. Zone 2: Middle Zone. The goal of the Middle Zone is to maintain and enhance mature native vegetation adapted to the region and is regulated as follows:
   (i) Protects key components of the stream and provides distance between upland development and the streamside zone.
   (ii) Begins at the outer edge of the streamside zone and extends a minimum of [50] feet plus any additional buffer width as specified in this section.
   (iii) Allowable uses within the middle zone are restricted to
      1. Biking or hiking paths
      2. Structural and nonstructural stormwater management facilities, with the approval of [planning official]
      3. Recreational uses as approved by [planning official]
      4. Tree removal limited to safety and necessary for construction of uses allowed in the Middle Zone. Tree removal requires approval from [planning official]
      5. Utility rights of way

c. Zone 3: Outer Zone. The goal of the Outer Zone is to provide a gradual transition between development and the water quality protection overlay and is regulated as follows:
   (i) Prevents encroachment into the water quality buffer and provides an opportunity for treatment of stormwater where pollutant loads are low and water enters the buffer as sheet flow.
   (ii) Begins at the outward edge of the middle zone and provide a minimum width of [25] feet between Zone 2 and the nearest permanent structure.
   (iii) Prohibits, permanent structures, or impervious cover, with the exception of paths.
   (iv) Encourages the planting of native vegetation to increase the total width of the buffer.

4.3.9(b) Drinking Water Protection (DWP) Overlay Zone for Groundwater Wells

Problem
Development and implementation of a Drinking Water Protection Plan is a strategy available to local governments interested in protecting their source of municipal water. Local governments are not required to develop plans, but those who choose to do so can receive assistance from DEQ and the Oregon Health Department (OHD). Many communities have not developed strategies to protect their drinking water and are placing their drinking water at risk from both point and nonpoint sources of pollution. Protection of drinking water is a key water quality issue, and should not be overlooked when developing ordinances to protect other elements of water quality such as riparian areas. The OHD can require a local jurisdiction to find a new source of drinking water or treat the existing source, if the current supply does not meet certain standards. Protection is a much more cost-effective alternative.

Objective
To protect existing sources of drinking water from both point and nonpoint sources of pollution.

Strategy
Develop a voluntary Drinking Water Protection Plan as outlined by the DEQ and OHD and implement the following model ordinance. If final completion of the Drinking Water Protection Plan is a number of years away, then the model ordinance should be implemented first to establish a base level of protection. The ordinance can then be updated upon completion of the plan.

Model Drinking Water Protection Ordinance for Groundwater Wells

Section 1.0 – General
Appropriate land use regulations may be imposed which are in addition to those imposed in the underlying zoning districts or in other county regulations. Where the regulations and permitted uses of an underlying district conflict with those of an overlay district, the more restrictive standards shall apply.

Section 2.0 – Purpose
The [jurisdiction] recognizes: (a) that residents of [jurisdiction] rely exclusively on groundwater for a safe drinking water supply, and (b) that certain land uses in [jurisdiction] can contaminate groundwater, particularly in shallow/surficial aquifers. The purpose of the Groundwater Protection Area District is to protect public health and safety by minimizing contamination of the shallow/surficial aquifers of [jurisdiction]. This Article established procedures and standards for the use of hazardous materials within Time of Travel Zones (TOTZ).

Section 3.0 - Definitions

AQUIFER. A geological formation, group of formations or part of a formation capable of storing and yielding groundwater to wells and springs.

BEST MANAGEMENT PRACTICES (BMPs). Measures, either managerial or structural, that are determined to be the most effective, practical means of preventing or reducing pollution inputs from point sources or nonpoint sources of water bodies.

CONFINED ANIMAL FEEDING OPERATION (CAFO). The concentrated confined feeding or holding of animals or poultry, including, but not limited to horse, cattle, sheep or swine feeding areas, dairy confinement areas, slaughterhouse or shipping terminal holding pens, poultry and egg production facilities and fur farms, in buildings or in pens or lots where the surface has been prepared with concrete, rock or fibrous material to support animals in wet weather, or which have waste water treatment works.

CONTAMINATION. An impairment of water quality by chemicals, radionuclides, biologic organisms, or other extraneous matter, whether or not it affects the potential or intended beneficial use of water.

DEVELOPMENT. The carrying out of any construction, reconstruction, alteration of surface or structure or change of land use or intensity of use.

FACILITY. Something that is built, installed, or established for a particular purpose.

FARM PRACTICES. A mode of operation that is common to farms of a similar nature; reasonable and prudent for the operation of such farms to obtain a profit in money; is or may become a generally accepted method in conjunction with farm use; complies with applicable laws; and is done in a reasonable and prudent manner.

GREY WATER. All domestic wastewater except toilet discharge water.

HAZARDOUS MATERIAL. A material which is defined in one or more of the following categories:

- Ignitable: A gas, liquid or solid which may cause fires through friction, absorption of moisture, or which has low flash points. Examples: white phosphorous and gasoline.
- Carcinogenic: A gas, liquid, or solid which is normally considered to be cancer causing or mutagenic. Examples: PCBs in some waste oils.
- Explosive: A reactive gas, liquid or solid which will vigorously and energetically react uncontrollably if exposed to heat, shock, pressure or combinations thereof. Examples: dynamite, organic peroxides and ammonium nitrate.
- Highly Toxic: A gas, liquid, or solid so dangerous to humans as to afford an unusual hazard to life. Example: chlorine gas.

- Moderately Toxic: A gas, liquid or solid which through repeated exposure or in a single large dose can be hazardous to humans.
- Corrosive: Any material, whether acid or alkaline, which will cause severe damage to human tissue, or in case of leakage might damage or destroy other containers of hazardous materials and cause the release of their contents. Examples: battery acid and phosphoric acid.

PRIMARY CONTAINMENT FACILITY. A tank, pit, container, pipe or vessel of first containment of a liquid or chemical.

RELEASE. Any unplanned or improper discharge, leak, or spill of a potential contaminant including a hazardous material.

SECONDARY CONTAINMENT FACILITY. A second tank, catchment pit, pipe, or vessel that limits and contains liquid or chemical leaking or leaching from a primary containment area; monitoring and recovery are required,

SHALLOW/SURFICIAL AQUIFER. An aquifer in which the permeable medial (sand and gravel) starts at the land surface or immediately below the soil profile.

SPILL RESPONSE PLANS. Detailed plans for control, recontainment, recovery, and clean up of hazardous material releases, such as during fires or equipment failures.

TIME-OF-TRAVEL DISTANCE. The distance that groundwater will travel in a specified time. This distance is generally a function of the permeability and slope of the aquifer.

TIME OF TRAVEL ZONE (TOTZ). The area mapped pursuant to Oregon Health Division Delineation Certification #0002R which identifies the time it takes ground water to flow to a given well or wellfield.

WELLHEAD PROTECTION AREA. The surface and subsurface area surrounding a water well, spring or wellfield, supplying a public water system, through which contaminants are reasonably likely to move toward and reach that water well, spring or wellfield.

Section 4.0 – Time of Travel Zones (TOTZ)

1. The DWP Overlay District includes two TOTZ: Zone A: 0-6 months and Zone B: all areas not included in Zone A. The locations of the TOTZ for each wellhead are shown on Drinking Water Protection Area Maps on file with the [jurisdiction].

2. The areas within specified wellhead TOTZ are those drinking water protection areas certified by the Oregon Health Division, under the Oregon Administrative Rules that apply to Oregon's EPA-approved Drinking Water Protection Program, in Oregon Health Division Delineation Certification #0002R, March 18, 1999.

3. In determining the location of a property within a TOTZ, the following criteria shall apply:

    a. The [name jurisdiction] Taxation maps shall be used as a base map with the addition of TOTZ boundaries.
    b. That portion of a tax lot that lies within a TOTZ shall be governed by the restrictions applicable to that TOTZ.
    c. Tax lots having parts lying within more than one TOTZ shall be governed by the standards of the more restrictive TOTZ.

4. Exception. The Director may waive the requirement that the more restrictive standards apply when all of the following apply:
    a. Storage, use, handling, treatment, production, and/or transportation of hazardous materials will not take place within the portion of the tax lot having the more restrictive TOTZ standards; and
    b. Storage, use, handling, treatment, production, and/or transportation of hazardous materials will not take place within 50 feet of the portion of the tax lot having more restrictive TOTZ standards; and
    c. The tax lot is 20,000 square feet or larger.
    d. A property owner may request the TOTZ be modified by submitting a Zone Change application to the [jurisdiction]. Any request for modification of the TOTZ shall be accompanied by certification of the TOTZ as proposed to be modified by the Oregon Health Division, under the Administrative Rules that apply to Oregon's EPA-approved Drinking Water Protection Program.

Section 5.0 – Review Procedures

1. A Drinking Water Protection Overlay District Development Application shall be submitted in instances (a) through (d) that include storage, use, handling, treatment, production, and/or transportation of hazardous materials or which increase the quantity of hazardous materials used or produced within the DWP Overlay District.
   a. when there is a change of use, occupancy or tenancy of a property, including but not limited to a change from vacant to occupied;
   b. during the Building Permit process;
   c. when there is an internal alteration of a building that does not require a Building Permit; or
   d. in conjunction with any development application including but not limited to Site Plan review and Minimum Development Standards.

2. DWP Overlay District applications shall be reviewed under Type II procedures (as defined in *Model Development Code & User's Guide for Small Cities*). Development approval within the DWP Overlay District shall be obtained before any change of use, construction, storage or development begins.

3. Applications shall include the following information:
   a. Hazardous Material Inventory Statement and, upon request from the [Director], a Material Safety Data Sheet for any or all materials entered in the Statement. Hazardous material weights shall be converted to volume measurement for purposes of determining amounts - 10 pounds shall be considered equal to 1 gallon in conformance with Uniform Fire Code 8001.15.1;
   b. a list of the chemicals to be monitored through the analysis of groundwater samples and a monitoring schedule if ground water monitoring is anticipated to be required;
   c. a detailed description of the activities conducted at the facility that involve the storage, handling, treatment, use or production of hazardous materials in quantities greater than the maximum allowable amounts as stated in Section 6, 2.c;
   d. a description of the primary and any secondary containment devices proposed, and, if applicable, clearly identified as to whether the devices will drain to the storm or sanitary sewer;
   e. a proposed Hazardous Material Management Plan for the facility that indicates procedures to be followed to prevent, control, collect and dispose of any unauthorized release of a hazardous material;
   f. a description of the procedures for inspection and maintenance of containment devices and emergency equipment;
   g. a description of the plan for disposition of unused hazardous materials or hazardous material waste products over the maximum allowable amounts including the type of transportation, and proposed routes.

4. For those development proposals requiring Site Plan Review or Minimum Development Standards review as specified in [reference appropriate section] of this Code, applications may be submitted concurrently.

5. A complete DWP Overlay District Development application together with all required materials shall be accepted by the [Director] prior to the review of the request as specified in [reference appropriate code section], Application Submittal.

6. The [Director] shall review the application and make a decision on the application after consulting with the [list appropriate officials, building, fire, etc.]

Section 6.0 – Use Provisions

1. ZONE A - DRINKING WATER CRITICAL IMPACT ZONE.
   a. Encouraged Uses. Provided they meet appropriate performance standards outlined in 2c below and are designed so as to prevent any groundwater contamination:
      i. Parks, greenways, or publicly-owned recreational areas.
      ii. Necessary public utilities/facilities.

   b. Special Exceptions. The following uses are permitted only under the terms of a special exception and must conform to provisions of the underlying zoning district and meet the performance standards outlined in 2(c) below.
      i. Expansion of existing nonconforming uses to the extent allowed by the underlying district. (NOTE: consult local plan for nonconforming uses and standards and criteria for their expansion.) The [Council/Planning Commission] shall not grant approval unless it finds such expansion meets the criteria for nonconforming uses and in addition does not pose greater potential contamination of groundwater than the existing use.

c. Prohibited Uses. The following uses are prohibited within Zone A, the 6-month time-of-travel zone. (NOTE: this is typically within about 1000 feet of the public water supply well.)
   - Automobile body/repair shop;
   - Gas station;
   - Fleet/trucking/bus terminal;
   - Dry cleaner;
   - Electrical/electronic manufacturing facility;
   - Machine shop;
   - Metal plating/finishing/fabricating facility;
   - Chemical processing/storage facility;
   - Wood preserving/treating facility;
   - Junk/scrap/salvage yard;
   - Mines/gravel pit (unless zoned EFU and permitted under ORS 215.248);
   - Irrigated nursery/greenhouse stock (unless zoned EFU);
   - Confined animal feeding operations (unless zoned EFU);
   - Land divisions resulting in high density (>1/acre) septic systems;
   - Equipment maintenance/fueling areas;
   - Injection wells/dry wells/sumps;
   - Underground storage tanks, (except those with spill, overfill, and corrosion protection requirements in place;
   - All other facilities involving the collection, handling, manufacture, use, storage, transfer or disposal of any solid or liquid material or waste having potentially harmful impact on groundwater quality;
   - All uses not permitted or not permitted as special exceptions.

2. ZONE B. Zone B is established as the remainder of the wellhead protection area not included in Zone A.

   a. Permitted Uses: All uses permitted in the underlying zoning districts provided that they can meet the Performance Standards as outlined for the Wellhead Protection Area District.

b. Special Exceptions: All special exceptions allowed in underlying districts may be approved by the [Council/Planning Commission] provided they can meet performance standards outlined for the Wellhead Protection Area District.

c. Performance Standards: The following standards shall apply to uses in Zones A and B of the Drinking Water Protection Area District:
   i. Any facility involving the collection, handling, manufacture, use, storage, transfer or disposal of any solid or liquid material or wastes, except those facilities associated with Farm Practices as defined in ORS 30.930 in an Exclusive Farm Use Zone and to the extent prohibited by SB 3486 (pesticide use and sale) and Confined Animal Feeding Operations (CAFOs), in excess of 1,000 pounds and/or 100 gallons, which has the potential to contaminate groundwater, must have a secondary containment system which is easily inspected and whose purpose is to intercept any leak or release from the primary containment vessel or structure. Underground tanks or buried pipes carrying such materials must have double walls and inspectable sumps.
   ii. Open liquid waste ponds containing materials referred to in item (i) above will not be permitted without a secondary containment system.
   iii. Storage of petroleum products in quantities exceeding fifty-five (55) gallons at one locality in one tank or series of tanks must be in elevated tanks; such tanks must have a secondary containment system noted in item (1) above where it is deemed necessary by [city engineer].
   iv. All permitted facilities must adhere to appropriate federal and state standards for storage, handling and disposal of any hazardous waste materials.
   v. A contingency plan acceptable to [planning official] for all permitted facilities must be prepared for preventing hazardous materials from contaminating the shallow/surficial aquifer should floods, fire, or other natural catastrophes, equipment failure, or releases occur:
      (a) For flood control, all underground facilities shall include but not be limited to a monitoring system and secondary standpipe above the 100 year flood control level, for monitoring and recovery. For above ground facilities, an impervious dike, above the 100 year flood level and capable of containing 100 percent of the largest volume of storage, will be provided with an overflow recovery catchment area (sump).
      (b) For fire control, plans shall include but not be limited to a safe fire fighting procedure, a fire retarding system, effective containment of any liquid runoff, and provide for dealing safely with any other health and technical hazards that may be encountered by disaster control personnel in combating fire. Hazards to be considered are pipes, liquids, chemicals, or open flames in the immediate vicinity.
      (c) For equipment failures, plans shall include but not be limited to:
         - Below ground level, removal and replacement of leaking parts, a leak detection system with monitoring, and an overfill protection system.
         - Above ground level, liquid and leaching monitoring of primary containment systems, their replacement or repair and cleanup and/or repair of the impervious surface.

(d) For any other release occurring, the owner and/or operator [as specified in the contingency plan] shall report all incidents involving liquid or chemical material to the designated wellhead protection spill coordinator at the [appropriate office location].

vi. Since it is known that improperly abandoned wells can become a direct conduit for contamination of groundwater by surface water, all abandoned wells should be properly plugged according to Oregon Water Resources Department regulations.

Section 7.0 - City/County Liability

1. Warning and Disclaimer of Liability. The degree of aquifer protection required by this Article in the areas designated in Section [X – Time of travel zones section] is based on scientific and engineering considerations. The nature of these considerations is such that the exact boundaries of Time of Travel Zones (TOTZ) have an associated uncertainty that renders conclusions based on them to be estimates. Under no conditions should this Article be construed to guarantee the purity of the ambient ground water or guarantee the prevention of ground water contamination. Therefore, this Article shall not create liability on the part of the [jurisdiction], or any [jurisdiction] personnel, for any contamination that may result from reliance on this Article or any administrative decision made under this Article.

Section 8.0 - Enforcement

Reference to appropriate section of the Development Code (see 4.4.5 of this guidebook).

Section 9.0 - Saving Clause

1. Should any section or provision of this ordinance be declared invalid, such decision shall not affect the validity of the ordinance as a whole or any other part thereof.

4.3.9(c) Hillside Development (Steep Slopes)

Problem
Development on hillsides and/or areas defined as steep slopes poses a high risk of erosion, and an increased risk of land slides both during and after construction. Sedimentation resulting from erosion can be particularly detrimental to stream water quality and wildlife, since the upper reaches of streams (if accessible) are important spawning and rearing areas for fish and an important source of cold, clean water. Many local development codes do not adequately regulate development on steep slopes, thus resulting in degradation of water quality and endangerment of public safety through the increased likelihood of landslides.

Objective
To regulate development on hillsides in order to protect and enhance water quality and to protect public and private property from damage due to landslides.

Strategy
Implement the following model ordinance to regulate hillside development. Tailor the ordinance to meet local requirements, particularly the identification of drainage areas and the upper reaches of streams.

Discussion
Implementation of this model ordinance requires that “steep slopes” and “constrained slopes” be defined and mapped. This model ordinance uses a wide range of percentages for both steep slopes and constrained slopes to fit with the local topography and development history. Two classes of slopes are used to allow a jurisdiction the flexibility of different levels of development based on the slope. Another, more restrictive, option would be to classify everything as a steep slope above 15 or 20 percent and use just the steep slope standards found in this ordinance.

Other issues to be resolved in this ordinance include the provision for maximum impervious surfaces (IV.A.3.a), the limitation of residential density (IV.C.1) and the amount of density transfer allowed (IV.C.3). A community must look carefully at how much density they allow to be transferred and where are the potential impacts to the “receiving” area or lands. See Section 4.3.2 for more information on density transfer.

Model Hillside and Erosion Control Overlay [HS]

I. Purpose. The purpose of this overlay district is to promote the public health, safety, water quality and general welfare. Provisions under this section are designed to:

   A. Restrict or prohibit uses, activities or development which is damage-prone or damage-inducing to the land or to water quality.

   B. Require uses vulnerable to landslides, including public facilities which serve such uses, to be protected at the time of initial construction.

   C. Allow the development of land only for those uses which are suitable on steep slopes.

   D. Maintain land and water quality by minimizing erosion and sedimentation, and by restricting or prohibiting development, excavation and vegetation removal in areas with constrained or steep slopes.

   E. Comply with Statewide Planning Goals 6 (Air, Water and Land Resources Quality) and 7 (Natural Hazards).

II. Areas of Application. The Hillside and Erosion Control Overlay District shall apply to land on slopes of [15-35] percent or greater or unconstrained slopes within [30] feet of the top of escarpments associated with rivers or streams. (note – if implementing the extended model buffer ordinance in Section 4.2.8(a) (Riparian Overlay) of this guide book, then the 30 foot setback should be coordinated with the provisions of that ordinance.)

A. Delineation of Boundaries.

The Hillside and Erosion Control Overlay District shall be mapped generally by the [jurisdiction], and shall consist of Steep Slope and Constrained Slope areas.

1. Steep Slope areas include all areas in the [jurisdiction] where the slope of the land is [15-35] percent or greater.
2. Constrained slope areas include all areas where the slope of the land is between [beginning at 15-20 and ending at 25-35] percent.
3. These areas are associated primarily, but not exclusively, with the [list significant drainages and streams in the jurisdiction].
4. Specific determination of Steep Slope and Constrained Slope areas shall be made at the time of a development proposal by the applicant for alteration or development for the respective properties within the Hillside and Erosion Control Overlay District, based on the topographic map and field survey.
5. Areas subject to the restrictions and prohibitions of this overlay district are indicated on the map entitled "[jurisdiction] Slope Map" on file with the [jurisdiction].
   a. Where development, excavation or vegetation removal is proposed for areas with [the minimum defined for constrained slopes] percent or greater slope, an on-the-ground topographical survey shall be prepared for the entire site. The survey shall show trees or tree clusters and 2 foot contours, and shall be provided by the property owner or applicant for development approval.
   b. Areas with [as defined for constrained slopes above] percent slopes, and areas with [as defined as steep slopes above] percent or greater slopes, shall be specifically indicated on the required survey maps.

B. Warning and Disclaimer of Liability.

The degree of landslide protection required by this ordinance is considered reasonable for regulatory purposes, and is based on common engineering and scientific practices . Landslides may occur on rare occasions in areas outside of the delineated Steep Slope and Constrained Slope boundaries. This Ordinance does not imply that areas outside the Hillside and Erosion Control Overlay District boundaries, or land use permitted within such boundaries, will be free from significant mass movement or landslide damage. This Section shall not create [jurisdiction] liability for damage resulting from reliance on the provisions of this Section or any administrative decision lawfully made thereunder.

III. Permitted Uses

A. Steep Slope [as defined above] or unconstrained slopes within [30] feet of the top of escarpments associated with rivers or streams.
   1. Open space and trails as designated by the [comprehensive plan] provided they are constructed consistent with standards on file with the [jurisdiction].

   2. Removal of refuse and unauthorized fill.

   3. Removal of nuisance or invasive plant species, or planting of approved vegetation species on the [Native] Plant List kept on file at the [jurisdiction].

   4. Removal of dead or dying trees that are an imminent danger to public safety as determined by the [Director].

   5. Construction of roads designated in the Transportation System Plan and public utilities necessary to support permitted development on slopes of [the minimum defined for constrained slopes] percent or less, subject to construction standards on file in at the [jurisdiction].

   6. Expansion of existing roadways and public utility facilities necessary to support permitted development on slopes of [the minimum defined for constrained slopes] percent or less, subject to construction standards on file in at the [jurisdiction].

B. Prohibited uses on slopes of [the minimum defined for steep slopes] percent or greater, unless specifically permitted under Section IV:
   1. Man-made structures except as described in IV.C.4.
   2. Vegetation removal not specifically allowed under sub-section III A.
   3. Road construction not specifically allowed under sub-section III A.
   4. Excavation.

C. Uses Permitted - Constrained Slope [as defined above].
   1. Open space.
   2. Any use in the underlying district provided the standards of Section IV are met.
   3. Removal of nuisance or invasive plant species, or planting of approved vegetation species on the [Native] Plant List and kept on file at the [jurisdiction].

IV. Hillside Development Standards.

A. Standards.

1. The property shall have access to a public street or to a private street connected to a public street. All streets shall be built to a width and street improvement standard acceptable to the [jurisdiction]. The parcel can be adequately served by [municipal] water supply and sanitary sewer systems or meets applicable state standards for individual sewage disposal systems.

2. Where slopes are [the minimum defined for steep slopes] percent or greater, or on unconstrained land within [30] feet of the top of escarpments associated with rivers or streams, grading, approved vegetation removal, site preparation and construction shall be prohibited, except where necessary to provide access or utilities to buildable lots with slopes of [as defined for constrained slopes] percent or less.
   a. Land with slopes of [the minimum defined for steep slopes] percent or greater shall be conserved and maintained as open space. This may occur through private ownership, through private conditions, covenants and restrictions, through conservation easements enforceable by the [jurisdiction] or other public or private nonprofit agency, or where approved by the [City/County Council/Commission], dedication to the [jurisdiction] or donation to other appropriate public or private nonprofit agency.
   b. Disturbed areas shall be replanted in approved [native] vegetation and tree cover.

3. Where development is proposed on slopes of [the minimum defined for constrained slopes] percent or greater:
   a. The impervious surface area of any residential lot or commercial or industrial site (including driveways, sidewalks, structures, swimming pools, and any other area not covered by vegetation) shall not exceed [30] percent of the constrained [as defined for constrained slopes] slope area;
   b. Development shall not result in cuts or fills in excess of three (3) feet except for basement construction unless specifically approved by the [Director].
   c. At least half the constrained slope area shall remain in, or be planted in, approved native vegetation. The existing tree canopy shall be retained wherever possible, and shall be considered in meeting this standard.
   d. If development is proposed on constrained or steep slope areas, a mitigation plan for disturbed areas on constrained or steep slope areas shall be prepared and implemented. This plan shall provide for the replanting and maintenance of approved native plant species designed to achieve pre-disturbance conditions.

4. The applicant's engineering plans shall certify that runoff and sedimentation from the site will not increase more than [10%] above conditions present on the site as of [effective date of ordinance].
5. The applicant's engineer shall provide a construction erosion control plan and water quality plan, consistent with the provisions of Section [X – cross reference to appropriate Code section] [and consistent with the DEQ's or jurisdiction's NPDES stormwater control program].

B. Submission Requirements. For the purpose of minimizing landslide hazards, and where development is proposed on slopes of [as defined for constrained slopes] percent or greater, the [Director] shall require submission of the following special reports, prepared by professionals in their respective fields:
   1. Hydrology and Geology Report. This report is required for subdivisions with [25] lots or more. This report shall include information on the hydrological activities of the site, the effect of hydrologic conditions on the proposed development, and any hydrological or erosion hazards. This report shall also include geological characteristics of the site, its suitability for development, its carrying capacity, and any geological hazard that might present a hazard to life and property, or adversely affect the use or stability of a public facility or utility.
   2. Soils Report. A soils report is required for all new development. This report shall include information on the nature, distribution and strength of existing soils, the adequacy of the site for development purposes, and an assessment of grading procedures required to impose the minimum disturbance to the natural state.
   3. Grading Plan. The grading shall be specific to a proposed physical structure or use and shall include information on terrain (two-foot contours), drainage, direction of drainage flow, location of proposed structures and existing structures which may be affected by the proposed grading operations, water quality facilities, finished contours or elevations, including all cut and fill slopes and proposed drainage channels. Project designs including but not limited to locations of surface and subsurface devices, walls, dams, sediment basins, storage reservoirs, and other protective devices shall form part of the submission. The grading plan shall also include a construction phase erosion control plan and a schedule of operations and shall be prepared by a professional engineer registered in Oregon.
   4. Vegetation Report. This report shall consist of a survey of existing vegetative cover, whether it is native or introduced, and how it will be altered by the proposed development. Measures for re-vegetation with approved native plant species will be clearly stated, as well as methods for immediate and long-term stabilization of slopes and control of soil erosion. The vegetation report shall be prepared by a landscape architect, landscape designer, botanist, arborist, or natural resource planner with specific knowledge of native plant species, planting and maintenance methods, survival rates, and their ability to control erosion and sedimentation. The applicant will be responsible for replacing any [native] plant species that do not survive the first two years after planting.

5. Design Standards. The required reports shall include design standards necessary for the engineer and landscape expert to certify that development on slopes of [the minimum as defined for constrained slopes] percent or greater, when combined with impacts from development of lesser slopes, will not increase runoff, sedimentation to affected streams or wetlands, erosion, or landslide potential more than [10%] above base conditions. These requirements shall be incorporated as conditions into the final decision approving the proposed development.

C. Residential Density Allowance and Transfer Provisions.
   1. Slopes of between [as defined for constrained slopes] percent: the maximum residential density allowed in constrained slopes areas shall be [70] percent of the [average] density otherwise permitted in the underlying residential zoning district. The remaining [30] percent of the otherwise permitted density may be transferred to buildable portions of the site (i.e., areas where slopes are less than 15 percent and outside of the 100-year floodplain).
   2. Slopes of [minimum as defined for steep slopes] percent or greater: density may be transferred to buildable portions of the site (i.e., where slopes are less than 15 percent and outside the floodplain) at a rate of [one unit per steeply-sloped acre.]
   3. The net increase in density as a result of density transfer shall not exceed [50] percent of the base density that would otherwise be allowed on buildable portions of the lot.
   4. Exception: Each lot-of-record that has received planning approval from [jurisdiction], may have one dwelling unit, provided that the siting, engineering, erosion control, water quality and re-vegetation standards of Section IV have been fully satisfied. No new lot shall be approved for development which is exclusively on slopes of [the minimum defined as steep slopes] percent or greater.

V. Approval Procedure - Type II.

A. The [Director] shall approve new development for a single-family or two-family dwelling under the Type II procedure (as defined by the *Model Development Code and User's Guide for Small Cities*) within the Hillside and Erosion Control Overlay District only if the proposed use or structure meets all of these conditions:
   1. Development standards are met as prescribed under section IV.

   2. Adequate protection is utilized to minimize landslide and erosion hazards, consistent with Section [cross-reference to appropriate Code section as per Section IV.A.5 above].

3. The applicant provides assurances that development impacts will be minimized on slopes greater than [the minimum defined for steep slopes] percent, provided however, that a property owner shall not be denied the right to construct a single-family home on a residentially zoned, lot-of-record, approved by the [jurisdiction] prior to [effective date of ordinance].

4. Notwithstanding the provisions of Section [reference appropriate Code section on variances], Variance, an adjustment of up to [50] percent from any dimensional standard in the underlying zoning district may be approved under Type I procedure, where necessary to avoid construction on slopes of [the minimum defined for steep slopes] percent or greater or to meet the standards of Section IV.

5. It is in conformance with the provisions of the [jurisdiction] Development Code .

B. The [Director] shall determine the final boundaries of constrained slope and steep slope areas based on topographical information provided by an engineer or surveyor registered in Oregon. The applicant shall be responsible for submitting such information.

VI. Approval Procedure - Type 3. The [Planning Commission] shall approve new developments for more than one single-family or two-family dwelling within the Hillside and Erosion Control Overlay District under a Type 3 procedure provided that the proposed use or structure meets all of these conditions:

A. Development standards are met as prescribed under Section IV.

B. Adequate protection is utilized to minimize landslide and erosion hazards, consistent with Section [cross-reference to appropriate Code section as per Section IV.A.5 above].

C. It is in conformance with the [jurisdiction's] Comprehensive Plan, and [jurisdiction's] Development Code, [provided, however, that policies in the Comprehensive Plan will not be used to discourage needed housing, or to unreasonably increase cost or review time].

4.3.9(d) Floodway and Floodplain Overlay District

Problem
Most of Oregon's flood prone communities participate in the National Flood Insurance Program (NFIP). In exchange for implementation and enforcement of floodplain development ordinances, local governments ensure that flood insurance is available to community residents. Communities participating in the NFIP must also designate a floodway to avoid significantly increasing upstream flood elevations. A floodway is defined as the river channel and floodplain that must remain unobstructed in order to discharge the base flood without increasing flood levels by more than one foot. Construction within the floodway is well regulated, but development in the floodplain may not be. In addition, some local flood hazard ordinances may be out of date, requiring updating to protect private and public property from flood hazards and aid in the protection and enhancement of water quality.

The floodplain serves as natural storage for flood waters, protecting downstream development by decreasing the velocity of runoff and lengthening the amount of time it takes for water to flow downstream. An intact, natural floodplain improves water quality in the same way. Decreased velocity reduces erosion and the lengthening of the runoff period decreases the severity of the flood. Building impervious surfaces in a floodplain disrupts the natural function of the floodplain, and leads to decreased water quality, loss of fish and wildlife habitat/refuge and increased property damage. Unfortunately, floodplains are some of the least costly land to build on, and have been mostly built out in many communities.

Objective
To protect and enhance water quality, preserve fish and wildlife habitat/refuge and to decrease property damage by better regulating development within the floodplain and prohibiting development in the floodway.

Strategy
Update the community's flood hazard ordinance using the model FEMA ordinance found in the appendix. The model establishes the minimum ordinance language needed for a community to participate in the National Flood Insurance Program. Supplement the model ordinance with the following water quality provisions to help protect and enhance water quality. If the community's flood hazard ordinance is up to date, the following additions can be made to the existing ordinance with a minimal amount of effort.

Note: The parenthetical references refer to the model FEMA ordinance found in the` appendix.

Statement of Purpose (Section 1.3 in the FEMA model ordinance)
Add language to the purpose section of the floodplain ordinance specific to the water quality issues associated with flooding:

> To protect and enhance water quality by restricting or prohibiting uses which cause increased flood heights or velocity or lead to increased erosion on site or downstream.

Area of Flood Hazard (Section 3.2 in the FEMA model ordinance)
To participate in the National Flood Insurance Program, local governments must include a reference to the Flood Insurance Administration's (FIA's) Flood Insurance Study and the Flood Insurance Rate Maps in their flood development ordinance. Many of these maps are almost 20 years old and do not reflect flood hazards associated with new development. To better protect the community from flooding and to achieve water quality goals, a community might include a broader area for floodplain management based on historic flood records, including aerial photos.

> The Ordinance shall apply to all areas of special flood hazard areas within [jurisdiction]. The areas of special flood hazard identified by the Federal Insurance Administration in a scientific and engineering report entitled *The Flood Insurance Study for the [jurisdiction]* dated [list date] and as amended, with accompanying Flood Insurance Maps, as amended are hereby adopted by reference and declared to be a part of this ordinance. The flood hazard areas also include areas identified and mapped by [jurisdiction] that were not studied by the Flood Insurance Administration. The report and maps are incorporated in the overlay zone by this reference and are on file [list location of maps].

Floodways (Section 5.3 in the FEMA model ordinance)
The current NFIP regulations require different treatment of development in floodways versus floodplains. These could be treated differently by local governments to address water quality concerns.

Floodways are those areas closest to the stream channel, and thus development in this area has the greatest impact on flooding and water quality. Federal regulations require an engineering certification that development in the floodway area will cause no rise in the base flood elevation. Some communities have gone beyond this general requirement by prohibiting any development or "encroachment" in the floodway area. In effect, establishing a setback requirement for new development.

> Above ground structures are not allowed in the [jurisdiction] floodway as delineated by the Federal Emergency Management Agency on [date of floodway map].

In some cases, local governments allow no development in floodways with the exception of local public works activities (utilities, bridges…). The following language provides an exception for public works activities:

Floodways are established in Special Flood Hazard areas to transport the waters of a 100-year flood out of the community as quickly as possible with minimal flood damage. Floodways are most often mapped in urban areas, including in small cities. Encroachments on the floodway generally produce a rise in base flood elevation and contribute to other hydraulic problems. Accordingly [jurisdiction] prohibits encroachment on designated floodways except for public works projects pursuant to section [xx] (below).

[Jurisdiction] recognizes that utilities, flood prevention structures and improvement projects that are in the public's best interest must sometimes encroach on designated floodways. In compliance with Federal Emergency Management Agency requirements, (44 CFR s. 65.12), [jurisdiction] will permit floodway encroachments under the following conditions:

(1) the [jurisdiction] finds that the proposed public works project is in the public interest; and
(2) FEMA has approved the proposed project.

In no instance shall the proposed development result in any increase in flood levels during the occurrence of the base flood discharge.

Encroachments (Section 5.4 in the FEMA model ordinance)
The model FEMA ordinance requires that proposed development within areas of special flood hazard not increase the surface elevation of the base flow more than one foot. Some jurisdictions allow only a 0.1-foot rise or 0.5-foot rise. Another option is to maintain a strict zero-rise standard to avoid cumulative impacts from many developments in the Flood Hazard area. These lower allowed flood elevations result in wider floodways. Wider floodways result in less streamside development, which benefits water quality.

The cumulative effect of any proposed development within the areas of special flood hazard established in Section 3.2 of this ordinance shall not increase the water surface elevation of the base flood at any point.

Prohibited Uses
The FEMA model ordinance does not include a list of prohibited uses. There are certain uses that a community may want to prohibit from the area of special flood hazard. Generally these uses will be similar to those prohibited in the Drinking Water Protection Overlay found in 4.2.8(b) of this guidebook.

The following uses are prohibited from the area of special flood hazards as defined 3.2 of this ordinance:

- Automobile body/repair shop;
- Gas station;
- Fleet/trucking/;
- Dry cleaner;
- Electrical/electronic manufacturing facility;
- Machine shop;
- Metal plating/finishing/fabricating facility;
- Chemical processing/storage facility;
- Wood preserving/treating facility;
- Junk/scrap/salvage yard;
- Mines/gravel pit (unless zoned EFU and permitted under ORS 215.248);
- Irrigated nursery/greenhouse stock (unless zoned EFU);
- Confined animal feeding operations (unless zoned EFU);
- Land divisions resulting in high density (>1/acre) septic systems;
- Equipment maintenance/fueling areas;
- Injection wells/dry wells/sumps;
- Underground storage tanks, (except those with spill, overfill, and corrosion protection requirements in place;
- All other facilities involving the collection, handling, manufacture, use, storage, transfer or disposal of any solid or liquid material or waste having potentially harmful impact on groundwater quality;
- All uses not permitted or not permitted as special exceptions.

44.3.9(e) Wetland Protection Overlay

Problem

Many communities rely on the Oregon Division of State Lands (DSL) to designate and regulate wetlands. The DSL's jurisdiction over wetlands is limited to regulation of fill and removal activities in the wetland itself. The regulations permit fill to be placed in wetlands if the loss is mitigated. DSL does not have jurisdiction over vegetation removal, or any buffer that may be needed to preserve wetland functions.

Oregon State Land Use Planning Goal 5 directs local governments to protect significant wetlands from urban impacts. Goal 5 requires that local communities complete a "Local Wetlands Inventory" (LWI) that identifies all wetlands and characterizes them by their condition and function. Significant wetlands must then be identified using criteria adopted by the DSL (see OAR 141-086-0350 for a list of the criteria) and programs to protect significant wetlands must be developed. The significance of a wetland is determined largely by the habitat and water quality functions the wetland provides. In some cases these functions can be compromised if urban development is allowed up to the edge of the wetland. The standard Goal 5 process requires an economic, social, environmental, and

energy (ESEE) analysis, to determine appropriate protection measures. State land use laws, however, provide a safe harbor option for protecting significant wetlands. The safe harbor does not protect wetland buffers. If adopted under Goal 5 rules, restrictions on development adjacent to significant wetland would need to be justified under an ESEE analysis.

It may also be possible to address wetland and wetland buffer protection under the water quality provisions of Goal 6. It is well established that wetlands serve an important function in preserving the natural hydrology of a watershed. However, a connection must be made between protecting wetland function in a watershed and protecting water quality. Findings to justify protection of wetlands under Goal 6 would need to be established. DSL's Oregon Freshwater Wetlands Assessment Methodology and the state criteria for determining wetlands significant for water quality (see OAR 146-086-0350) provides guidance for this type of assessment.

NMFS has identified a local wetlands protection program, which includes buffers as a criterion for a limitation on take (See Chapter 2).

Objective
Protect wetlands and wetland function through a protection overlay that includes a wetland buffer to protect and enhance water quality and aquatic habitat.

Strategy
Implement the following model ordinance to meet Goal 5 safe harbor requirements for protecting locally significant wetlands. Using the ESEE analysis process, identify appropriate protection measures for upland areas that serve to protect wetland functions from urban impacts. Alternatively, use the following model ordinance to meet Goal 6 requirements based on findings that wetland protection is necessary for meeting water quality standards or load allocations issued under a TMDL.

Discussion
The following model ordinance includes a wetland buffer as a component of the wetland protection area. A wetland buffer is excluded from the safe harbor provisions of Goal 5. Therefore, specific findings will need to be made, using an ESEE analysis, to protect wetland buffers around some or all wetlands. The more weight that is given to aquatic habitat needs in the analysis, the more likely the resulting program will meet the wetland protection criterion for limitation on take in the 4(d) rule for salmon and steelhead.

If a community chooses not to address wetland buffers, this model ordinance can be used to meet the safe harbor requirements of Goal 5 by not including the language italicized and within brackets.

The implementation of this ordinance requires the completion of a Local Wetlands Inventory as prescribed in the Goal 5 rule. This inventory should be referenced in the Comprehensive Plan. An example can be found in Chapter 3 - Model Comprehensive Plan under Goal 5.

WETLAND PROTECTION AREAS

I. Wetland Protection Areas, Purposes

The purposes of establishing wetland protection areas are:

(1) To implement the goals and policies of the [jurisdiction] Comprehensive Plan and achieve their purposes.
(2) To protect and restore [jurisdiction's] wetland areas, thereby protecting and restoring the hydrologic, ecologic, and land conservation functions these areas provide for the community.
(3) To protect fish and wildlife habitat, enhance water quality, control erosion and sedimentation, and reduce the effects of flooding.
(4) To protect and restore the natural beauty and distinctive character of [jurisdiction's] wetlands as community assets.
(5) To enhance the value of properties near wetlands by utilizing the wetland as a visual amenity.
(6) To enhance coordination among local, state, and federal agencies regarding development activities near wetlands.

II. Wetland Protection Areas, Definitions

The following definitions shall apply to Sections I through XI, "Wetland Protection Areas":

Wetland - An area inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and which, under normal circumstances, does support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

Locally significant wetland - Locally significant wetlands are as determined by OAR 141-86-350.

Local Wetlands Inventory **(LWI)** – Maps and report entitled [list report that inventories wetlands] and any subsequent revisions as approved by the Oregon Division of State Lands.

Oregon Freshwater Wetland Assessment Methodology **(OFWAM) -** A wetland function and quality assessment methodology developed by the Oregon Division of State Lands.

Wetland buffer area - An area, identified and recorded through an ESEE process, surrounding or adjacent to a locally significant wetland.

Wetland protection area - An area that includes any wetland determined to be locally significant [*plus its wetland buffer area*].

Jurisdictional delineation - A delineation, approved by the Oregon Division of State Lands, and the U.S. Army Corps of Engineers if required, of the wetland boundary.

III. Determination of Local Significance for Wetlands

A determination of locally significant wetlands has been be made by the [jurisdiction] in accordance with rules adopted by Division of state Lands (OAR 141-086-3000, and are identified on [Name localy significant wetland inventory map for the jurisdiction].

[*IV. Determination of a Wetland Buffer Area*

A determination of the wetland buffer area shall be made by the [jurisdiction] through an ESEE decision process as described in OAR 660-02-0040. The wetland buffer area shall be identified on a "Wetland Buffer Map" that includes all locally significant wetlands and their buffer areas. The map shall be kept available at the [jurisdiction] for reference. Upon approval of the ESEE decision process the provisions of Sections I through XII "Wetland Protection Areas" shall apply to the identified wetland buffer areas.]

V. Wetland Protection Areas, Applicability

A. The provisions of Sections I through XII, "Wetland Protection Areas," shall be applied to any property or parcel containing wetlands identified as being locally significant [*and the areas identified on the Wetland Buffer Map*]. The provisions shall apply regardless of whether or not a building permit, development permit, or plan authorization is required. The provisions do not provide any exemption from state or federal regulations. Sections I through XII, "Wetland Protection Areas," shall take precedence over other wetland regulations or standards in specific area plans or applicable master plans.

B. Applications for plan authorizations (except Annexations), development permits, or building permits, and plans for proposed public facilities on parcels containing a wetland protection area, or a portion thereof, shall contain the following:

(1) A jurisdictional delineation of the wetland boundary, approved by the Oregon Division of State Lands.
(2) A to-scale drawing that clearly delineates the wetland boundary, the wetland buffer area, the surface water source, and existing trees and vegetation.

C. When reviewing development permits or plan authorization applications for properties containing a wetland protection area, or portion thereof, the approving authority shall consider how well the proposal satisfies the purpose statements in Section I, "Wetland Protection Areas, Purposes," in addition to any other required approval criteria.

D. The [Planning Commission] shall be the approving authority for applications for exceptions to the Wetland Protection Area provisions. In addition to the provision of Sections [list appropriate sections of development code that deal with exceptions or variances] such a request shall be submitted to the Oregon Department of Fish and Wildlife for a mitigation recommendation pursuant to OAR 635-415 "Fish and Wildlife Habitat Mitigation Policy."

VI. Wetland Protection Areas, Location

Wetland protection areas consist of locally significant wetlands [*plus the wetland buffers identified on the Wetlands buffer Map*].

VII. Permitted Activities Within Wetland Protection Areas

A. Any use, sign, or structure, and the maintenance thereof, lawfully existing on the date of adoption of this ordinance, is permitted within a wetland protection area. Such use, sign, or structure may continue at a similar level and manner as existed on the date of adoption of this ordinance. The maintenance and alteration of pre-existing ornamental landscaping is permitted within a wetland protection area as long as no additional native vegetation is disturbed. The provisions of this section shall not be affected by any change in ownership of properties containing a wetland protection area.

B. All plans for development and/or improvements within a wetland protection area shall be submitted to the Oregon Department of Fish and Wildlife for a mitigation recommendation pursuant to OAR 635-415 "Fish and Wildlife Habitat Mitigation Policy." The following activities, and maintenance thereof, are permitted within a wetland protection area, if applicable permits from the Oregon Division of State Lands and the U.S. Army Corps of Engineers are obtained.

(1) Wetland restoration and rehabilitation activities.

(2) Restoration and enhancement of native vegetation.

(3) Cutting of trees which pose a hazard due to threat of falling, if the tree is left in the wetland protection area after felling; or removal of non-native vegetation, if replaced with native plant species at the same amount of coverage or density.

(4) Normal farm practices, other than structures, in existence at the date of adoption of the provisions herein, on land zoned for Exclusive Farm Use.

(5) Channel maintenance practices, other than structures, to maintain flow at original design capacity within a waterway, necessary to mitigate flooding, provided that management practices are used to minimize sedimentation and impact to vegetation.

(6) Replacement of a permanent legal nonconforming structure in existence at the date of adoption of this ordinance with a structure on the same building footprint, if it does not disturb additional area, and in accordance with the provisions of Sections [list sections of code related to nonconforming uses].

(7) Expansion of a permanent legal nonconforming structure in existence at the date of adoption of this ordinance, if the expansion area is not within the wetland protection area, and in accordance with the provisions of Sections [list sections of code related to nonconforming uses].

C. New fencing shall be permitted at the discretion of the [Planning Director or designee] in consultation with the [Director of Public Works] and applicable state and federal agencies. An application for new fencing within a wetland protection area shall contain a to-scale drawing that clearly depicts the wetland and wetland buffer area boundary on the entire parcel or parcels, and shall indicate why the proposal is necessary and how it minimizes intrusion into the wetland protection area.

VII. Conditional Uses within Wetland Buffer Areas

A. The following activities, and maintenance thereof, are allowed within the wetland buffer area if compatible with Section I "Wetland Protection Areas, Purposes," if no other options or locations are feasible, and if designed to minimize intrusion. Such activities shall be subject to approval of a Conditional Use Permit, which may be considered separately or in conjunction with another plan authorization review. The approving authority must determine that the proposal complies with at least one of the Conditional Use Permit criteria and the criteria of this paragraph. Applicable permits from the Oregon Division of State Lands and the U.S. Army Corps of Engineers shall be obtained. All development and improvement plans shall be submitted to the Oregon Department of Fish and Wildlife for a mitigation recommendation pursuant to OAR 635-415 "Fish and Wildlife Habitat Mitigation Policy."

(1) Water-related or water-dependent uses as defined by [Department of Land Conservation and Development or jurisdiction], such as drainage facilities and irrigation pumps.
(2) Utilities or other public improvements.
(3) Streets, roads, or bridges where necessary for access or crossings.
(4) Public multi-use paths, accessways, trails, picnic areas, or interpretive and educational displays and overlooks, including benches and outdoor furniture.

VIII. Prohibited Activities Within Wetland Protection Areas

The following activities are prohibited within a wetland protection area, including the 50-foot wetland buffer area, except as permitted in Sections VI "Permitted Activities Within Wetland Protection Areas" and VII "Conditional Uses within Wetland Buffer Areas."
(7) Expansion of a permanent legal nonconforming structure in existence at the date of adoption of this ordinance, if the expansion area is not within the wetland protection area, and in accordance with the provisions of Sections [list sections of code related to nonconforming uses].

C. New fencing shall be permitted at the discretion of the [Planning Director or designee] in consultation with the [Director of Public Works] and applicable state and federal agencies. An application for new fencing within a wetland protection area shall contain a to-scale drawing that clearly depicts the wetland and wetland buffer area boundary on the entire parcel or parcels, and shall indicate why the proposal is necessary and how it minimizes intrusion into the wetland protection area.

VII. Conditional Uses within Wetland Buffer Areas

A. The following activities, and maintenance thereof, are allowed within the wetland buffer area if compatible with Section I "Wetland Protection Areas, Purposes," if no other options or locations are feasible, and if designed to minimize intrusion. Such activities shall be subject to approval of a Conditional Use Permit, which may be considered separately or in conjunction with another plan authorization review. The approving authority must determine that the proposal complies with at least one of the Conditional Use Permit criteria and the criteria of this paragraph. Applicable permits from the Oregon Division of State Lands and the U.S. Army Corps of Engineers shall be obtained. All development and improvement plans shall be submitted to the Oregon Department of Fish and Wildlife for a mitigation recommendation pursuant to OAR 635-415 "Fish and Wildlife Habitat Mitigation Policy."

(1) Water-related or water-dependent uses as defined by [Department of Land Conservation and Development or jurisdiction], such as drainage facilities and irrigation pumps.
(2) Utilities or other public improvements.
(3) Streets, roads, or bridges where necessary for access or crossings.
(4) Public multi-use paths, accessways, trails, picnic areas, or interpretive and educational displays and overlooks, including benches and outdoor furniture.

VIII. Prohibited Activities within Wetland Protection Areas

The following activities are prohibited within a wetland protection area, including the 50-foot wetland buffer area, except as permitted in Sections VI "Permitted Activities Within Wetland Protection Areas" and VII "Conditional Uses within Wetland Buffer Areas."

(1) Placement of new structures or impervious surfaces.
(2) Excavation, grading, fill, or removal of vegetation, except for perimeter mowing for fire protection purposes.
(3) Expansion of areas of pre-existing non-native ornamental landscaping such as lawn, gardens, etc.
(4) Dumping, piling, or disposal of refuse, yard debris, or other material.
[(5) Discharge of untreated stormwater]

[*X. Wetland Buffer Areas, Reduction or Deviation*

A request to deviate from the wetland buffer area, including buffer averaging, may be submitted for consideration by the [Planning Director or designee]. A deviation request may be approved as long as equal or better protection of the wetland will be ensured through a plan for restoration, enhancement, or similar means, and if applicable permits from the Oregon Division of State Lands and the U.S. Army Corps of Engineers are obtained. Such a plan shall be submitted to the Oregon Department of Fish and Wildlife for a mitigation recommendation pursuant to OAR 635-415 "Fish and Wildlife Habitat Mitigation Policy." In no case shall activities prohibited in Section VIII (1) through (3) "Prohibited Activities Within Wetland Protection Areas" occupy the wetland or more than 50 percent of the wetland buffer area. The [Planning Commission] shall be the approving authority for applications to alter the buffer area.]

XI. Conservation and Maintenance of Wetland Protection Areas

When approving applications for the following plan authorizations: Land Divisions, Planned Unit Developments, Conditional Use Permits, and Exceptions, or for development permits for properties containing a wetland protection area, or portion thereof, the approving authority shall assure long term conservation and maintenance of the wetland protection area through one of the following methods:

(1) The area shall be protected in perpetuity by a conservation easement recorded on deeds and plats prescribing the conditions and restrictions set forth in Sections I through XII, "Wetland Protection Areas," and any imposed by state or federal permits; or,
(2) The area shall be protected in perpetuity through ownership and maintenance by a private nonprofit association by conditions, covenants, and restrictions (CC&R's) prescribing the conditions and restrictions set forth in Sections I through XII, "Wetland Protection Areas," and any imposed by state or federal permits; or,
(3) The area shall be transferred by deed to a willing public agency or private conservation organization with a recorded conservation easement prescribing the conditions and restrictions set forth in Sections I through XII, "Wetland Protection Areas," and any imposed by state or federal permits; or,
(4) The area shall be protected through other appropriate mechanisms acceptable to the [jurisdiction] which ensure long-term protection and maintenance.

XI. Wetlands Notification to Oregon Division of State Lands

The Oregon Division of State Lands shall be notified in writing of all applications to the [jurisdiction] for development activities, including applications for plan authorizations, development permits, or building permits, and of development proposals by the [jurisdiction], that may affect any wetlands, creeks, or waterways identified on the Local Wetlands Inventory.

4.5 Procedures

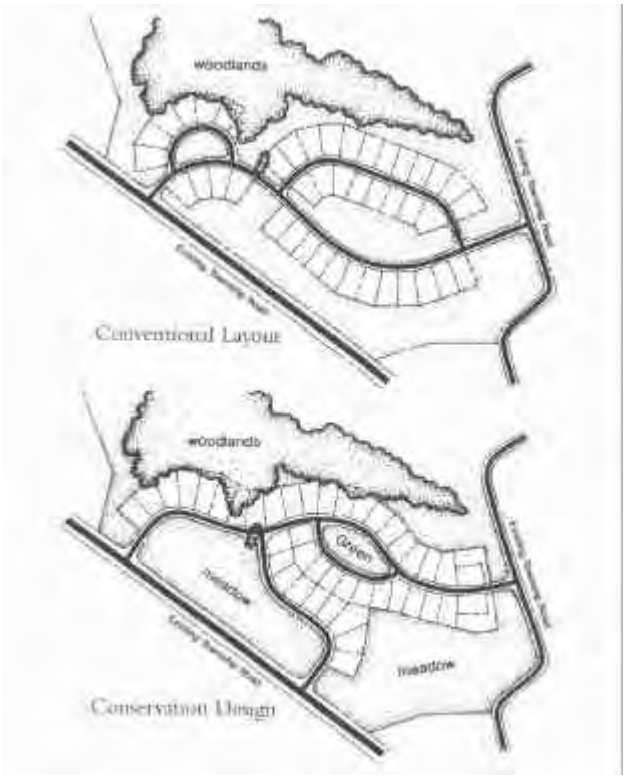
4.5.1 Development Review and Site Design Review

Problem
Most communities have a specific list of development review approval criteria, site design approval criteria and submission requirements. It is important for communities to review these criteria, and submission requirements, in light of added water quality requirements, particularly erosion control requirements, stormwater management requirements, and impervious surface limitations. For most jurisdictions, all that is needed are amendments to code language in the form of new criteria and requirements.

Objective
Ensure that water quality provisions established in other sections of the code are properly implemented, and that water quality protection and enhancement is considered during each portion of the development review process.

Strategy
Review the changes made to the development code to protect and enhance water quality and aquatic habitat and add the appropriate development and site design review criteria and application submission requirements. Implement the appropriate sections of the *Model Development Code & User's Guide for Small Cities* with the changes illustrated below.

Sample Site Design for Conservation



Source: *Growing Greener: Putting Conservation into Local Plans and Ordinances*, Arendt, Randal, 1999.

Sample additions to Chapter 4.2 of the *Model Development Code & User's Guide for Small Cities*

Add to Purpose (Section 4.2.1)

- To protect and enhance water quality and aquatic habitat.

Add to Site Design Review – Application Submission Requirements (Section 4.2.5)

Under Proposed Site Plan 4.2.5(B)(2)

- A calculation of the total impervious surface before development, and the total effective impervious surface after development (as per appropriate code section)

- The location and dimensions of all stormwater or water quality treatment, infiltration and/or retention facilities

- A listing of the non-structural design strategies used to reduce runoff.

A new requirement should be added that requires an erosion and sediment control plan, as per the appropriate code section.

If a grading plan is not required in the current development ordinance, add the grading requirement found in Section 4.2.5(B)(4) of the *Model Development Code & User's Guide for Small Cities*

4.5.2 Land Divisions

Problem

Water quality can be addressed at the land division stage of development, but the appropriate criteria or requirements need to be present to ensure that water quality is considered. For example, the identification and consideration of a riparian buffer and other sensitive resources during the land division process can save time for the developer and can ensure that the resource is protected in the most efficient manner.

Objective

Ensure that water quality provisions established in other sections of the code are properly implemented and that water quality protection and enhancement is considered during each portion of the land division process.

Strategy

Review the changes made to the development code to protect and enhance water quality and add the appropriate land division review criteria and application submission requirements. Implement the appropriate sections of the *Model Development Code & User's Guide for Small Cities* with the changes illustrated below.

Sample additions to Chapter 4.3 of the *Model Development Code & User's Guide for Small Cities*

Add to Purpose (Section 4.3.1)

- To protect and enhance water quality

Add to Preliminary Plat Submission Requirements - Proposed Improvements 4.3.130(B)(3)

- The location and dimensions of all stormwater or water quality treatment, infiltration and/or retention facilities

4.5.3 Conditional Use Permits

Problem
The conditional use process can be a powerful tool for ensuring that water quality standards are met. As with the land divisions and development review sections of the development code, it is important to include water quality provisions in the conditional use portion of the development code.

Objective
Water quality should be a factor in the consideration in the approval of a conditional use permit.

Strategy
Implement Chapter 4.4 of the *Model Development Code & User's Guide for Small Cities,* and use the water quality design standards found in Section 4.3.1 of this manual [or as determined by the community], as a means of determining approval of a conditional use permit.

4.5.4 Master Planned Developments

Problem
The ability to adequately address water quality issues often requires flexibility in the development code. This flexibility can be achieved through the use of a planned unit development (PUD) or master planned development. It is important for communities to have a good master plan or PUD provision in their development code that allows developers to address water quality and aquatic habitat while meeting other state and local goals such as density, design, and parks and open space.

Objective
A PUD or master plan provision should be available in the development code to help protect and enhance water quality.

Strategy
Implement Chapter 4.5 of the *Model Development Code & User's Guide for Small Cities*, including the provision for density bonuses for the protection of natural features in open space. This chapter includes as a purpose the improvement of water quality and other components that allow enough flexibility to meet water quality standards while maintaining the requirements of base and overlay zones.

4.5.5 Enforcement

Problem
All ordinances should have an adequate enforcement provision. The water quality ordinances suggested in this guidebook are no different in the need for proper enforcement. As with many development code violations, water quality violations are often detected by members of the community and as such, the development code should have a mechanism for allowing the community to report violations.

Objective
Ensure that the development code has an adequate enforcement mechanism.

Strategy
Implement Chapter 1.4 of the *Model Development Code & User's Guide for Small Cities.*

4. Model Ordinances

4.1 Introduction

Chapter 4 is composed of four main sections:

- Introduction
- Zoning
- Design Standards
- Procedures

The introduction includes a description of best management practices (BMPs) and the range of water quality parameters used to measure the effectiveness of BMPs. The remaining three sections are organized by the structure found in most local development codes. The zoning section includes the regulations that apply to the site, including overlay zones. The design standards section includes model regulations that apply to the design of the development, and the procedures section includes model language on the administration of the development code.

The model ordinances contained in this chapter are based on structural and non-structural best management practices. BMPs are methods for improving water quality through development. Non-structural BMPs refer to methods of altering development patterns through the development code, such as stream buffers and retention of the tree canopy. On the other hand, structural BMPs, refer to the actual construction of swales, wet ponds and other such devices to protect and enhance water quality.

4.2 The BMP Matrix

The actual effectiveness of any BMP, whether structural or non-structural, is important when considering what ordinances to implement, and what to specifically require of new development. Unfortunately, the science of determining the effectiveness of BMPs is still new and complicated by the complex nature of water quality. There is a growing body of research that exists on this topic. The BMP matrix provides a synopsis of that research for BMPs that are included in the model ordinances within this chapter.

The matrix outlines a variety of structural and non-structural best management practices. It describes how each of these BMPs may help to address specific water quality parameters. The water quality parameters include:

- sedimentation and erosion
- runoff volumes
- nitrogen, phosphorous metals and other pollutants
- water temperature

These parameters were selected because they are measurable, and there are some quantitative data existing on the topics. These parameters also are commonly encountered in water quality management plans prepared by DEQ to reduce pollutants in a particular stream (see Chapter 2 for more information).

Although it is best to evaluate the effectiveness of any given BMP by looking at studies conducted in areas with a similar climate and landscape, data are not available for all BMPs from areas comparable to the Pacific Northwest. For this reason some of the research used to compile the matrix comes from other parts of the country. It also is important to note that pollutant removal efficiencies, which appear in this matrix, provide only one technique for describing the effectiveness of BMPs. This method of measurement has been chosen because the majority of accessible data on BMPs are expressed in these terms, and because it allows for consistency and comparability of numbers. It should be noted that ten or more years may be necessary to monitor, observe and analyze conditions to relate the changes in water quality to non-point source control efforts. For this reason, estimates of BMP load reduction capabilities will become more accurate with ongoing studies.

At-a-Glance Guide to BMP Effectiveness

The BMP matrix on the following pages includes ratings for each combination of BMP and water quality parameter. The ratings include:

<Effective> - Research indicates improved water quality through implementation of the BMP.

<Inconclusive> - Research does not conclusively indicate that implementation of the BMP improves water quality.

For example, the implementation of a stream buffer, a non-structural BMP, is an “effective” way to reduce sedimentation in a stream. On the other hand, it is “inconclusive” whether a vegetated filter strip has any effect on runoff volumes.

4.4 Design Standards

4.4.1 Water Quality Design/Performance Standards

Problem
Many communities have not given the same consideration to water quality standards as they have to street standards, building design standards or even vehicle parking standards. While all of these standards are important to a community, and are in many ways linked to protecting and enhancing water quality and aquatic habitat, they do not get to the heart of what determines a community's water quality. To protect and enhance water quality and aquatic habitat, a community must have standards to measure the success of their regulations and programs.

Each community may have a different motivation for addressing water quality through their design standards. The need for water quality standards may be determined by the Oregon Department of Environmental Quality (DEQ) load allocations given to local jurisdictions following a total maximum daily load allocation. The federal Endangered Species Act (ESA), Goal 5, Goal 6 or other regulations also influence a community's standards (See Chapter 2 for more information on these programs).

Objective
Develop water quality performance and design standards for site development. Standards provide a means to evaluate potential new development, redevelopment, or improvements. Standards require any new development to meet the expectations of the community and the regulations imposed by state and federal agencies.

Strategy
Work with the appropriate state and federal agencies to determine and adopt specific design and performance standards that adequately protect water quality. This may take the form of a management plan required by DEQ to address specific pollutant identified in a 303(d) list, or may be part of a Drinking Water Protection Plan, or both. In addition, federal ESA requirements may necessitate an emphasis on particular standards for habitat protection and stormwater management.

Discussion
The sample standards that follow are meant to provide an idea of the type of standards a community could adopt. These standards are considered "performance standards" as they leave much discretion. A community may decide to create more specific standards based on its assessment of their water quality issues.

Sample Water Quality Performance Standards

A. Purpose
To protect and enhance water quality, to support the designated beneficial water uses and to protect the functions and values of water quality resources (streams, wetlands, open space, etc.), which include, but are not limited to:

1. Provide a vegetated corridor to protect Protected Water Features from development;

2. Maintain or reduce stream temperatures;

3. Maintain and rehabilitate natural stream corridors and other protected water features;

4. Minimize sediment, nutrient and pollutant loading into water;

5. Provide filtration, infiltration and natural water purification;

6. Stabilize slopes to prevent landslides contributing to sedimentation of water features;

7. Maintain the existing tree canopy where possible;

8. Minimize impervious surfaces while providing for compact growth;

4.4.2 Vehicular Access and Circulation (Model Code Section 3.1.2)

Problem
Streets, parking lots, driveways and other automobile infrastructure accounts for a significant portion of the impervious surface in most urban areas. Most communities require vehicular access and circulation designs to accommodate rapid, smooth traffic flow and do not consider the potential impacts to water quality and aquatic habitat. Street and driveway length and the design of fire lanes can be prescribed in local codes to reduce impervious cover, but most jurisdictions have not addressed these issues.

Objective
Reduce the total area of street pavement by allowing alternative street layouts that result in the greatest number of homes per length of street, while maintaining the necessary connectivity to meet other transportation goals. Encourage and provide incentives for shared driveways and alternative paving surfaces to reduce the amount of impervious surface.

Strategy
Implement the *Model Development Code and User's Guide for Small Cities* section 3.1.2 (which includes provisions for shared driveways and alternative street networks) with the changes and/or additions below.

Discussion
The street network is an important part of any community and must be managed in a manner that meets many community goals, including mobility, accessibility, safety, as well as the protection and enhancement of water quality and aquatic habitat. This section is not meant to preclude the use of a grid pattern, which has many community benefits. A grid pattern is usually able to accommodate more houses per unit of length, and the additional length can be offset by allowing skinnier streets where appropriate, thus reducing impervious surfaces in some instances. A community should consider a modified grid pattern where topography, natural water features, and other site conditions pose barriers to street connectivity.

Changes to Model Development Code

3.1.2 (A) Intent and Purpose
Add: The roadway system will be designed in a manner that limits impervious surfaces to the extent possible by requiring street patterns that reduce the total area of needed street pavement while meeting all requirements of this Section.

3.1.2(L) Fire Access and Parking Area Turnarounds
Add: Fire equipment access drives and parking area turnarounds may be constructed with porous paving material per [jurisdiction] specifications.

4.4.3 Pedestrian Access and Circulation (Model Code Section 3.1.3)

Problem
Local codes may not require safe, direct and convenient pedestrian circulation. Lack of pedestrian and bicycle options limits residents' ability to make trips via modes other than the automobile, leading to more automobile trips. Increasing the number of automobile trips leads to a demand for more roads (or wider roads), and thus a greater amount of impervious surfaces. In addition, a significant amount of water pollutants originate from motor vehicle use.

Objective
Require pedestrian and bicycle access and circulation as part of certain new developments,to provide opportunities for residents to make trips other than by automobile.

Strategy
Implement the *Model Development Code and User's Guide for Small Cities* Section 3.1.3 with the change below.

Discussion
Although swales require significant amounts of land and ongoing maintenance, they do provide moderate to high water quality benefits.

Changes to Model Development Code 3.1.3 – Pedestrian Access and Circulation B. Design and Construction Vehicle/Pathway Separation. Where pathways are parallel and adjacent to a driveway or street (public or private), they shall be separated from the driveway/street by a vegetated swale or other similar Best Management Practice (BMP) to treat the stormwater runoff from the pathway and/or driveway/street where possible. The swale or other BMP shall be designed to [jurisdiction] standards. If a vegetated swale or similar BMP is not possible to construct, the applicant shall make a finding describing why stormwater treatment is not possible and the following standards shall apply (Model Code provisions 3.1.3 (B)(1)

4.4.4 Landscaping (Model Code Section 3.2)

Problem
Landscaping is often required to meet community standards for greenery and to provide buffers between different uses. This landscaping, if designed correctly, also can reduce impacts to water quality and aid in infiltration, storage and treatment of surface water runoff. Excessive clearing of native vegetation can lead to increased erosion and sedimentation (see 4.4.9 for erosion control standards). Non-native vegetation can have higher irrigation demands in the summer than native species adapted to seasonal dry periods. Non-native plants also can be more susceptible to insects, which may result in increased application of pesticides which impacts water quality.

Objective
Minimize clearing of development sites, preserve natural vegetation to the extent possible and replace lost vegetation with native species that are pest resistant and adapted to the local climate conditions. Utilize required landscaping for the purpose of protecting and enhancing water quality.

Strategy
Implement the *Model Development Code and User's Guide for Small Cities* Section 3.2.2 without changes, or use the alternative provided below that provides incentives to maintain existing landscaping.

Implement Section 3.2.3 of the *Model Development Code* with the changes described below to add water quality elements to new landscaping requirements.

Discussion
Landscaping standards should support the protection and enhancement of water quality, but may not be the most effective method of meeting the goal of increasing infiltration on site (i.e., decreasing the amount of surface water runoff from the site). For example, requirements found throughout Section 4.3 of this guidebook are better suited to address water quality through infiltration, but must be supported by provisions in the design standards section of the code.

Model Code Language to Minimize Clearing of Existing Vegetation Using Incentives (Alternative to Model Development Code Section 3.2.2)

Encourage the preservation and integration of existing native vegetation into the design of the development.

1. Credit shall be given for preservation of native vegetation as follows:

    a. For each tree with a trunk diameter of [4-8] inches or greater, as measured 4 feet above the ground (DBH), preserved on the development site, the development will be relieved from planting requirements for [two] trees as specified in section X.X.X.

    b. When the 100 percent of the area defined by the dripline of the tree is preserved, the development will be relieved from providing [ten] square feet of planting area as specified in section X.X.X.

    c. Areas containing mature native vegetation shall require to provision irrigation except where the [City Official] finds that the subject area needs irrigation due to altered soil, slope, drainage or other conditions related to development. (Note the following section only applies if the community has a Heritage Tree or similar program).

    d. Variable credit shall be allowed for preservation of Heritage Trees, as defined in the adopted Urban Forest Plan. The urban forester shall determine the value of the Heritage Tree, according to formulas established in Valuation of Landscape Trees, Shrubs and Other Plants (International Society of Arborculture) and shall relieve the contractor/ developer from planting a number of trees equal to the value of the Heritage Tree preserved.

2. Contractors/developers who choose to preserve native vegetation on the site, (including Heritage Trees), shall be required to:

    a. Submit a detailed planting plan to the [city official] who shall confirm that vegetation to be preserved conforms to the definition for native vegetation (or Heritage Tree);

b. Follow the [city/county official] recommendations to insure that no cutting, filling or compaction of soil takes place within the root zone protection area, which consists of 75% of the area defined by the dripline of the tree. Alteration of the soil within the root zone protection area shall require submittal, to the [city official], of a plan for mitigative actions to preserve the tree. The mitigation plan shall address drainage, compaction, feeding, and pruning measures that will be taken to insure the continued health of the tree before and after the root zone protection area is disturbed.

c. Execute an agreement with the city to replace any significant tree (or Heritage Tree), shrub or other native vegetation that dies within five years of the date the agreement is signed. For trees determined to be significant, replacement trees shall be provided at the rate of two new trees for each tree lost. (The replacement ratio for Heritage Trees is variable; the number of Heritage replacement trees shall be equal to the number credited, as provided in section X.X.X above. The location of replacement trees shall be determined prior to execution of the agreement.)

1. Yard Setback Landscaping. Landscaping shall satisfy the following criteria:
   Add: Use the appropriate [native] landscaping and the appropriate design to increase infiltration and reduce the amount of surface water runoff from the site. Treatments might include swales, filter strips, ponds and wetlands. Landscaping for water quality will count towards total percentage of landscaping required on site.

2. Parking Areas.
   Require 10 percent of combined parking areas to be landscaped.
   Add: Where parking areas are required and/or selected to provide water quality treatment on site, the resulting best management practice (e.g. bioretention areas, filter strips, etc.) will count towards the total required landscaping. Provision of water quality treatment facilities will not replace the requirements for trees or shrubs.

4.4.5 Vehicle Parking

Problem
Vehicle parking in commercial and industrial districts often represents the largest amount of impervious surface in the district. Stormwater pollutant removal and volume control are not usually considered when parking lots are designed. Many communities have codes that require excessive parking to be constructed. Revising these provisions, and allowing for alternative parking scenarios, can serve to reduce the amount of parking, and thus reduce the amount of impervious surface found in commercial and industrial districts.

Parking lots will continue to be necessary in all districts, but fitting various stormwater treatment and/or infiltration techniques, into landscaped areas can mitigate the impact of the impervious surface created by parking lots. Where appropriate, alternative paving surfaces can used to reduce storm water runoff.

Objective
To decrease the amount of impervious surfaces by revising the amount of parking required for commercial and industrial uses. Require or provide the opportunity for the use of stormwater treatment and/or infiltration techniques within landscaped areas, and, where appropriate, allow alternative parking surfaces.

Strategy
Implement Chapter 3.3, Vehicle and Bicycle Parking, of the *Model Development Code and User's Guide for Small Cities*. Include the provision for the limitation on the total number of parking spaces to insure the appropriate amount of parking is provided for each use. Include the credit for on-street parking to decrease the amount of new parking required.

Add provisions requiring pollution reduction and flow control facilities be incorporated into parking lot design (See recommendations under section 4.4.4 *Landscaping* in this document, which would provide sufficient area for this requirement.) Allow alternative parking surfaces that increase infiltration in certain low use areas, such as residential off-street parking and overflow parking for incidental commercial and institutional uses.

Discussion
Parking areas are one of the largest contributors of impervious surfaces in urban and unincorporated communities. Local jurisdictions also have direct control over the size, design and maintenance requirements of parking areas. Appropriate regulations can significantly reduce the amount of impervious surface and untreated stormwater. Studies have shown that pollutant removal and flow control for parking lots can generally be accomplished within a 10% set-aside for landscaping (City of Portland, Bureau of Planning. August 2, 2000. *Stormwater Amendments to the Zoning Code, Recommended Draft*). Issues to be aware of when requiring onsite surface water management include the maintenance required to keep facilities effective, and the potential for added or reduced cost of construction. The effectiveness of each of the different BMPs depends on a number of factors including soil type, slope of the site and final design, construction, and maintenance of the facility. Simplified sizing and construction specifications for storm

water runoff treatment/infiltration facilities for parking lots and other impervious areas are referenced in the appendix. These standards were generated for the northern Willamette Valley and may need to be revised for areas with different climate and soil types.

Model Code Provisions

Implement Chapter 3.3 of the *Model Development Code and User's Guide for Small Cities.* Add sections G and H.

G. Off-Street Parking Design Standards for Water Quality
Parking lot construction must give consideration to the water quality and quantity, of stormwater created by new or expanded impervious surface. New parking lots greater than [X square feet], or parking lot expansions greater than [X square feet] will provide onsite surface water management. Vegetative treatment will be provided within area reserved for landscaping. Exceptions based on site restrictions, such as slope or impermeable soils, must be documented and approved by [city/county engineer].

Small, [less than X square feet], off-street parking areas, such as those provided in single family residential districts and necessary overflow parking in commercial and institutional districts, will be allowed to use alternative paving techniques to reduce the total impervious surface of the site. Suitable alternative paving materials, their installation and maintenance will be determined by the [city/county official].

Parking areas using pollution reduction and flow control facilities or alternative paving materials pursuant to this section will not be included in the calculation of the total impervious surface of the site when there is less than [0-10%] net increase in off-site runoff from the parking area.

H. Off Street Parking Surface Water Management Construction Specifications and Alternative Paving Specifications
The [city/county official] shall establish sizing and design criteria for treatment facilities consistent with the requirements of this Chapter and the application of engineering principles. Standards are incorporated in this code by reference and described in [name design manual] (or reference general stormwater management requirements if adopted).

4.4.6 Public Facility Standards

Problem
The Western United States has a tradition of wide streets. In the early days of a city, many communities required that streets be wide enough to turn a team of horses around. This tradition often lives on zoning codes and Transportation System Plans. The impervious

surface created by unnecessarily wide streets leads to increased surface water runoff. The increase of impervious surface decreases the amount of infiltration available in the watershed, and leads to a runoff rate that increases erosion and downstream flooding. Runoff from streets typically contains pollutants deposited by motor vehicles. Many cities require sidewalks on both sides of the street. For some communities, this may not be appropriate or necessary. In some cases, reducing sidewalks to only one side of the street can further decrease the amount of impervious surface without sacrificing pedestrian mobility.

In many older communities and new "neo-traditional" development, rear alleys are often used to minimize the amount of curb cuts across sidewalks, locate utilities away from the street and provide for a more human-scale environment. Permitting alleys can help reduce the amount of impervious surface by reducing driveway lengths and the size of local streets. On the other hand, alleys that are larger than necessary may actually increase total impervious surface. In addition, alleys usually carry little traffic but are required to have paving types similar to regular streets, further increasing surface water runoff.

Cul-de-sacs are often a signature of many newer developments. Cul-de-sacs can have a radius that is larger than necessary or may have many square feet of unused space in the center, contributing to the amount of impervious surface found in a community.

Objective
Limit the amount of pavement to the smallest amount needed for the function of each specific street. Utilize the space remaining in the right-of-way for pedestrian and bicycle travel, and to promote infiltration and treatment of surface water runoff through the appropriate structural BMPs. Where appropriate, limit the sidewalk to only one side of the street and grade the pavement to drain to infiltration areas when available.

Allow rear alleys as a development alternative, and where appropriate, allow the alleys to be constructed with an alternative paving material to decrease impervious surface.

Discourage the use of cul-de-sacs, except where necessary due to topography or other constraints. Limit the cul-de-sac to the smallest radius necessary, or require the center of the cul-de-sac to be landscaped and/or serve as a surface water runoff treatment/storage facility.

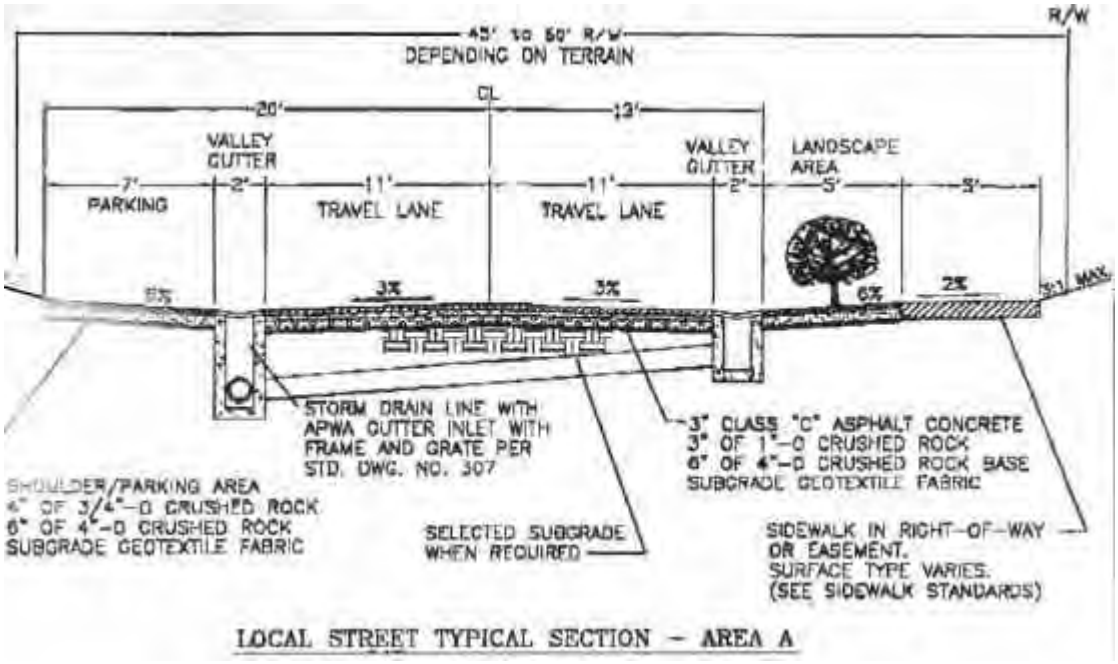
Strategy
Implement Chapter 3.4 of the *Model Development Code and User's Guide for Small Cities*. Utilize the "no curb and gutter" option for local streets (see footnote 4 on table 3.4.1). Where public right-of-way allows, use the seven-to-eight-foot planting strip as a vegetated swale on each side of the street, and grade the street for drainage to the swale. Where swales are used, access to the street from the sidewalk should be provided every 200 feet or less. Consider placing sidewalks on only one side of residential streets where vegetated swales are employed.

Allow alternative paving types for residential alleyways with a required covenant for maintenance.

Discussion
The implementation of the model code provisions found in the Model Development Code, and the additions suggested above, will likely take much discussion with the fire department and the public works department. In addition, the public works department will have to create standards to address the installation and maintenance of porous pavement, infiltration swales along roadways, and other water quality BMPs as necessary. (See available sources for BMP standards on page A.1 of the Appendix.)

Model Code Language

Implement Chapter 3.4 – Public Facilities Standards of the Model Development Code for Small Cities or include the following standard for local streets.



Add to Table 3.4.1
Footnote to Alleys – Porous paving materials may be used with approval from [City Engineer] and in accordance with [jurisdiction] standards. Private alleys using porous paving materials will not be counted as impervious surface on site when there is less than [0-10%] net increase in off-site runoff from the private alley.

4.4.7 Stormwater Management

Problem
Many communities deal with stormwater created by development by channeling and diverting it off site into the storm sewer system as quickly as possible. Stormwater plans and zoning codes often deal only with the conveyance of stormwater, and not the retention, treatment and prevention of water quality impacts. Stormwater runoff can alter natural stream flows, cause increased erosion and lead to downstream flooding. Where stormwater comes into contact with pollutants, such as oil, pesticides, solvents and other materials used in the urban environment, pollutants can be carried into surface or groundwater. These issues must be adequately considered during the land use review process.

Objective
To reduce the amount of stormwater leaving a site to the greatest extent possible, and to treat and, when appropriate detain, the stormwater that cannot be infiltrated on-site.

Strategy
Implementing the zoning code changes suggested throughout this guidebook will lead to a significant reduction in the amount of stormwater flowing from a site. It is unlikely that all stormwater can be eliminated and therefore, a zoning code should contain adequate stormwater provisions to address both the quality and quantity of stormwater leaving a site. The *Model Development Code and User's Guide for Small Cities* includes some language for storm drainage, but does not adequately address both the quantity and quality of stormwater leaving a site. Implement the model code language that follows, requiring storm drainage plans to effectively address stormwater.

Discussion
Many of the model ordinances found in this guidebook are designed to minimize the amount of runoff generated by new development by increasing infiltration opportunities and decreasing impervious surfaces where possible. Where it is not feasible to eliminate runoff, it is important that local jurisdictions allow or require developers and to treat and/or store stormwater on-site and/or provide for regional treatment and storage. The best method to ensure such provisions is to prepare a local stormwater or surface water master plan that shows the jurisdiction's method for dealing with stormwater. Stormwater Master Plans specify BMPs to be used, to mitigate stormwater impacts on surface and ground water and the rationale (nexus) for requiring new development to manage stormwater. They can also describe regional and sub-regional treatment and storage facilities. Absent a stormwater plan, language in the comprehensive plan can help support a stormwater ordinance (See Chapter 3).

When developing a strategy for stormwater management it is important to select an appropriate size of storm for which to design your BMPs. Many jurisdictions require treatment facilities to be designed for large storms, such as a twenty-year storm. In western Oregon most of the rain falls in many small storms. While you may need to require conveyance facilities to handle large storms, designing infiltration and treatment facilities for smaller storms will allow many more options and may provide sufficient protection for

water quality and aquatic habitat. The objective is to allow rainwater to flow through a development in a manner that most closely mimics the pre-development condition, or in other words, preserve the natural hydrology of the site.

Much of this objective can be achieved by eliminating barriers that exist in local drainage ordinances. Many cities and counties require gutters, storm drains and storm sewers. Some have mandatory systems development charges for storm sewers that provide no incentive to reduce stormwater flow. If developers are given the freedom reduce the amount of stormwater generated on the site through landscaping techniques, the use of porous paving materials and/or improving infiltration on site, impacts to the natural hydrology and downstream water ways will be reduced. Code improvements to promote stormwater mitigation strategies can be made within a drainage ordinance and supported through education, technical assistance and incentive programs. Sections one through five of the following ordinance provide code language to facilitate this type of approach.

For a more aggressive approach to stormwater management a local jurisdictions can adopt specific requirements for treatment, infiltration, and possibly detention of stormwater. Such requirements may be necessary in high impact areas (i.e. downtown, or industrial parks), or when the jurisdiction has water quality or salmon protection obligations under state or federal law (See Chapter Two). Section six, “Pollution Reduction and Flow Control”, provides a framework for specific infiltration, treatment and detention requirements that could apply to high risk areas in the jurisdiction or for all development. It is important to remember, however, that the development of such standards is an engineering exercise that is difficult to generalize for a model code. Each jurisdiction needs to research appropriate standards for their local area.

Model Code Requiring a Stormwater Management Plan for New Development and Redevelopment

STORM AND SURFACE WATER MANAGEMENT STANDARDS

I. Statement of Purpose

This ordinance includes standards for conveyance of surface water in streams, creeks and channels that exist on a site at the time of development. It also addresses pollution reduction and flow control for stormwater generated from new and redevelopment. For the purpose of this ordinance, "new" and "redevelopment" refers to any man-made change to improved or unimproved real estate including, but not limited to the placement of buildings or other structures, dredging, filling, grading, or paving.
The ordinance provides standards for addressing infiltration, treatment and detention of stormwater separately as well as an option for a combined approach to mitigating the water quality impacts of developments that fall below a certain size threshold.

II. Applicability

No permit for construction of new developmnet or tenent improvements [greater than X square feet.]within the [jurisdiction] shall be issued untill a stormwater management plan is approved. Separate applicability thresholds for Pollution Reduction and Flow Control Standards are listed in section IV. Development projects shall not be phased or segmented in such a manner to avoid the requirement of these Rules and Regulations.

III. Stormwater Management Plan Submittal

A. Preconstruction plans - shall included the following analyses and descriptions.

1. An analysis of stormwater mitigation strategies to increase infiltration and evapotranspiration (use of water by plants) and reduce the amount of stormwater runoff generated from the site. *(Note: rainwater can soak into the ground where it falls or it can accumulate on a non-pervious surface, flow to a pervious area and then infiltrate into the ground. The former scenario is stormwater mitigation, while the later scenario requires stormwater management.)*
2. Calculations of the amount of impervious surface before development and the amount of impervious surface after development. Impervious surface refers only to strictly impervious surfaces including roofs of buildings, impervious asphalt and concrete pavements, and other specifically impervious pavement materials such as mortared masonry and gravel.
3. An analysis of vegetative and other treatment methods used to reduce pollutants.
4. An analysis of flow reduction methods including, infiltration, and detention and techniques.
5. Statement of consistency with [jurisdiction] stormwater management objectives stated in section 3.1 and, if applicable, the watershed management plan for the basin and/or requirements of a pollutant load reduction plan for a water quality limited stream.

B. Post construction plans shall include the following information
   1. As-built plans, [stamped by a qualified professional] indicating all storm water mitigation and management strategies are installed per approved plans and approved changes.
   2. Maintenance plans for all stormwater facilities installed to comply with this ordinance. The maintenance program must be approved by the [Jurisdiction]. [Proof of maintenance shall be submitted [annually].*]*

IV General Requirements

A. All development shall be planned, designed, constructed and maintained to:
   1. Provide a system by which storm/surface water within the development will be managed without causing damage or harm to the natural environment, or to property or persons.
   2. Protect property from flood hazards.

B. Plan Review Standards

Plans shall be submitted to the jurisdiction for review. All plans and calculations must be stamped and signed by a [qualified professional]. Plan approval will be based on the following criteria:

1. Design, construction and maintenance of proposed stormwater management plan will result in post construction stormwater volumes flowing off site which are substantially the same as pre construction volumes for all storms less than or equal to the [2-year] design storm. *(Although water quality and aquatic habitat benefit from preservation of the natural hydrology, small jurisdictions that anticipate the cumulative impacts of development to be small over time might consider a less stringent criteria, which allows post development runoff volumes to be somewhat greater than pre development volumes.)*

2 All culvert installations must allow fish passage in accordance with Division of State Lands (DSL) and the US Army Corps of Engineering (COE) and any other authorized federal, state, or local agency.

3. Instillation of culverts, spans or stormwater outfalls along natural water features shall be designed to emphasize preservation of natural flow conditions, allow for natural obstructions and pursue stream enhancement opportunities.

4. Stormwater mitigation strategies, such as retention of existing trees, and use of porous paving surfaces, as well as stormwater treatment and flow control facilities used to meet the requirements of this code must be included in the plans.

5. Stormwater management plan shall be consistent with [state applicable basin or sub basin watershed management plan and/or pollutant load reduction plan].

6. In areas of high pollutant load, stormwater infiltration shall incorporate, or be preceded by treatment as necessary to prevent siltation of the infiltration facility, protect ground water, and prevent toxic accumulations of pollutants in the soil. (Note: it is preferable to eliminate pollutant contact with stormwater where possible.)

7. All vegetation used for the installation and landscaping of storm water facilities shall be selected from plants listed in [name of document, listing approved native plants] available from the [Jurisdiction or other source]. *[Optional - Trees which are preserved or planted on site for stormwater mitigation credit, no not need to meet this criteria.]* Planting schedule and maintenance of vegetation shall be approved by the [local official].

(Note: The use of a plan review to determine compliance with general objectives is appropriate when a jurisdiction has not adopted specific construction standards for stormwater facilities, or mitigation credits for specific stormwater reduction strategies. Jurisdictions may prefer to adopt standards to provide clearer direction to developers. Design standards for simplified combined facilities and storm water mitigation credits from the City of Portland are included in the appendix. Many other large cities and counties have also developed such standards. Although examples from other jurisdictions are valuable reference, construction standards for stormwater facilities that incorporate infiltration and vegetative treatment must be tailored to local watershed conditions. If standards are adopted the following statements could be substituted for ***B.1 through B. 7.***

[All storm conveyance pipes, vaults and stormwater infiltration, treatment and detention facilities shall be built to specifications of the [Jurisdiction]. As described in [reference standards document].)

9. See section V for Surface Water Conveyance Standards.
10. See section VI for Pollution Reduction and Flow Control standards.

C. The [jurisdiction] reserves the right to restrict the use of infiltration facilities in high risk areas including those with steep slopes, unstable soils, high water tables, or sites known to be contaminated by hazardous substances.

D. Infiltration facilities which fall under the jurisdiction of DEQ's Underground Injection Control (UIC) Program must be registered with the state and meet the requirements of the UIC Program.

E. Bonds

Applicants shall provide a performance bond or similar surety acceptable to the [Jurisdiction] to assure successful installation and initial maintenance of surface pollution reduction and flow control facilities. During construction and for a period of one year thereafter, the bond shall be in favor of the [Jurisdiction] and in an amount of the anticipated construction cost. *(Reference existing local practice for administering performance bonds.)*

F. Contingency for system failure

If the storm drainage system fails due to lack of maintenance or breakage, and there are impacts to downstream water quality or quantity as a result of the failure, the [Jurisdiction] may perform the maintenance or repair and charge the owner of the facility.

V. **Surface Water Conveyance Standards**

A. Culverts in and spans of streams, creeks, gulches and other natural drainage channels shall maintain a single channel conveyance system.

B. Culverts and/or spans are to be sized for the 24-hour post-developed tributary conditions of the [100 year storm].

C. Conveyance calculations shall use [state method desired by jurisdiction, i.e. the Rational Method] for analysis. Exceptions must be documented and approved by the [Jurisdiction].

D. In-stream and in-line detention is not allowed.

E. It shall be the responsibility of the owner that the new drainage system shall not negatively impact any natural waters on or downstream from the site. The owner is responsible for providing a drainage system for all surface water, springs, and groundwater on site and for water entering the property as well as management of springs and groundwater that surface during construction.

VI Pollution Reduction and Flow Control Standards

A. Applicability

1. (Applicability should be determined by the local jurisdiction. It could include just commercial and industrial, or commercial, industrial and high density residential, or all development. Alternatively, a size threshold could be set for new impervious surface areas. Parking lots could be addressed under this ordinance, or addressed separately – see section 4.4.5 of this guidance. Jurisdictions that are working to encourage in-fill and redevelopment in core areas should select applicability thresholds for redevelopment such that they do not impose a disincentive for redevelopment and in-fill efforts.)

2. Stormwater treatment and detention facilities receiving stormwater from impervious surface areas less than [15,000 square feet] may be designed in accordance with sizing and construction standards for combined facilities. More than one such facility can be installed on site as long as each facility receives stormwater from an area less than the stated threshold. (See subsection E of this section.)

B. Infiltration, Treatment and Detention

1. Infiltration

(a) Infiltration systems are to infiltrate a minimum of [one-half inch of rainfall in 24 hours].

(b) Stormwater treatment, in accordance with subsection B.2 of this section, shall occur prior to or concurrent with infiltration.

(c) Infiltration systems shall be designed to overflow to conveyance systems in accordance with subsection D of this section.

(d) Infiltration may be waived, or reduced, if it can be demonstrated by a registered professional engineer that infiltration will destabilize the soil, cause structural problems, or provide negative impacts to the environment, or due to site constraints such as high groundwater or soil contamination.

2. Treatment
   (a) Water quality facilities shall be designed to capture and treat runoff for all flows up to [2/3 of a 2-year, post-developed, 24-hour storm].
   (b) The water quality system shall use vegetation for treatment. Accepted types of vegetated treatment facilities and sizing criteria are described in [name document]. Alternative systems may be used with approval of [local official] and shall be designed to provide equivalent treatment as is provided with a vegetated system.
   (c) Systems treating stormwater from over [15,000] square feet of impervious area and all systems that deviate from the sizing and design criteria in [name document] must be designed by a registered engineer and be approved by [local official].
3. Detention
   Onsite storm quantity detention facilities shall be designed to capture and detain runoff as follows:
   (a) [2-year, 24-hour post-developed runoff rate to a ½ of the 2 year, 24-hour pre-developed discharge rate;]
   (b) Sites with infiltration systems designed to handle storms in excess of that specified by subsection (1) of this section will be permitted to reduce on-site detention requirements by a volume equal to [100%] of the excess infiltration capacity.

(The following provisions, c and d, should be added when jurisdictions have areas of known flooding/conveyance problems. The standards contained in the brackets must be tailored to meet the specific needs and watershed conditions of your jurisdiction.)

(c) In areas with limited downstream capacity, [reference map or other document specifying areas], detention shall be designed for a [25-year, 24 hour, post-developed runoff rate to a 2-year, 24-hour pre-developed discharge rate, and, from the 2 year, 24-hour, post developed rate, to ½ of the 2-year, 24-hour pre-developed discharge rate.]
(d) Downstream analysis shall be provided to assure sufficient capacity for new development. Downstream analysis shall occur to the distance downstream where the project site contributes less than 15% of the upstream drainage area OR a minimum of 1,500 feet downstream of the project.

C. Combined stormwater infiltration, treatment and detention
Facilities receiving stormwater from impervious areas less than [15,000 square feet] and designed in accordance with the sizing and construction standards contained in [name document] are presumed to comply with the [Jurisdiction's] infiltration, treatment and detention requirements of this code. (See appendix of this document for example of sizing and construction standards from City of Portland.)

(An option for In-lieu-of fees for treatment and/or detention should be considered by the jurisdiction if regional treatment facilities are in place or are planned. The following criteria are recommended for determining the appropriateness of in-lieu-of fees.

- *Subregional or regional treatment/detention downstream is available and has been identified.*
- *Downstream treatment/detention is constructed or an agreement has been approved by the [Jurisdiction] on implementation of downstream treatment/detention.*
- *Fees for "in lieu of" treatment/detention would be applied as a percentage of facility costs, including engineering and administration. Percentage of costs would be based on percentage of use of facility.*
- *Maintenance of facility is provided.)*

D. Conveyance

Infiltration, treatment and detention facilities shall be constructed to convey stormwater that exceeds their design capacity. Conveyance systems shall be sized to meet the following conditions:

1. Storm sewer drainpipes draining [less than 640 acres], [25-year 24-hour design storm].
2. Storm sewer drain pipes draining [greater than 640 acres], [50 year 24-hour design storm].

4.4.8 Tree Preservation Ordinance

Problem
Development ordinances sometimes require the preservation of trees, to the extent possible ,during construction. Prior to and after construction, however, there often are no regulations that prohibit the cutting or destruction of trees. An intact tree canopy can aid significantly in reducing the amount of precipitation that results in runoff and stream flow, thus reducing the amount of stormwater that must be treated or stored. Tree destruction also causes erosion that can lead to a degradation of water quality.

Objective
Protect the existing tree canopy within the community to help protect and enhance water quality.

Strategy
Implement the following tree preservation model code to protect existing trees throughout the community before, during and after construction.

Discussion
The requirement for compliance with this code, regardless of whether a building permit is being sought, may be controversial. It may require the public to be educated in its benefits.

The penalty suggested in this ordinance (Section XIII) is set at a minimum of $500. This amount may not be enough to deter a property owner from cutting a tree that might be worth three or four times that amount. A community could set the minimum penalty higher to reflect the economic worth of mature trees.

Implementation of this ordinance will require the local jurisdiction to administer the Forest Practices Act within their legal boundaries according to the Oregon Department of Forestry's interpretation of ORS 527.722 (The local government option to the Forest Practices Act). The model language provided meets the requirements of the Forest Practices Act.

TREE CUTTING, DESTRUCTION AND REMOVAL

Sections:

I. Purpose.

The purpose of this chapter is to establish a process and standards which will minimize the cutting or destruction of trees and wooded areas within [jurisdiction]. This chapter is intended to protect the scenic beauty of the [jurisdiction] to retain a livable environment through the filtering effect of trees on air pollution and sound. To protect soil, air, water, fish and wildlife resources, and to provide visual contrast to the built urban environment through the maintenance and protection of trees and wooded areas in the [jurisdiction]. The [jurisdiction] finds that timber harvesting is secondary to preservation of other natural resources and cultural values within the [jurisdiction] and its urban growth boundary. Therefore, pursuant to ORS 527.722, the [jurisdiction] has chosen to regulate the cutting, destruction, and removal of trees in place of the Oregon Forest Practices Act.

II. Definitions.

As used in this chapter or in any conditions imposed by the [jurisdiction] pursuant to [Chapter VII of this ordinance], the following words and phrases, unless the context requires otherwise, shall mean:

CUTTING means falling or removing a tree, or any act by a person, above or below ground, which results in death or substantial destruction of a tree. Cutting does not in any context include measures which are in accordance with sound arboriculture practice such as trimming, pruning. If the tree dies within one year of such trimming, pruning or topping, the property owner or other responsible party bears the burden of proving compliance with sound arboriculture standards.

HAZARD TREE means any tree with any structural defect, disease, extreme size or combinations of these, making it subject to a high probability of failure which might cause damage to persons or property.

HERITAGE TREE means any tree of exceptional value to the [jurisdiction] based on its size (relative to species), history, location or species, or any combination of these criteria. The specific methodology for classifying a tree as a Heritage Tree shall be established by resolution of the [city council/county commission].

NUISANCE TREE means any tree which impedes pedestrian or vehicular traffic within public rights-of-way from its normal and reasonable use of such right-of-way. Any tree by its biological nature which has a negative impact on its surrounding environment.

RIGHT-OF-WAY means the area between the boundary lines of a street or public easement. This area includes the park strip or tree lawn area between the curb and sidewalk.

REMOVE or "removal" means the act of removing a tree by digging up, cutting down or any act which causes a tree to die within a period of three years. This includes but is not limited to damage inflicted on the root system by machinery, storage of materials or soil compaction, changing the ground level in the area of the tree's root system, damage inflicted on the tree permitting infections or infestation, excessive pruning, topping or any other action which is deemed harmful to the tree.

TREE means any woody, perennial, deciduous, evergreen or coniferous plant, characterized by having a main stem or trunk of six inches or more in diameter four and one-half feet above natural grade. In cases of multi-stemmed or multi- trunk trees, the diameter shall be the sum of diameters of all individual stems or trunks.

III. Tree removal prohibited.

(1) Except as provided in [Chapter XI of this ordinance] no person shall remove more than [two] trees per parcel within a single calendar year without first filing a tree removal plan and obtaining a tree removal permit.

(2) Except as provided in [Chapter XI of this ordinance], no person shall remove a Heritage Tree from a parcel of property, without first applying for and obtaining a Heritage Tree removal permit.

IV. Exemptions.

The provisions of this chapter do not apply to the exemptions listed within this section nor is any fee required for their implementation.

(1) The action of any city official or of any public utility necessary to remove or alleviate an immediate danger to life or property, to restore utility service or to reopen a public street to traffic;

(2) Any removal of trees necessary to install or maintain improvements such as streets and sewers within publicly owned and accepted rights-of-way or utility easements;

(3) Removal of trees that are nuisances or hazardous trees, after being designated as such by the [jurisdiction] administrator. The [city official] may rely upon this chapter and [XX chapter] in making this determination.

V. Permit fee.

(1) The permit fee for tree and Heritage Tree removal shall be submitted at the time of application. The fee shall be [$150.00] if the parcel is one acre or less in size. If the parcel is larger than one acre the fee shall be [the lesser of $300.00 or $150.00 plus $50.00 per tree for each tree in excess of [two] to be cut from the entire parcel]. In the event of unusual circumstances, the [city official] may adjust the fees to reflect the [jurisdiction]'s actual anticipated costs in processing the application, including staff time and administrative costs. The permit fee is nonrefundable.

(2) Fees collected under the provisions of this chapter shall first be allocated to the costs of administering and enforcing the tree felling ordinance, including the payment of legal costs. The remainder of fees collected and not used in the administration of the tree felling ordinance shall be deposited in a special "tree project account," which shall be administered through an appropriate fund or funds as determined by the [city council/county commission], for the purpose of enhancing and furthering the integration of trees into the urban landscape of [jurisdiction].

VI. Permits required with planned unit developments, subdivisions and site plans.

(1) Any application for any planned unit development (PUD), subdivision, site plan or other zoning permit or approval, the plans for which call for tree removal which would require a tree removal permit, pursuant to [Chapter III of this ordinance], shall be accompanied by an application for a tree removal permit, together with the required filing fee under [Chapter X of this ordinance].

(2) Compliance with this chapter shall be a supplemental condition of approval for all site plans, PUDs, and subdivisions.

VII. Procedure for filing tree removal plan.

Application for a permit to remove a Heritage Tree or more than three trees shall include:

(1) The name, address, and telephone number of the applicant, species or common name of the tree(s), the reason for removal, a plot plan showing the location of trees to be removed and their sizes, the method of tree removal and the hauling route to be used.

(2) A description of any plan (vegetation and re-vegetation report) to replace, landscape, or otherwise reduce the effect of the removal that addresses the applicable standards in VMC 8.10.080.

(3) The [city official] at their discretion may hire a professional forester, hydrologist, landscape architect, or arborist at the applicant's expense. Such a professional consultant may be hired for any or all of the following reasons:

(a) To ensure the standards in [Chapter XIII of this ordinance] are met;

(b) To ensure that standards promulgated within the Forest Practices Act are met, except where they are inconsistent with the provisions of this chapter;

(c) To provide consultation during the application review process; and

(d) If the permit is granted to provide continuing oversight through cutting, reforestation, and until the end of the fifth growing season after reforestation.

VIII. Tree removal standards.

(1) The [city official], in consultation with the city engineer and the fire chief, shall approve, approve with conditions or deny the permit, as provided in [Chapter IX of this ordinance]. The [city official] may, at their discretion, refer the permit to the [jurisdiction] planning commission.

(2) The [jurisdiction]'s consideration of the permit shall be based on the following standards:

(a) Whether the condition of the trees with respect to disease, hazardous or unsafe conditions, danger of falling, proximity to existing structures or proposed construction, or interference with utility services or pedestrian or vehicular traffic safety warrants the proposed removal;

(b) The impact the trees' removal has on the environmental quality of the area, including but not limited to the protection of nearby trees and windbreaks, air quality, fish and wildlife, erosion, soil retention and stability, volume of surface runoff and water quality of streams, scenic quality, and geological sites;

(c) Whether it is necessary to remove trees in order to construct proposed improvements, or to otherwise utilize the applicant's property in a reasonable manner;

(d) In the event that no plot plan has been approved by the [jurisdiction], removal of trees shall be permitted on a limited basis consistent with the following criteria:

(i) Wooded areas associated with natural drainageways and water areas shall be retained to preserve riparian habitat and to minimize erosion;

(ii) Wooded areas that will likely provide attractive on-site views to occupants of future developments shall be retained;

(iii) Wooded areas along ridge lines and hilltops shall be retained for their scenic and wildlife value;

(iv) Wooded areas shall be retained to serve as buffers along property lines, streets, roadways, railroad rights-of-way and other thoroughfares;

(v) Trees shall be retained in sufficiently large areas and dense stands so as to ensure against windthrow;

(vi) Any proposed replanting of new trees or vegetation must be an adequate substitute for the trees to be removed;

(vii) Removal must be compatible with generally accepted practices of horticulture, silviculture or landscape architecture. Such practices include erosion control to prevent stormwater runoff from damaging soil in the area of removal;

(viii) The removal must be consistent with the guidelines set forth in the Forest Practices Field Guide published by the Oregon Department of Forestry.

IX.Plan review.

(1) Within 30 business days after a plan is filed with the [jurisdiction], unless a request for a time extension in writing is submitted by the applicant, the [jurisdiction] shall:

(a) Accept the plan if it meets the requirements of [chapter VII of this ordinance]and [chapter VIII of this ordinance]; or
(b) Accept the plan, with conditions; or
(c) Deny the plan and provide the applicant with a written statement containing the basis for the denial. Denial shall be for a failure of the applicant to meet the requirements of [Chapter VII of this ordinance]and [Chapter VIII of this ordinance] only. The [jurisdiction] shall not be required to review any plans or check any information supplied for accuracy or completeness. The receipt or acceptance of a plan is not an indication that the [jurisdiction] has approved the plans or the information contained therein.

(2) In accepting the plan, either conditionally or outright, the [jurisdiction] may waive street or land use development setback requirements or grant a conditional use or variance in order to preserve one or more Heritage Trees. The issue of whether to approve such a grant or waiver may be referred to the [jurisdiction] planning commission.

X. Conditions of approval.

The [jurisdiction] may place conditions on the applicant's plot plan in order to meet the standards in [chapter VIII of this ordinance].

(1) If issuance of the tree removal permit is conditioned upon the applicant's proposed plan to replace the trees, landscape or otherwise reduce the effects of the tree removal, the time within which the plan is to be completed shall be set forth on the permit.
(2) The [jurisdiction] may require the posting of a surety bond to guarantee that any conditions imposed on tree removal or replanting are met or to insure against damage to [jurisdiction] facilities.
(3) Failure to comply with a condition of a tree removal permit within the designated time is a violation of this section.

XI. Permit posting.

In order to ensure compliance with this chapter, once a tree removal permit has been issued, the permittee shall:

(1) Display the tree removal permit in a visible location on the parcel where tree removal is to occur; or
(2) Once removal has begun, the tree removal permit may be kept in the possession of the operator, while the operator is on the parcel conducting the permitted tree removal.

XII. Appeal to city council.

(1) An applicant may appeal the denial or conditioning of a permit to the city council by filing a written notice of appeal with the [jurisdiction] within 30 days from the date of the notice of [jurisdiction] action.
(2) The city council shall hold a hearing within 30 days of filing of the appeal. Notice of the hearing shall be provided to the applicant.

(3) The appellant shall carry the burden of proving that the requirements of [Chapter VII of this ordinance] and [Chapter VIII of this ordinance] have been met.
(4) Notice of denial or conditioning of a permit, and notice of hearing, shall be deemed to be served upon the applicant upon the earlier of:
  (a) Personal service upon the applicant:
  (b) Deposit of such notice in the mail with first class postage, addressed to the applicant at the address listed in the application.

XIII. Violation - Penalty.
(1) Any person found to have removed a tree in violation of this chapter shall incur a civil penalty of not more than [$1,000] nor less than [$500].
(2) Failure to comply with any condition of the permit issued to the applicant shall constitute a violation of this chapter and shall, upon conviction. subject the applicant to a fine of not more than [$1,000] nor less than [$500].
(3) Each tree removed in violation of this chapter or any permit issued pursuant to this chapter shall constitute a separate violation.
(4) Each tree that the applicant fails to replant or replace as required by the terms of the permit, and each violation of any other condition of a permit, shall constitute a separate violation.
(5) A court may impose less than the mandatory [$500] per tree penalty only if the defendant establishes by clear and convincing evidence that:
  (a) The minimum [$500] per tree penalty would create a severe financial hardship; or
  (b) A settlement agreement is reached prior to the hearing in which reclamation is offered as a substituted for part or all of the fine.

4.4.9 Erosion and Sediment Control

Problem
Erosion control during construction is a primary means of decreasing the amount of sedimentation and associated pollutants in a water body. The EPA recently adopted rules to lower the threshold from five acres to one acre for construction and grading activity, requiring an NPDES erosion and sediment control permit (see Chapter 2 for more information). This requirement is imposed on the state, but could lead to additional requirements for local erosion and sediment control programs. Cities may decide that additional risk factors, or a more stringent land area threshold is needed to control impacts from development activity. Such a decision could be based on a 303(d) listing or ESA listing (see Chapter 2 for more information).

Objective
Develop erosion prevention and sediment control standards that match the needs of a community, and provide the necessary level of protection for potentially impacted water bodies.

Strategy
Review the model ordinance below and the discussion that follows to determine the steps that must be taken to implement the model ordinance. The ordinance relies on an "erosion and sediment control manual" or some similar document that describes the "best management practices" applicable to the community given soil types, topography and location of water bodies and drainages. The model also calls for a manual that describes water quality treatment facilities. This manual need not be created for the community, instead a manual or handbook from another community or the Oregon Department of Transportation can be referenced in the code and kept on hand at the jurisdiction's offices. See page A.1 of the Appendix for examples.

Discussion
The implementation of an erosion prevention and control ordinance may require additional work on the part of the jurisdiction. In particular, techniques for preventing erosion must be determined and included in the "erosion and sediment control manual." If a community does not have the resources to complete such a manual entirely from scratch there are a number of communities that probably have similar erosion control issues that have completed such a manual. Jurisdictions with completed manuals include, Eugene, City of Portland, Unified Sewerage Agency of Washington County. The ideas and techniques within these manuals can be easily "borrowed" and tailored for use with this model ordinance.

This model ordinance begins to address the "relative risk" of each land disturbing activity. The risk of damaging sediments traveling from a disturbed site to a water body depends on the following factors:

- Amount of soil disturbed
- Occurrence of rain
- Erosivity of the soil
- Slope
- Proximity to water body or storm drain

The relative risk factors found in the model ordinance include amount of soil disturbed, slope and proximity to water bodies. A community can choose to include the other relative risk factors, and create a matrix that rates each project according to its relative risk and places fewer requirements on projects that pose less risk to water quality through erosion. The appendix contains a full explanation of relative risk and a suggested matrix for inclusion in the zoning code.

This ordinance also includes a separate section in the Appendix that can be added to require larger developments to install water quality controls that protect specific water bodies. This additional section requires a manual or a referenced manual that describes water quality treatment facility standards.

I. Purpose

The purpose of these standards is to reduce the amount of sediment and pollutants resulting from development, construction, grading, excavating, clearing, and any other activity which accelerates erosion or increases water pollution, from reaching the public storm and surface water system or from directly entering surface waters. The objective is to prevent and control erosion and pollution at its source in order to maintain and improve water quality and reduce downstream impacts.

II. Applicability

An erosion prevention and sediment control plan shall be required and approved by the [planning director/city engineer] under any of the following circumstances:

A. Prior to final plat approval for any subdivision, in accordance with Chapter [X.X].

[B. Prior to Design Review, in accordance with Chapter [X.X].]

C. Prior to approval of any building or grading permit that results in:
   1. Disturbance of [1,000] square feet or more of land surface area.
   2. Land or native vegetation disturbance within [50] horizontal feet of top of bank of any wetland, stream, river or storm drain inlet.
   3. Disturbance of land or vegetation affecting [500] square feet or more of land area on slopes of [25] percent or greater.

D. Farming activities are exempt from the provisions of this section, provided that the specific land area has been cultivated within the last three years.

E. Upon a finding that visible or measurable erosion has entered, or is likely to enter, the public storm and surface water system. As used in this section, "visible or measurable erosion" shall include the following:
   1. Depositions of soil or sediment exceeding [one cubic foot] in volume on a public or private street, adjacent property, or into the surface water management system either by direct deposit, dropping, discharge or as a result of erosion.
   2. Flows of water over bare soils, turbid or sediment laden flows, or evidence of on-site erosion such as rivulets or bare soil slopes, where the flow of water is not filtered or captured on the site.
   3. Earth slides, mud flows, earth sloughing, or other earth movement which leaves the property of origin.

F. Single Family Lot Exemption - Standard Erosion Control Plan.

Standard Erosion Control Plan Option. In lieu of compliance with [section V of this ordinance] the developer may choose to follow the requirements of the [Standard Erosion Control Plan, approved by the Planning Commission] and on file in the [with the jurisdiction] in the following circumstances:

a. The lot is [20,000 square feet or less.] and
b. No portion of the lot exceeds [5%] slope.

Nothing in this section shall relieve any person from the obligation to comply with the regulations or permits of any federal, state, or local authority.

III. Approval Standards

The Director shall make the following affirmative findings prior to approval of an erosion control plan:

A. The project has been designed to minimize disturbance of natural topography, native vegetation and soils, consistent with applicable provisions of [section X.X of this development code] (Hillside Preservation) and [section X.X of this development code] (Flood Hazard).
B. The site design maximizes the preservation of healthy trees, understory shrubs and ground cover.
C. The plan complies with the applicable technical guidelines, as determined by the [Public Works Director/engineer]. In the case of erosion control and prevention standards, the [list adopted erosion control manual or another jurisdiction's manual] shall be the recognized authority. [In the case of water quality facilities, the [list adopted water quality manual or a manual from another jurisdiction] shall be the recognized authority.] (note: include only if including the Special Water Quality Treatment Facilities in section VII.)

IV. Erosion Prevention and Sediment Control Plan Submission Requirements

The required erosion prevention and sediment control plan shall include a narrative description and scaled drawings which address:

A. The physical characteristics of the site, including a map of existing topography at [2] foot contour intervals, the location of water areas, and a narrative description of soil characteristics. The requirement for a [2] foot contour map may be waived by the [planning official] where this information is not readily available, and erosion potential is minor.
B. The nature of the proposed development, including any phasing plans, which may affect soils or create soil erosion. Areas of excavation, grubbing, clearing, stockpiling, or vegetation removal shall be specifically identified.
C. Specific erosion control measures and practices to be used to demonstrate compliance with Section V of this ordinance.

[D. Submitted plans shall be stamped by a professional engineer registered in Oregon.]

V. Erosion Control Plan Standards.

[In addition to compliance with relevant portions of the Hillside Development (4.2.7(c) in this handbook) and Floodway and Floodplain (4.2.7(d) in this handbook) Overlay Districts,] the required Erosion Prevention and Sediment Control Plan shall comply with the following standards:

A. Control Measures. Specific methods of soil erosion and sediment control shall be used during construction to minimize visible and measurable erosion. In no case shall soil erosion and sediment transport from the site exceed the rate of one ton per acre per year. These methods shall include all of the following:
   1. The land area to be grubbed, stripped, used for temporary placement of soil, or to otherwise expose soil shall be confined to the immediate construction site only.
   2. The duration of exposure of soils shall be kept to a minimum during construction. Exposed soils shall be covered by mulch, sheeting, temporary seeding or other suitable material following grading or construction, until soils are stabilized. During the rainy season [(November through May)], soils shall not be exposed for more than [seven] consecutive days. All disturbed land areas which will remain unworked for [21] days or more during construction, shall be mulched and seeded.
   3. During construction, runoff from the site shall be controlled, and increased runoff and sediment resulting from soil disturbance shall be retained on-site. Temporary diversions, sediment basins, barriers, check dams, or other methods shall be provided as necessary to hold sediment and runoff.
   4. A stabilized pad of gravel shall be constructed and maintained at all entrances and exits to the construction site to prevent soil deposits on the roadway or in the drainageways. The stabilized gravel pad shall be the only allowable entrance or exit to the site.
   5. Topsoil removal for development shall be stockpiled and reused on-site to the degree necessary to restore disturbed areas to their original or enhanced condition, or to assure a minimum of six inches of stable topsoil for re-vegetation. Additional soil shall be provided if necessary to support re-vegetation.
   6. The removal of all sediments which are carried into the streets, or on to adjacent property, are the responsibility of the developer. The applicant shall be responsible for cleaning and repairing streets, catch basins, and adjacent properties, where such properties are affected by sediments or mud. In no case shall sediments be washed into storm drains, ditches, drainageways, streams, or wetlands.
   7. Any other relevant provision of the [list adopted erosion control manual or the manual referenced from another jurisdiction], required by the [planning official].

B. Restoration of Vegetation. In addition to compliance with native vegetation removal and enhancement provisions of [chapters X.X and X.X] of this code, the developer shall be responsible for re-vegetating public and private open spaces, utility easements, and undeveloped rights-of-way in accordance with an approved Schedule of Installation.
   1. If the vegetation existing prior to site development is non-native or invasive, it shall be replaced with native or non-invasive plant species.
   2. Temporary measures used for initial erosion control shall not be left in place permanently.
   3. Work areas on the immediate site shall be carefully identified and marked to reduce potential damage to trees and vegetation.
   4. Trees shall not be used as anchors for stabilizing working equipment.
   5. During clearing operations, trees and vegetation shall not be permitted to fall or be placed outside the work area.
   6. In areas designated for selective cutting or clearing, care in falling and removing trees and brush shall be taken to avoid injuring trees and shrubs to be left in place and the provisions for tree preservation in [Chapter X.X and X.X of this ordinance].
   7. Stockpiling of soil, or soil mixed with vegetation, shall be removed prior to completion of the project.

C. Schedule of Installation. A schedule of planned erosion control and revegetation measures shall be provided, which sets forth the progress of construction activities, and mitigating erosion control measures.

D. Responsible Person. The developer shall designate a specific person to be responsible for carrying out the Erosion Prevention and Sediment Control Plan.

E. Reference Authority. The [list adopted erosion control manual or other jurisdiction's manual or the manual referenced from another jurisdiction] shall be the primary guide for [jurisdiction] in establishing and reviewing erosion control techniques, methods and requirements. The [planning official] and [Public Works Director] may also develop regulations and procedures in accordance with the Handbook to implement erosion control measures as needed.

VI. Plan Implementation Requirements.

An approved Erosion Prevention and Sediment Control Plan shall be implemented and maintained as follows:

A. Plan Approval Required Prior to Clearing or Grading. No grading, clearing or excavation of land requiring an Erosion Prevention and Sediment Control Plan shall be undertaken prior to approval of the Erosion Prevention and Sediment Control Plan.

B. Implementation. The developer shall implement the measures and construct facilities contained in the approved Erosion Prevention and Sediment Control Plan in a timely manner.
   1. During active construction, the developer shall inspect erosion prevention and control measures daily during rainy periods. In all cases, the developer shall be responsible for maintenance, adjustment, repair and replacement of erosion control measures to ensure that they are functioning properly without interruption.
   2. Eroded sediment shall be removed immediately from pavement surfaces, off-site areas, and from the surface water management system, including storm drainage inlets, ditches and culverts. In the event that sediment is inadvertently deposited in a wetland or stream, the developer shall immediately contact the [planning official] and coordinate remedial actions with the [jurisdiction].
   3. Water containing sediment shall not be flushed into the surface water management system, wetlands or streams without first passing through an approved sediment filtering facility or device.
   4. When required by the [planning official], the developer shall maintain written records of all site inspections of erosion control measures which shall be provided to the [planning official] upon request.
   5. The developer shall call for [jurisdiction] inspection, prior to the foundation inspection for any building, to certify that erosion control measures are installed in accordance with the Erosion Prevention and Sediment Control Plan.

[C. Dust Control. [jurisdiction] is especially susceptible to wind erosion. Therefore, the [planning official] may require that additional dust control measures be included in the Erosion Prevention and Sediment Control Plan. Such control measures may include, but are not limited to, the following:
   1. Sprinkling access and haul roads and other exposed dust producing areas with water.
   2. Applying dust palliatives to access and haul roads.
   3. Establishing temporary vegetative cover.
   4. Placing wood chips, gravel or other effective mulches on vehicle and pedestrian use areas.
   5. Maintaining the proper moisture condition on all fill surfaces.
   6. Pre-wetting cut and fill surface areas.
   7. Using covered haul equipment.]

D. Correction of Ineffective Measures. If the facilities and techniques approved in the Erosion Prevention and Sediment Control Plan are not effective or sufficient to meet the purpose of this section, based on an on-site inspection, the [planning official] may require a revised plan.
   1. The revised Erosion Prevention and Sediment Control Plan shall be provided within 5 working days of written notification by the [planning official].
   2. The developer shall implement fully the revised plan within 5 working days of approval by the [planning official].
   3. In cases where serious erosion is occurring, the [planning official] may require the developer to install interim control measures immediately, before submittal of the revised Erosion Prevention and Sediment Control Plan.

E. Additional Standards. The following additional standards shall apply:
   1. Construction between stream banks shall be prohibited, unless absolutely necessary to construct required public facilities. Any such activities must be performed in accordance with Oregon Department of Fish and Wildlife and other state regulations.
   2. Pollutants such as fuels, lubricants, raw sewage, and other harmful materials shall not be discharged into or near rivers, streams, or impoundments, and shall be properly stored and disposed.
   3. Discharge of water into a stream, wetland or impoundment shall not result in violation of the state temperature standard.
   4. All sediment-laden water from construction operations shall be routed through stilling basins, filtered, or otherwise treated to reduce the sediment load, and prevent violation of the state turbidity rule.

F. Storage. All erodible or toxic materials delivered to the job site shall be covered and protected from the weather and stored according to appropriate health and safety guidelines.
   1. Such materials shall not be exposed during storage.
   2. Waste material, rinsing fluids, and other such material shall be disposed of in such manner that pollution of groundwater, surface water, or air does not occur.
   3. In no case shall toxic materials be dumped into drainageways or onto land.

G. Contaminated Soils. Where the construction process reveals soils contaminated with hazardous materials or chemicals, the Contractor shall stop work immediately; ensure that no contaminated material is hauled from the site; remove the work force from the contaminated area; leave all machinery and equipment; secure the area from access by the public until such time as a mitigation team has relieved the Contractor of that responsibility; notify the [jurisdiction] of the situation upon its discovery; and prohibit employees who may have come in contact with the contaminated material from leaving the site until released by the [jurisdiction].

H. Duration of Maintenance. Continuing maintenance after development pursuant to the Erosion Prevention and Sediment Control Plan, including re-vegetation of all graded areas, shall be the responsibility of the developer, subsequent developers or property owners.

1. Erosion prevention and control measures shall be maintained during construction and for one year after development is completed.
2. The [planning official] may, upon a finding that soils are completely stabilized, reduce this period.

(Note: the Appendix contains an additional section that is recommended for implementation if the jurisdiction has specific water resources that need protection from a single, large development. The additional section is not necessary for a complete erosion prevention/control ordinance.)

VIII. Security

[Except as provided by Section VII of this ordinance,] after an Erosion Prevention and Sediment Control Plan [or Water Quality Facility] is approved by the [planning official] and prior to construction or grading, the applicant shall provide a performance bond or other financial guarantee in the amount of [120%] of the value of the erosion prevention/control [and water quality measures] necessary to stabilize the site and maintain water quality. Any financial guarantee instrument proposed other than a performance bond shall be approved by the [City Attorney].

A. Duration. The financial guarantee instrument shall be in effect for a period of at least one year (or two years in the case of a water quality facility), and shall be released when the Director determines that the site has been stabilized (or the water quality facility is operating as designed). All or a portion of the security retained by the City may be withheld for a period of up to five years beyond the one-year maintenance period, if it has been determined by the [planning official] that the site has not been sufficiently stabilized against erosion [(or the water quality facility is not operating as intended)].

B. Exemptions. Individual lots zoned for single-family and multi-family residential use prior to the effective date of this Section, and individual lots subject to the standard erosion control plan stated in Section V of this ordinance shall be exempt from the security requirements of Section VIII of this ordinance.

C. Conflict. Due to the immediate threat to the public health, safety and welfare posed by failure to comply with the strict provisions of the erosion control measures required under this Section, the provisions of Section VIII shall supersede the more general provisions of [jurisdiction's development code], where they exist.

IX. Enforcement

Each violation of any provision of this Section, or any failure to carry out the conditions of any approval granted pursuant to this Section, shall be unlawful and a civil infraction subject to the enforcement provisions of [jurisdiction development code, Section X.X].

A. Additional Penalties. In addition to those penalties available under [jurisdiction development code, Section X.X], the [planning official] may enforce the following additional penalties:
   1. Issue a stop work order where erosion control measures are not being properly maintained or are not functioning properly due to faulty installation or neglect.
   2. Refuse to accept any development permit application, revoke or suspend any development or building permit, or deny occupancy of the subject property until erosion control measures have been installed properly and maintained in accordance with this Section.

B. The owner of the property from which the erosion occurs, together with any person or parties who cause such erosion, shall be responsible for mitigating the impacts of the erosion and for preventing future erosion.

C. Upon request of the [city/county Administrator or at the direction of the City Council/County Commission], the City Attorney may institute appropriate action in any court to enjoin development of a site or building project which is in violation of this Section, or to require conformance with this Section.

Common Problems Associated with Designated Pollution Factors	Increased Erosion & Sedimentation	Increased Runoff Volume	Nitrogen, Phosphorous, Metals & Other Pollutants	Increased Water Temperature
	♦ decreases light penetration which decreases plant production and respiration ♦ transports contaminants ♦ reduces flood storage capacity ♦ alters habitat areas ♦ clogs gill tissue of fish and other organisms; covers fish spawning beds; suffocates eggs	♦ transports pollutants ♦ contributes to flood events ♦ increases the volume of water and the frequency of channel forming events like bank erosion or downcutting ♦ affects in-stream flow patterns and can result in wider and shallower streams	♦ nitrogen and phosphorous contribute to increased algae blooms and reduced dissolved oxygen levels ♦ heavy metals are toxic to aquatic organisms ♦ bacteria and pesticides impact public health and may be toxic to humans and wildlife	♦ negatively affects fish growth and their resistance to disease ♦ reduces dissolved oxygen ♦ stimulates the growth of algae

Non-Structural BMP Solutions for Designated Pollution Factors

	Increased Erosion & Sedimentation	Increased Runoff Volume	Nitrogen, Phosphorous, Metals & Other Pollutants	Increased Water Temperature
Impervious Cover Reduction *Studies have shown stream biodiversity decreases once imperviousness exceeds 10%[1], and stream warming, during warmer seasons, is related to impervious surface.[2]*	**<Effective>** Reduces total suspended solids by as much as 90% if impervious area reduced by 20%.[3]	**<Effective>** Reduces annual runoff volumes by 20%-60% if impervious area reduced by corresponding 20%-60%.[4]	**<Effective>** **Nitrogen**: 40%-70% reduction if 20%-40% less impervious cover[5] **Phosphorous**: 40%-80% reduction if 20%-40% less impervious cover[6]	**<Inconclusive>** Prevents stream widening by reducing sediment loads and runoff volumes. Stream widening allows more direct solar radiation and increased water temperatures.
Water Quality & Environmentally Sound Design *These designs cluster a variety of housing types into a smaller portion of the site allowing for more green area and less impervious surface.*	**<Effective>** Reduction of impervious surface by 20% reduces total suspended solids by as much as 90%.[7]	**<Effective>** Reduces runoff volumes and peak flow rates by increasing opportunities for natural infiltration.	**<Effective>** **Nitrogen**: 40%-70% reduction if 20%-40% less impervious cover[8] **Phosphorous**: 40%-80% reduction if 20%-40% less impervious cover[9]	**<Effective>** Keeps water temperatures from rising to excessively high levels by limiting the amount of impermeable surface within an area.

Non-Structural BMP Solutions for Designated Pollution Factors

	Increased Erosion & Sedimentation	Increased Runoff Volume	Nitrogen, Phosphorous, Metals & Other Pollutants	Increased Water Temperature
Higher Building Density in Specified Areas (Urban Growth Boundaries) *Higher building densities in specified areas can offset lands made unavailable for development in riparian buffers and other sensitive lands.*	**<Inconclusive>** Quantitative comparison of compact vs. dispersed development patterns not available.	**<Effective>** Runoff volumes per dwelling unit from low-density projects can be greater than runoff per dwelling unit from high-density projects.[10], Low-density projects may reduce impervious area per project, but may require more roads, resulting in more paved area for whole watershed.	**<Inconclusive>** Studies on the effect of higher building density on pollutants are not available.	**<Inconclusive>** Quantitative comparison of compact vs. dispersed development patterns is not available.
Stream/Wetland Buffer *Buffers are usually established and maintained through local development ordinances. They limit sedimentation and erosion, provide shade, contribute woody debris for stream health, incorporate floodways and allow for natural stream channel movement. Buffers provide connecting corridors allowing wildlife to move safely.*	**<Effective>** Enhances sediment deposition and reduces erosion. Maintains bank stability when vegetated. Reduces sediment, nutrients, and bacteria from runoff and septic system effluent in rural and agricultural areas.[11] Reduces between 40%-80% of total suspended solids.[12]	**<Effective>** Slows and reduces runoff volumes by allowing natural infiltration to occur.	**<Effective>** **Nitrogen**: 25%-65% reduction **Phosphorous**: 30%-70% reduction[13]	**<Effective>** Reduces water temperatures.[14] Vegetation provides shade and promotes stormwater infiltration. Infiltrated stormwater cools underground and is naturally recharged to a stream as cool groundwater.
Addition/Retention of Trees Throughout the Watershed *Planting new or retaining existing trees in developing areas provides shade, erosion control and wildlife habitat. Tree preservation ordinances are used in many cities and counties.*	**<Effective>** Anchors soil and stabilizes stream banks. Slows water, allowing for sedimentation on banks where narrowing and deepening are desirable (though this may lead to loss of stream capacity in other areas).	**<Effective>** Tree canopy captures rain and reduces runoff through evapotranspiration. Estimated that 37% loss in tree cover in the Puget Sound area over the last 24 years increased runoff flow during a peak storm event by 29%.[15]	**<Inconclusive>** Puget Sound study estimates the loss in tree cover contributes to an additional 35 million annual pounds of pollutants in the atmosphere. [16]	**<Effective>** Shade keeps surface waters cool in warm weather and reduces runoff temperature. Vegetation along riparian areas helps prevent bank erosion and stream widening. Stream widening allows more direct solar radiation and increased water temperatures.[17]

Non-Structural BMP Solutions for Designated Pollution Factors

	Increased Erosion & Sedimentation	Increased Runoff Volume	Nitrogen, Phosphorous, Metals & Other Pollutants	Increased Water Temperature
Use/Retention of Native Vegetation *The use of native vegetation reduce water, pesticide and fertilizer use.*	**<Effective>** Limits soil disturbance, which contributes to erosion. Prevents soil erosion and preserves habitat complexity.	**<Effective>** Encourages infiltration, which reduces runoff volumes.	**<Effective>** Reduces need for pesticide and fertilizer.	**<Inconclusive>** Effectiveness has not been determined.
Hillside Protection Overlay *Development restrictions in areas with steep slopes limit soil erosion and loss of tree canopy. Soil stability and tree canopy contribute to fish and wildlife health and water quality.*	**<Effective>** Reduces erosion by limiting activities that would otherwise contribute to disturbance in areas with high erosion potential.	**<Effective>** Generally, steeper slopes have a high runoff velocity, contributing to a shorter time of concentration and greater peak flow rates.	**<Inconclusive>** Preserves vegetation in sensitive areas, which may contribute to an increased intake of nitrogen and phosphorous.	**<Effective>** Reduces excessive in-stream sedimentation preventing wider, shallower streams that respond more rapidly to solar radiation and high air temperatures.

Structural BMP Solutions for Designated Pollution Factors				
	Increased Erosion & Sedimentation	**Increased Runoff Volume**	**Nitrogen, Phosphorous, Metals & Other Pollutants**	**Increased Water Temperature**
Porous Paving for Low Use Roads, Parking Lots, Sidewalks & Driveways *Needs ongoing maintnance and periodic vacuuming.[18] Best when applied on soil with good drainage.*	**<Inconclusive>** 60%-90% removal of total suspended solids.[19] Reduces impact by allowing runoff to infiltrate. Keep sediment-laden runoff away from porous pavement; use erosion and sediment control devices during construction to prevent clogging.	**<Inconclusive>** Reduces volumes and peak flows. Increases opportunities for groundwater recharge, helping to restore the natural hydrologic cycle.	**<Inconclusive>** Facilitates better infiltration of runoff and less erosion of surface soils to surface waters, which limits the transport of adsorbed contaminants.	**<Inconclusive>** Lowers temperatures by contributing to an overall reduction in runoff volume.
Wet Pond *Biological processes remove pollutants. Bottom layer can trap most types of pollutants. Needs to be cleaned at 15-25 year cycles.[20]*	**<Effective>** 50%-90% removal of total suspended solids.[21]	**<Effective>** Captures and slowly releases runoff at controlled rates. Able to provide peak flow control.[22] Most suitable for larger areas.[23]	**<Effective>** **Nitrogen**: 10%-90% reduction **Phosphorous**: 20%-90% reduction[24] Wet ponds may contribute bacteria from water fowl.	**<Inconclusive>** May contribute to warmer temperatures in receiving stream. Shading vegetation can reduce this effect.
Constructed Wetland *Similar to wet pond. May consist of shallow marshes, 2 to 3-celled pond, extended detention and pocket wetlands. Treats runoff through adsorption, plant uptake and filtration. Periodic maintenance is necessary.*	**<Effective>** 50%-90% removal of total suspended solid.[25,26]	**<Effective>** Controls runoff volumes by allowing for infiltration.	**<Effective>** **Nitrogen**: 40%-60% reduction **Phosphorous**: 40%-80% reduction **Heavy metals**: 40%-80% reduction.[27]	**<Inconclusive>** May contribute to warmer temperatures in receiving stream. Shading vegetation can reduce this effect.
Sediment/Silt Basin *Non-natural structure that allows sediment to settle out of runoff. Used frequently at construction sites, and for drainage areas 5-100 acres in size. Sediment basins designed as permanent structures should meet all standards for wet ponds.[28]*	**<Effective>** 55%-100% removal of total suspended solids.[29] Maintenance is essential to ensure effectiveness.	**<Inconclusive>** Generally, used more for ability to capture sediments and pollutants rather than ability to reduce peak runoff flows.	**<Effective>** Effective in removing phosphorous and metals loads from incoming runoff.	**<Inconclusive>** May contribute to warmer temperatures in receiving stream. Shading vegetation can reduce this effect.

Structural BMP Solutions for Designated Pollution Factors				
	Increased Erosion & Sedimentation	**Increased Runoff Volume**	**Nitrogen, Phosphorous, Metals & Other Pollutants**	**Increased Water Temperature**
Trapped Catch Basin *Type of water quality inlet consisting of a single-chambered device to collect runoff. The basin rests below the outlet pipe, allowing water to rest and sediments to settle. Semi-annual maintenance is important to ensure effectiveness.*	**<Effective>** Estimated 22% removal of total suspended solids runoff.[30] Moderately effective in trapping total suspended solids.	**<Inconclusive>** Not intended for reducing peak runoff flows or runoff volumes.	**<Inconclusive>** Not associated with significant pollutant reductions other than those associated with sediment removal. [31] May be used with prefiltering inserts such as charcoal, wood fibers or fiberglass for additional pollutant removal.	**<Inconclusive>** Available research does not suggest a significant relationship between trapped catch basins and stream temperatures.
Dry/Wet Swale *Shallow vegetated ditches. Wet swales more appropriate when water table is close to surface and typically have dead storage below elevation of discharge point. Runoff is sent through a grass filter strip, and may be sent through a second BMP for further treatment before being discharged. Most suitable for 10 acre sites or less.*	**<Effective>** 20%-40% removal of total suspended solids.[32] Portland Parkrose bioswale removes 78% of total suspended solids.[33]	**<Effective>** Portland Parkrose bioswale reduces storm volumes significantly.[34]	**<Effective>** **Total Nitrates**: 10%-30% reduction **Phosphorous**: 20%-40% reduction[35] **Metals**: Portland Parkrose bioswale reduces metals such as lead, zinc, cadmium and copper by more than 50%.[36] **Other Pollutants:** Up to 75% reduction of oil, grease and petroleum hydrocarbons.[37]	**<Effective>** Portland Parkrose bioswale demonstrated an average runoff temperature reduction of 10% between the inlet and outlet for three sampling events.[38]
Vegetated Filter Strip *Area of vegetation used to remove sediment and other pollutants. Frequently designed for sheet runoff from less than 5 acre sites, such as parking lots.*	**<Effective>** 40%-90% removal of total suspended solids.[39]	**<Inconclusive>** Provides increased infiltration of stormwater, decreasing runoff volumes though generally not effective against high-velocity flows.[40]	**<Effective>** **Nitrogen**: 20%-60% reduction **Phosphorous**: 30%-80% reduction[41] **Total Metal**s: 40%-50% removal of total metals for parking lots[42]	**<Inconclusive>** Though minimal, shading from vegetation along filter strips may contribute to cooler water temperatures.

Structural BMP Solutions for Designated Pollution Factors				
	Increased Erosion & Sedimentation	**Increased Runoff Volume**	**Nitrogen, Phosphorous, Metals & Other Pollutants**	**Increased Water Temperature**
Infiltration Trench *Shallow ditch, 2-10 feet deep, backfilled with stone where runoff slowly infiltrates into subsoil then into groundwater. Used for smaller sites. May clog in 5 years. Most effective when used with pretreatment devices (i.e., vegetated filters).*[43]	**<Effective>** 50%-100% removal of total suspended solids depending on soil type.[44] Where chemical contamination risk is low, useful in capturing sediments.[45]	**<Inconclusive>** Larger systems may help reduce runoff volumes.	**<Effective>** **Nitrogen**: 50%-100% removal depending partially on soil type **Phosphorous**: 50%-100% removal depending partially upon soil type.[46]	**<Inconclusive>** Prevents stream widening by reducing sediment loads and runoff volumes. Stream widening allows more direct solar radiation and increased water temperatures.
Roof Downspout Drain *Consists of small trenches, sometimes filled with gravel, that collect and filter roof runoff. Typically, residential roof downspouts drain directly into storm sewers.*	**<Effective>** Redirecting rooftop runoff through porous surfaces can significantly reduce runoff volumes. [47]	**<Effective>** Annual runoff volume can be decreased by as much as 50% for medium-to-low density residential land uses.[48]	**<Effective>** Significant effect in reducing pollutant load by reducing runoff volumes that reach surface water.[49]	**<Inconclusive>** Prevents stream widening by reducing sediment loads and runoff volumes. Stream widening allows more direct solar radiation and increased water temperatures.
Farm Animal Management *Farm animals contribute to erosion and increased nutrient and bacteria levels in runoff. Livestock BMPs include containment of contaminated runoff, proper storage and disposal of manure, installation of runoff treatment systems, reduction of livestock densities, and separation of livestock from sensitive water quality areas.*	**<Effective>** BMPs that limit contact between farm animals and sensitive riparian areas reduce erosion and sedimentation.	**<Effective>** BMPs for large farm animals areas that reduce density or modify practices to prevent compacted soils or amended areas reduces runoff.	**<Effective>** Runoff from farm animal areas can be high in nutrients and bacteria from animal feed and manure. Water quality can be protected if these areas are not directly adjacent to streams or sensitive areas.	**<Inconclusive>** Prevents stream widening by controlling farm animals and protecting against erosion. Stream widening allows more direct solar radiation and increased water temperatures.

[1]Center for Watershed Protection; A Comprehensive Guide for Managing Urban Watersheds, October 1998, p.1.8.
[2]Scheuler, T., The Importance of Imperviousness, Watershed Protection Techniques, Volume 1., No. 4, Summer 1995.
[3]Center for Watershed Protection; Better Site Design, Handbook for Changing Development Rules in Your Community, p. 95.
[4]Ibid.
[5]Ibid.
[6]Ibid.
[7]Ibid.
[8]Ibid.
[9]Ibid.
[10]Beach, Dana, How Federal "Non-Point Source Programs" Promote Sprawl, New Urban News, January-February, 1999.
[11]Center for Watershed Protection; A Comprehensive Guide for Managing Urban Watersheds, October 1998, p. 2.13.
[12]Oregon DEQ, Nonpoint Source Pollution Control Guidebook for Local Government, June 1994, p. IV-11.
[13]Ibid.
[14]Ibid.
[15]American Forests, Regional Ecosystem Analysis: Puget Sound Metropolitan Area, 1999. (http://americanforests.org/ufc/uea/Page_2.html)
[16]Ibid.
[17]Metro's Streamside CPR Report; Discussion Draft. December 1999, p. 30.
[18]Cahill, T., A Second Look at Porous Pavement/Underground Recharge, Watershed Protection Techniques. Summer 1994, Volume 1: 2, p. 76.
[19]US EPA, Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, January 1993, p. 4-27.
[20]Yousef, A.Y., Pollutant Dynamics of Pond Muck; Watershed Protection Techniques, summer 1994, Volume 1: 2, p. 39.
[21]US EPA, Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, January 1993, p. 4-27.
[22]US EPA, Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, January 1993, p. 4-18.
[23]Oregon DEQ; Oregon Stormwater Management Guidelines, January 1999, p.12.
[24]US EPA, Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, January 1993, p. 4-27.
[25]Oregon DEQ; Oregon Stormwater Management Guidelines, January 1999, p.13.
[26]US EPA, Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, January 1993, p. 4-28.
[27]Oregon DEQ; Oregon Stormwater Management Guidelines, January 1999, p.13.
[28]US EPA, Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, January 1993, p. 4-72.
[29]US EPA, Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, January 1993, p. 4-78.
[30]Oregon DEQ; Oregon Stormwater Management Guidelines, January 1999, p. 15.
[31]Ibid.
[32]US EPA, Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, January 1993, p. 4-24.
[33]Portland NPDES Fourth Stormwater Monitoring Report, Fiscal Year 1998-99. Oregon DEQ, p. 4-47.
[34]Portland NPDES Fourth Stormwater Monitoring Report, Fiscal Year 1998-99. Oregon DEQ, p. 4-45.
[35]Ibid.
[36]Portland NPDES Fourth Stormwater Monitoring Report, Fiscal Year 1998-99. Oregon DEQ, p. 4-47.
[37]Oregon DEQ; Oregon Stormwater Management Guidelines, January 1999, p. 18.
[38]Portland NPDES Fourth Stormwater Monitoring Report, Fiscal Year 1998-99. Oregon DEQ, p. 4-46.
[39]US EPA, Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, January 1993, p. 4-25.

[40]US EPA, Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, January 1993, p. 4-32.
[41]US EPA, Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, January 1993, p. 4-25.
[42]Claytor and Scheuler, 1996, as quoted in *Better Site Design*, Center for Watershed Protection, August 1998, p. 89.
[43]Oregon DEQ; Oregon Stormwater Management Guidelines, January 1999, p. 5.
[44]US EPA, Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, January 1993, p. 4-25.
[45]Oregon DEQ; Nonpoint Source Pollution Control Book for Local Government, p. IV-7.
[46]US EPA, Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, January 1993, p. 4-25.
[47] Pitt, 1987, as quoted in, Rapid Watershed Planning Handbook, Center for Watershed Protection, October, 1998, p. 2.17
[48]Ibid.
[49]Ibid.

3. The Comprehensive Plan

3.1 Introduction

The comprehensive plan provides the framework for protecting and enhancing water quality. All water quality provisions in the land development code should be supported by the appropriate comprehensive plan goals and policies. Oregon Statewide Planning Goal 2: Land Use Planning, indicates that, "all land use plans shall include identification of issues and problems, inventories and other factual information for each applicable statewide planning goal, evaluation of alternative courses of action and ultimate policy choices…" Many comprehensive plans already have provisions that support water quality ordinances, particularly if any Goal 5 work has been completed. In addition to Goal 5 there are a number of Statewide Planning Goals that have water quality components to them. Perhaps the best way to address water quality is not to rely on one or two goals, but to recognize that most of the goals are in some way related to water quality, and when used in concert, they form a powerful basis for water quality ordinances.

Due to the changing regulatory environment, acknowledged local comprehensive plans may not adequately address water quality. New DEQ rules and pending ESA regulations are good reasons to review and update portions of the comprehensive plan. In the end, local jurisdictions will need to determine how to best address water quality and habitat protection in conjunction with state and federal agencies. A review of the comprehensive plan may reveal areas that can be strengthened, or where a community dialogue needs to occur about the proper method of protecting and enhancing water quality.

3.2 Model Comprehensive Plan Language

The following section contains a list of the Statewide Planning Goals applicable to water quality. There is a brief description of the goal and how it relates to water quality. Model comprehensive plan language to implement the model ordinances found in this guidebook is provided for each goal. The model language includes a reiteration of the Statewide Goal, sample findings and sample policies. As with any model language, the statements provided here are for example purposes only, and by state law each community must have a dialogue about what policies are appropriate for the community.

Because this guidebook focuses on water quality, sample language is only provided for the water quality component of each goal. Since changes to comprehensive plans are often long and involved processes, a community may decide to make changes for components other than water quality, or may be required to do so as part of periodic review. In these cases there are other resources available to assist communities with all facets of the comprehensive plan.

Goal 4: Forest Lands

While this guidebook is primarily focused on urban areas, there may be some unincorporated communities that include forest lands and even cities that have forest lands in their boundaries. Goal 4 requires that forest practices and auxiliary uses allowed in forest lands follow the rules specified in ORS 527.722, the Forest Practices Act. The act states that if a local jurisdiction decides to regulate tree cutting or other forestry practices

within its boundaries, then the local jurisdiction must implement all of the Oregon Forest Practices Act. Many communities have decided to take this approach, including the Cities of Tillamook and Veneta. The Forest Practices Act requires that forest practices be conducted in a manner that protects streams, wetlands and water quality. Local protections may not fall below the requirements found in the act. A model ordinance for tree preservation that meets the requirements of the Forest Practices Act can be found in Chapter 4 (4.3.8).

Goal
To conserve forest lands by maintaining the forest land base and to protect the state's forest economy by making possible economically efficient forest practices that assure the continuous growing and harvesting of forest tree species as the leading use on forest land consistent with sound management of soil, air, water and fish and wildlife resources and to provide for recreational opportunities and agriculture.

Findings
The [jurisdiction] contains forest lands or large tracks of property that remain forested and that are beneficial to the water quality of the watershed.

The [jurisdiction] has a mature tree canopy that has a beneficial impact on water quality by increasing infiltration and slowing the rate of runoff and by cooling the temperature of water in streams.

Loss of trees in the [jurisdiction] can lead to decreased water quality through increased erosion, decreased infiltration and increased water temperature.

Regulation of tree cutting by the [jurisdiction] will require the [jurisdiction] to ensure that all forest operations are regulated to protect soil, air, water, and fish and wildlife resources.

Policies
The [jurisdiction] will develop and implement development code language that will regulate tree cutting and protect soil, air, water and fish and wildlife resources during forest operations.

Goal 5 – Natural Resources, Scenic and Historic Areas, and Open Spaces
Goal 5 has received much attention in the last few years. Administrative rules were adopted in August of 1996 that require local governments to inventory and evaluate Goal 5 resources, and develop land use programs that conserve and protect significant Goal 5 resources. The Goal 5 rules requires that a local inventory and protection strategy be developed for three Goal 5 resources by completion of the jurisdiction's next periodic review. These resources are:

- riparian corridors, including water and riparian areas and fish habitats;
- wetlands;
- wildlife habitat

Other Goal 5 resources related to water quality protection are:

- federal Wild and Scenic Rivers;
- Oregon Scenic Waterways;
- groundwater resources;
- natural areas; and
- other resources not related to water quality

The first step in the Goal 5 process is to conduct an inventory of all Goal 5 resources. Local governments must demonstrate that the inventory process was "adequate", meaning that the location, quality and quantity of resources were identified. They must also demonstrate that the resources identified are "significant." The same information relating to location, quality and quantity of the resource may be used to evaluate its significance, though cities and counties may apply their own additional criteria in this step. Cities and counties must then conduct an "ESEE" analysis, evaluating the environmental, social, energy and economic consequences of allowing, limiting or prohibiting conflicting uses near a Goal 5 resource. Areas where conflicting uses "could adversely affect" the Goal 5 resource must be delineated as "impact areas." Goal 5 requirements are met when local governments have adopted "clear and objective standards" in their comprehensive plans that define the degree of protection for each Goal 5 resource.

Revised Goal 5 provisions include a "safe harbor" option for protection of riparian areas and wetlands. Safe harbors offer a more streamlined approach that local governments may use to achieve Goal 5 compliance for these resources.

For riparian corridors, the "adequacy" and "significance" determinations may be skipped in exchange for the adoption of specific setback requirements. These requirements consist of a 50-foot setback from all fish-bearing lakes and streams and a 75-foot setback from all streams with average annual stream flow greater than 1,000 cubic feet per second. These protective setbacks are both a minimum and a maximum and can be imposed without consideration of conflicting plan objectives.

For wetlands inside urban growth boundaries and urban unincorporated communities, a local government may adopt an ordinance that meets the requirements of OAR 660-023-0100(4)(b) in lieu of following the ESEE decision process. The safe harbor provisions for wetlands require local wetlands inventory (LWI) to be conducted using the standards and procedures of OAR 141-086-0110 through 141-086-0240 and that the LWI be adopted as part of the comprehensive plan or as a land use regulation. Criteria for determining "significance" are defined in OAR 141-086-0300. Significant wetlands must be protected from grading, excavation, placement of fill, and vegetation removal other than perimeter mowing and other cutting necessary for hazard prevention.

The safe harbor provisions for riparian corridors and wetlands implement specific requirements in Goal 5. They may not be sufficient to protect endangered fish and wildlife species, nor to meet DEQ water quality requirements.

Goal
To protect natural resources and conserve scenic and historic areas and open spaces.

Findings
The water resources and associated riparian vegetation in the jurisdiction contribute to the health, safety, and general welfare of the area. The stability of the natural systems and the vitality of the community depend on the excellent water quality provided by these resources. These resources include: (list resources).

Natural drainageways are a significant natural resource. They provide protection from flooding, treatment of stormwater, and help to maintain stream morphology.

Fish and other wildlife, some of which are endangered or threatened, depend on the excellent water quality and habitat function provided by these resources.

The storage capacity for stormwater provided by soil and its filtering function are essential to maintaining ground and surface water resources. These functions must be preserved or their loss mitigated.

The municipal water supply is drawn from groundwater [and/or surface water] within the city and care must be taken to preserve this valuable resource.

The Local Wetlands Inventory, published [X, X, 200X] describes locally significant wetlands.

Policies
Significant natural features within the [jurisdiction] shall be identified and inventoried by the [jurisdiction]. These shall include:

- Seasonal and perennial streams and other natural drainageways, wetlands, and flood plains;
- Lands abutting any significant rivers or streams (list significant rivers and/or streams)
- Lands with significant native vegetation as defined in the Oregon Natural Heritage Plan (1998), which may include certain woodlands, grasslands, wetlands, riparian vegetation, and plant species;
- Significant hillsides;
- Groundwater and surface water areas used for drinking water.

Rivers, streams and lakes shall be preserved and buffered as needed to protect their function.

Significant natural drainage features and wetlands shall be preserved or have their losses mitigated.

Site-specific buffering, setback requirements and best management practices may be required, as necessary, to enhance and protect resources.

To minimize the negative impacts of development, stormwater should be infiltrated on site to the greatest extent possible. Runoff that cannot be infiltrated shall be managed so that the hydrograph of the receiving stream is not significantly impacted and treated so water quality is maintained.

Domestic groundwater and surface water resources shall be mapped and protected from potential pollution through a variety of regulatory measures relating to land use, transportation and hazardous substance management.

If waterways or lakes within the [jurisdiction] are declared water-quality limited by the Oregon Department of Environmental Quality, the City will work with DEQ to determine appropriate pollutant load reduction strategies implementation plan in response to a Total Maximum Daily Load (TMDL) determination developed for the watershed.

Land use and development standards shall be utilized to avoid pollution of groundwater resources, including current and potential wellhead areas.

Locally significant wetlands mapped in the Local Wetlands Inventory shall be protected by buffers to preserve habitat and protect and enhance water quality.

The [jurisdiction] will identify highly sensitive habitat areas and areas that are significant for the protection of water quality for public purchase and ownership or for purchase and protection through existing conservancy programs.

Goal 6 – Air, Water and Land Resources Quality
Unlike Goal 5, Goal 6 does not have administrative rules to set standards for meeting the goal. Instead, it relies entirely on other state and federal regulations for direction and implementation. However, for water quality purposes, Goal 6 has the potential for being the most important land use planning goal. The Goal requires that "all waste and process discharges from future development, when combined with such discharges from existing developments shall not threaten to violate, or violate applicable state or federal environmental quality statutes, rules and standards."

State definitions for wastewater and pollutants include pollutants carried by stormwater, and impacts on habitat that result from stormwater flows. Goal 6 requires jurisdictions to integrate compliance with federal and state water quality regulations with their comprehensive planning process.

Goal
To maintain and improve the quality of the air, water and land resources of the state.

Findings
According to the 2000 Section 303(d) List of Water Quality Limited Waterbodies published by the DEQ, the [X section of X river] is water quality limited for [pollutant] (repeat this finding as necessary)

The pollutant load allocation given to [jurisdiction] as a result of the TMDL for [pollutant] conducted by DEQ represents a [percentage] reduction from current levels. A significant portion of this load reduction must be achieved through changes in development practices. (repeat finding as necessary)

According to the National Marine Fisheries Service [X species] is listed as [threatened/endangered). [Spawning/rearing/migration] habitat for [X species] is found within [jurisdiction].

According to the US Fish & Wildlife Service [X species] is listed as [threatened/endangered). [Spawning/rearing/migration] habitat for [X species] is found within [jurisdiction].

Development activities permitted by [jurisdiction] which result in harm to an threatened or endangered species and fall outside the provisions for incidental take allowed by section 4(d), a section 7 consultation or a section 10 permit of the ESA, could result in the [jurisdiction] being held liable for a take under the ESA.

The DEQ definition of waste water includes both point and non-point sources. Waste water from a point source comes from a discernable or discrete conveyance such as a pipe, ditch or channel. Non-point source waste water is from overland flow which does not generally follow a defined channel, and includes storm water. Water pollution in the [jurisdiction] results from both point sources and non-point sources.

Reduction of open space, removal of vegetative cover, terracing into hillsides, and development that increases the amount of impervious surfaces can contribute significantly to increases in the peak flows of stormwater and decrease water quality.

Offsetting measures can reduce the negative effects of urban development on water quality and quantity. Examples include reduction of stormwater runoff or maximization of infiltration, inclusion of landscaped buffer strips adjacent to new development, protection of flood plains, preservation and improvement of streamside vegetation along watercourses and in wetlands, and other development best management practices (BMPs).

Effective utilization of urban services through more compact development and efficient site planning can help reduce the impacts of development on water quality by reducing the amount of low density development that could otherwise occur in natural areas.

Policies
All development within the [jurisdiction] shall comply with applicable state and federal water quality regulations.

All development within the [jurisdiction] shall be constructed to preserve the quality and quantity of groundwater resources.

To protect and enhance water quality in [jurisdiction], as required by state and federal requirements, the [jurisdiction] will develop regulations or programs to manage non-point pollutants by:

- Regulating site planning for new development and construction to better control drainage and erosion and to reduce and treat and retain stormwater runoff;
- Increasing riparian area buffer widths where appropriate to address Total Maximum Daily Load (TMDL) requirements and other state and federal requirements;
- Regulating the location of permitted uses that may have higher than ordinary impacts on water quality, particularly those that generate, store or use hazardous waste or materials;
- Reducing street-related water quality and quantity problems;
- Increasing public awareness of techniques and practices private individuals can employ to help correct water quality and quantity problems;
- Increasing public awareness, minimizing the use, and encouraging the appropriate disposal of polluting substances that affect surface and groundwater resources;
- Regulating the cutting of trees and encouraging the reforestation and re-vegetation of appropriate areas in the [jurisdiction];
- Requiring certain new construction and improvements to have an erosion control plan to protect water quality.

The [jurisdiction] shall limit the increase in the percentage of impervious surfaces.

Goal 7 – Areas Subject to Natural Disasters and Hazards
While Goal 7 does not point specifically towards the issue of water quality, Goal 7 compliance entails measures that will help improve water quality. This goal notes that comprehensive plans "should consider as a major determinant, the carrying capacity of the air, land and water resources…(and) should not exceed the carrying capacity of such resources." In protecting against floods and other natural disasters, local governments may jointly address issues of water quality, such as limiting development within floodways and reducing impervious surfaces that increase runoff and flooding.

Goal
To protect life and property from natural disasters and hazards.

Findings
Hillside development changes the landscape and results in increased runoff, increased downstream peak flows and decreased water quality. Changes generally include the loss of trees and shrubs that intercept rainfall, and hillside cuts that can interup the flow of groundwater. Poor development practices on hillsides can require increased public expenditures for flood and erosion control, landslide clean up, stormwater management, and water quality treatment.

Increased amounts of stream sedimentation lead to a loss of in-stream storage of flood water, leading to widening of stream/river banks and more flooding.

The [jurisdiction] includes slope above [X%] that are considered steep and are not suitable for building. Other slopes between [X and X%] are considered constrained and require special consideration before, during and after development.

Urban development, without stormwater runoff mitigation techniques, can significantly increase stream flooding frequency and peak flows and may enlarge the 100-year flood plain areas.

To maintain habitat for many species the natural hydrology of the stream should be maintained, meaning that annual flow patterns should remain the same after development as before development.

The natural sinuosity of a stream and its associated wetlands provide essential flood storage capacity.

Many portions of the floodway fringe contain natural assets such as significant vegetation, wildlife, etc. and are valuable for water quality, open space and recreation purposes.

Policies

Development on hillsides shall not endanger life and property nor land and aquatic resources determined to be environmentally significant.

On tree-covered hillsides, development shall be designed to preserve as many trees and as much natural vegetation as possible.

The development code will define steep and constrained slopes.

The [jurisdiction] shall require certain land disturbing activities associated with construction and improvements to employ erosion control practices to prevent increased stream sedimentation.

Steep and constrained slopes will be mapped by the [jurisdiction] for the purpose of creating a hillside protection overlay zone.

Standards for the hillside protection overlay will require utilization of construction techniques that reduce sediment transport and peak storm flows by minimizing erosion and surface water runoff.

Development in the floodway fringe shall be controlled by local regulations in order to minimize potential damage (on-site, upstream and downstream) to life and property, to allow for transport of flood waters; to protect and enhance water quality, and to protect the economic, environmental, and open space qualities of the land and adjacent water bodies.

To the extent possible, significant drainageways shall be kept in a natural state to reduce flooding, protect and enhance water quality, and protect and enhance native plant species.

Standards for new development will require stormwater runoff to be infiltrated or detained on site or stored and treated by a regional facility to preserve the natural hydrograph and water quality of the receiving stream.

Goal 8: Recreational Needs

Goal 8 deals primarily with providing and planning for recreation areas, facilities and opportunities, including the siting of destination resorts. Two of the guidelines for Goal 8 lend themselves to the protection and enhancement of water quality as part of planning for recreational facilities. According to Goal 8, "Planning and provision for recreation facilities and opportunities should give priority to areas, facilities and uses that…minimize environmental deterioration." In addition, "Plans which provide for satisfying the recreation needs of persons in the planning areas should consider as a major determinant, the carrying capacity of the air, land and water…"

Goal

To satisfy the recreational needs of the citizens of the state and visitors and, where appropriate, to provide for the siting of necessary recreational facilities including destination resorts.

Findings

Certain parks can be developed with recreation areas that act as stormwater detention and treatment facilities as well as park space.

Policy

When developing plans for parks the [jurisdiction's] goal is to design parks which meet the recreational needs of the community, protect the significant natural features, minimize environmental deterioration, and where possible serve as stormwater detention and treatment facilities.

Goal 10: Housing

Goal 10 gives communities the opportunity to determine how their neighborhoods should develop and what characteristics are most important to emphasize during residential development. Since residential land use is the dominate use for most cities and rural communities, residential design can provide a significant link to the protection and enhancement of water quality. Many of the site design concepts used to protect and enhance water quality are similar to concepts used to promote human-friendly neighborhoods and other objectives of "smart development" as defined in the *Smart Development Code Handbook* published by the Transportation Growth Management Program.

Goal
To provide for the housing needs of the citizens of the state.

Findings
Promoting higher density housing makes more efficient use of urban services can reduce the total amount of impervious surface in a watershed.

Housing and housing developments can be designed in a manner that protects and enhances water quality through efficient site design and on-site best management practices (BMPs)

Policies
Planned unit developments and other flexible development techniques are encouraged so water quality issues are addressed more effectively during the development process.

Flexible site design standards will be implemented to encourage a wide-range of housing options and to help reduce impervious surfaces and protect existing natural areas.

All new housing will be developed in a manner that protects and enhances water quality and is consistent with other goals and policies on water quality.

Minimal street widths, a compact neighborhood form and a mix of uses that promote walking and bicycling is encouraged to help protect and enhance water quality in the watershed.

Goal 11: Public Facilities and Services
Goal 11 states that, "Urban and rural development shall be guided and supported by types and levels of urban and rural public facilities and services appropriate for, but limited to, the needs and requirements of the urban, urbanizable, and rural areas to be served." Urban facilities include storm drainage facilities and as sited in the Goal 11 rule, "major drainage ways (major trunk lines, streams, ditches, pump stations and retention basins)." In other words, Goal 11 requires planning for stormwater retention and the conveyance of stormwater. This requirement is often met through a community's drainage plan, and is addressed from strictly engineering perspective that seeks to move stormwater quickly into the conveyance system, usually without treatment or methods for decreasing volume or peak flows of stormwater discharge.

When a community updates its public facilities plan, revised comprehensive plan policies can direct stormwater management policy to be more comprehensive and emphasize the protection and enhancement of water quality.

Goal
To plan and develop a timely, orderly and efficient arrangement of public facilities and services to serve as a framework for urban and rural development.

Findings
Untreated stormwater and loss of natural storage capacity due to increases in impervious surfaces, loss of wetlands, and channelization of natural drainageways contribute to a decrease in water quality within [jurisdiction] and have contributed to the listing of [X stream/river] on DEQ's 303(d) List.

Improperly treated and/or stored stormwater can compromise the recovery of [listed species] and can lead to an illegal "take" of an endangered species.

Stormwater treatment requires a range of programs to be effective, including appropriate alterations to development patterns, on-site treatment, and/or regional treatment of stormwater and limits on increases to impervious surfaces.

Some areas of the [jurisdiction] are currently served by septic systems, some of which have failed in the past requiring the [jurisdiction] to annex those areas for public health reasons.

Policies
The [jurisdiction] shall increase its efforts to protect and enhance water quality, including preserving natural drainage and hydrology features, increasing opportunities for on-site infiltration, detainment and treatment of stormwater, through the stormwater master plan (or applicable plan), the Capital Improvement Program, and the development process.

Within the [jurisdiction] drainageway dedications adequate for flood protection, conveyance of stormwater, channel access and maintenance shall be secured along all open drainageways needed for public conveyance of stormwater, prior to or at the time of development. In already developed areas where dedications may not be possible, an easement may be pursued in lieu of dedication.

The [jurisdiction] shall recognize, and to the extent possible implement, other water quality goals and policies when developing the stormwater master plan (or other applicable plan).

The [jurisdiction] shall take steps to minimize the impacts to downstream water quality and drainage systems through the use of appropriate strategies as identified in the stormwater master plan (or other applicable plan).

Goal 12: Transportation
The transportation system can have a large impact on water quality. Roadways and parking lots that are designed to excessive standards create large areas of impervious surface that collect oil and other pollutants, and increase both the quantity and velocity of runoff. Goal 12 recognizes that the transportation system can have negative environmental impacts and requires the transportation plan to "minimize adverse social, economic and environmental impacts and costs" and as a planning guideline not to exceed the carrying capacity of water resources. In addition, implementation requirements state that "Plans for new or for the improvement of major transportation facilities should identify the positive and negative impacts on…environmental quality."

Transportation planning in Oregon is closely regulated by the Transportation Planning Rule (TPR) and is focused on insuring that transportation systems support more than one mode of transportation and interconnecting the land uses of the community. However, as indicated in the language of the Goal, transportation systems must also "be consistent with state and federal standards for protection of air, land and water quality including…the State Water Quality Management Plan." [OAR 660-012-0035 (3)(b)] The actual connection between water quality and transportation planning is best made at the transportation project development level within the TPR. Section 660-012-0050(3) states that "Project development involves land use decision-making to the extent that issues of compliance with applicable requirements remain outstanding at the project development phase. Issues may include, but are not limited to, …protecting or regulating development within floodways…identified Goal 5 resource areas, estuarine and coastal shoreland areas, and the Willamette River Greenway."

Goal
To provide and encourage a safe, convenient, economic transportation system

Findings
The impervious surfaces required by the transportation system can have negative impacts on water quality by increasing both the quantity and velocity of runoff and by collecting oil and other pollutants that are flushed into waterbodies when it rains.

Skinny local streets, standards that limit the amount of parking, and pervious paving surfaces where practical can reduce the amount of impervious surfaces in the [jurisdiction].

Policies
The transportation system plan shall be consistent with other [jurisdiction] goals and policies, including the goal of protecting and enhancing water quality.

The transportation system plan shall promote walking and bicycling within [jurisdiction] to reduce the impacts of transportation on water quality.

Street and parking standards shall be developed with a focus on protecting and enhancing water quality, including skinny residential streets, standards that limit the maximum amount of parking and pervious paving surfaces where practical.

Goal 14 - Urbanization

Urbanization of land resources and protecting and enhancing water quality are often thought of as competing goals with little chance for resolution. Studies have demonstrated a correlation between a moderate percentage of impervious surface in a watershed and degradation of stream quality and habitat function. It should not be assumed, however, that lower density requirements result in less impervious surfaces. It may be easier to design a low density neighborhood to have less impact on its immediately adjacent natural resources, but the cumulative effect of low density development can be more detrimental to the water quality of the entire watershed than compact development.

Lower density does not mean that fewer houses are built, since the demand for housing has not been affected. Houses are simply built over a greater percentage of the watershed. The infrastructure to serve those homes, including roads and other impervious surfaces, is still required and usually in greater quantities since the homes are further apart. The alternative is to increase density, or hold density constant, to better utilize the impervious surfaces, such as streets, that are required for urban development. In addition, innovative site design can maximize open space and BMPs can be used to treat stormwater on-site.

Goal

To provide for an orderly and efficient transition from rural to urban land use.

At the time of this writing Goal 14 is under review by DLCD and new rules being written that may impact the ability to use this goal to protect and enhance water quality. Therefore, no model findings or policies are provided.

Goal 15 – Willamette River Greenway

Goal 15 is meant to protect, conserve, enhance and maintain the qualities of the Willamette River Greenway. The goal requires the Department of Transportation to develop a Greenway Plan and for local jurisdictions in which the Greenway is located to incorporate the provisions of the plan in their comprehensive plan and appropriate statutes. The Goal requires the Greenway Plan to include, among others, inventory information on fish and wildlife habitats, hydrological conditions and ecologically fragile areas. The Goal also prohibits the intensification of uses or change of in use within the Greenway unless they are consistent with the Goal, related statutes, and the Greenway Plan.

Goal

To protect, conserve, enhance and maintain the natural, scenic, historical, agricultural, economic and recreational qualities of lands along the Willamette River as the Willamette River Greenway.

Because this Goal is specific to only some jurisdictions in the state, and because it has associated rules that implement the Goal and protect the water quality of the resources, specific findings and policies are not included in this guidebook.

Goal 16 – Estuarine Resources
Goal 16 includes numerous comprehensive plan requirements that are meant to "protect the estuarine ecosystem, including its natural biological productivity, habitat, diversity, unique features and water quality." The Goal requires inventories and the classification of management units for each estuary. Water quality is a major component of Goal 16, with the inventories and management units geared to reduce the amount of disturbance in the estuary. The implementation requirements state that an impact assessment be conducted for any "new actions which would potentially alter the estuarine ecosystem" (i.e. development) and that have not been addressed as part of the comprehensive plan. The impact assessment includes the "expected extent of impacts of the proposed alteration on water quality…"

The Goal 16 rule implements the requirements of the Goal and classifies each of the major estuaries in the state. The classification determines the types of activities that are permitted within the estuary and the allowed amount of discharge into the estuary.

Goal
To recognize and protect the unique environmental, economic, and social values of each estuary and associated wetlands; and to protect, maintain, where appropriate develop, and where appropriate restore the long-term environmental, economic, and social values, diversity and benefits of Oregon's estuaries.

Findings
Upland activities that affect water quality and aquatic habitat throughout the jurisdiction impact the quality and functions of [name] estuary.

Policies
Amendments to development ordinances instituted to mitigate impacts to water quality and aquatic habitat should recognize and be coordinated with estuary plan objectives.

Goal 17 – Coastal Shorelands

Goal 17 recognizes the importance of water quality as part of a healthy coastal environment. According to Goal 17 "land use plans, implementing actions and permit reviews shall include consideration of the critical relationships between coastal shorelands and resources of coastal waters…and maintain the diverse environmental, economic and social values of coastal shorelands and water quality in coastal waters." As with many of the resource related goals, Goal 17 requires inventories to be completed and comprehensive plan policies adopted that are based on those inventories. The Goal 17 rule helps to implement the goal, and provides specific definitions, shoreland suitability criteria and methods for protecting shorelands.

Goal

To conserve, protect, where appropriate, develop and where appropriate restore the resources and benefits of all coastal shorelands, recognizing their value for protection and maintenance of water quality, fish and wildlife habitat, water-dependent uses, economic resources and recreation and aesthetics. The management of these shoreland areas shall be compatible with the characteristics of the adjacent coastal waters; and to reduce the hazard to human life and property, and the adverse effects upon water quality and fish and wildlife habitat, resulting from the use and enjoyment of Oregon's coastal shorelands.

Findings

Upland activities that affect water quality and aquatic habitat throughout the jurisdiction impact the quality and functions of coastal shorelands.

Policies

Amendments to development ordinances instituted to mitigate impacts to water quality and aquatic habitat should recognize and be coordinated with coastal shorelands objectives.

Goal 18 – Beaches and Dunes

Goal 18 includes consideration of ground water resources associated with coastal and dune areas. One implementation requirement is for local governments to ensure that, "Local, state and federal plans, implementing actions and permit reviews shall protect the ground water from drawdown which would lead to loss of stabilizing vegetation, loss of water quality, or intrusion of salt water into water supplies".

Goal
To conserve, protect, where appropriate develop, and where appropriate restore the resources and benefits of coastal beach and dune areas. To reduce the hazards to human life and property from natural or man-induced actions associated with these areas.

Findings
Upland activities that affect ground water levels adjacent to coastal beach and dune areas can impact vegetation in these areas and result in salt water intrusion into drinking water supplies.

Policies
Amendments to development ordinances instituted to mitigate impacts to water quality and aquatic habitat should recognize and be coordinated with the dunal groundwater resource objectives of the [jurisdiction's] beaches and dunes planning element.

2. Water Quality Regulation

2.1 Introduction

Water quality in Oregon is regulated through a number of federal and state laws and policies. These laws and policies are meant to protect water quality both for humans and for plant and wildlife. On the federal level, the Environmental Protection Agency is responsible for overseeing the enforcement of the federal Clean Water Act and the Safe Drinking Water Act, two of the most important clean water laws in the country. Other federal agencies also have impacts on how water quality is regulated in Oregon including the National Marine Fisheries Service (NMFS), and U.S. Fish and Wildlife Service (USF&WS). At the state level, the Department of Environmental Quality (DEQ) implements and enforces provisions of the federal Clean Water Act, the Safe Drinking Water Act and state water quality laws and policies. The Oregon Department of Fish and Wildlife (ODF&W) is involved in protecting aquatic habitat and enforcing state laws and policies relating to fish and wildlife.

The implementation of state and federal programs results in continually evolving challenges at the local level, as agencies complete new analyses and gain a further understanding of the factors which lead to impaired water quality. A local government will need to keep current with regulations, and should develop water quality management plans that anticipate more stringent oversight.

The water quality programs and regulations reviewed below are the ones that most directly impact local government decisions, particularly regarding land use planning and development review. To avoid repetitive efforts, all of these programs and regulations must be considered when updating comprehensive plan and development code language. Many laws provide flexibility for compliance. Therefore, it is important to consult directly with the appropriate regulatory agencies (see listed contacts) when preparing new development the specific requirements for your jurisdiction.

Some programs that might be familiar to local jurisdictions, such as the Oregon Plan for Salmon and Watersheds, the Oregon Coastal Nonpoint Control Program and Army Corps of Engineers and Department of State Lands wetland fill and removal laws, are not included in this review. These programs are implemented at the state and federal level, and do not directly impact the local development permit process at the writing of this guidebook.

2.2 The Clean Water Act and Oregon's 303(d) List

The federal Clean Water Act requires states to undertake specific activities to protect the quality of their rivers, streams, lakes and estuaries. In Oregon, the Department of Environmental Quality (DEQ) has the responsibility for developing standards that protect beneficial uses such as drinking water, cold water fisheries, aesthetics, recreation, agriculture and other uses. The state must monitor water quality and review available data and information to determine if the standards are being met. DEQ's standards include parameters such as bacteria, pH, turbidity, dissolved oxygen, temperature, total dissolved

gas, certain toxic and carcinogenic compounds, habitat and flow modification, and aquatic weeds or algae that affect aquatic life.

Section 303(d) of the Clean Water Act requires each state to develop a list of water bodies that do not meet standards, and to submit an updated list to the Environmental Protection Agency (EPA) every two years. The list provides a way for Oregonians to identify problems and to develop and implement watershed recovery plans that achieve federal and state water quality standards and protect beneficial uses. There are over 1,100 streams and rivers on the state's 1998 303(d) list. Most cities, and all counties, lie within the watershed of a 303(d) listed stream, and development activity and stormwater discharge in these watersheds can directly influence the water quality of a listed stream.

When a water body is placed on the list the Clean Water Act requires the state to develop a plan to reduce the offending pollutants. The DEQ works with the local jurisdiction and other agencies and organizations, such as agriculture and forest products managers, to develop a management plan that covers a wide range of impacts from rural farm and forest activities to urban activities. A primary component of the management plan is the calculation of the total maximum daily loads (TMDLs) for each of the pollutants in the water body. TMDLs describe the amount of each pollutant a waterway can carry and still comply with water quality standards. The DEQ and the local partners then work together to determine how to reduce pollutants to meet the TMDL limits. DEQ will work with local jurisdictions so that the necessary steps, including changes to development code language, are taken to protect and enhance water quality.

Not all water bodies will have TMDLs developed at once, but the DEQ is committed to developing TMDLs for every stream on the 1998 303(d) list by the year 2007. While the list is normally updated by the DEQ every two years, the EPA has excused Oregon from compiling a 2000 update to the list. To determine the status of TMDL development or which water bodies are on the list, contact your regional DEQ office or the DEQ web page.

A complete listing of water bodies included on Oregon's 303(d) list can be found at:
http://waterquality.deq.state.or.us
Or call your regional DEQ office or DEQ headquarters
Headquarters: (503) 229-5696
Northwest Region: (503) 229-5263
Western Region: (541) 686-7838
Eastern Region: (541) 388-6146

2.3 National Pollutant Discharge Elimination System (NPDES)

The National Pollutant Discharge Elimination System (NPDES) program was authorized by the Clean Water Act (CWA) of 1972, and is the fundamental regulatory mechanism of the CWA. The NPDES program requires anyone discharging a pollutant from a point source into the waters of the nation to obtain an NPDES permit. In 1987, amendments to the CWA also required the EPA to address discharges from a municipality's separate storm sewer systems (MS4), which originate as urban stormwater runoff; this has been upheld by the court system.

Accordingly, the EPA has initiated the MS4 permitting program because national stormwater monitoring data have demonstrated that urban stormwater is a leading cause of water quality degradation in the United States. EPA's urban stormwater program implementation is designed to be phased over several years. In 1990, the Phase I rules, required by the 1987 CWA amendments, were issued by EPA and addressed stormwater discharges from medium and large MS4s (cities with a population of 100,000 and over). The Phase I rules also regulate stormwater discharges associated with certain commercial and industrial activity, and construction activity resulting in the disturbance of five acres or more of land. The permits required by the Phase I rules focus on the implementation of *best management practices* (BMPs) to improve the water quality of stormwater discharges.

On October 29, 1999, the Phase II final rule was signed by the EPA administrator. The Phase II rules require that by March, 2003, the DEQ shall regulate, at a minimum, small MS4s (those MS4s not covered by Phase I rules) serving municipalities within an urbanized area as defined by the Census Bureau. Currently this includes areas comprised of one or more central places, and the adjacent densely settled surrounding area (urban fringe) that together have a residential population of at least 50,000 and an overall population density of at least 1,000 people per square mile, as determined by 1990 census data. The list of Phase II jurisdictions will be updated when the 2000 census data is compiled.

In addition, the state is required to determine a set of criteria and evaluate all jurisdictions with populations between 50,000 and 10,000 and a density of 1,000 people per square mile or greater for inclusion in the Phase II program. The criteria for including these smaller jurisdictions may be based on whether or not water quality standards are being met in the basin. The DEQ may also be required to evaluate jurisdictions with under 10,000 population as a result of a citizen petition. The evaluation would be based on the same criteria as those set for evaluation of jurisdictions between 50,000 and 10, 000 and could result in regulation. The Phase II rules also lower the statewide threshold for erosion control of construction sites from five acres to one acre.

The Phase II rules require the operators of regulated small MS4s in an urbanized area to implement "minimum control measures." The minimum control measures include:

- public education and outreach on stormwater impacts;
- public involvement and participation;
- detection and elimination of illicit discharge;
- construction site stormwater runoff control;

- post-construction stormwater management in new development and redevelopment; and
- pollution prevention and good housekeeping for municipal operations.

In terms of land use and development requirements, the Phase II rules specifically call for ordinances to detect and eliminate illicit discharges, manage construction site runoff on sites of one acre and greater, and regulate post-construction stormwater runoff from new development and redevelopment. The rules provide guidance on structural and non-structural BMPs, many of which can be found in this Guidebook, that can be used to regulate post-construction runoff (see the BMP Table in Chapter 4). In addition, the Phase II rules call out the need for site plan review which considers potential water quality impacts.

For more information on the NPDES Phase II Rules see the EPA web site:
http://www.epa.gov/owm/sw/phase2/
or contact your regional DEQ office or DEQ headquarters
Headquarters: (503) 229-5696
Northwest Region: (503) 229-5263
Western Region: (541) 686-7838
Eastern Region: (541) 388-6146

2.4 Safe Drinking Water Act of 1986 (SDWA)

The 1986 federal Safe Drinking Water Act (SDWA) addresses nonpoint (and point) sources of pollution through a provision requiring states and local water agencies to establish wellhead protection zones to safeguard groundwater drinking water systems. In 1996, amendments to the SDWA extended the act to cover surface water sources of drinking water as well as groundwater sources. The 1996 amendments require the Oregon Health Division (OHD) and the DEQ to conduct "source water assessments" for every public water system in Oregon regulated under the SDWA. A source water assessment is one step in completing a Drinking Water Protection Plan.

In Oregon, the SDWA is administered by the OHD and the DEQ. The OHD regulates the quality of the approximately 3,450 public water systems in Oregon and can require local jurisdictions to find new drinking water sources when contamination standards are exceeded. Because finding a new source of drinking water or treating contaminated water is expensive, it is better to protect existing drinking water sources. The DEQ is the lead agency in assisting local jurisdictions to protect their drinking water sources through the creation of a voluntary Drinking Water Protection Plan.

The process for developing a complete Drinking Water Protection Plan is as follows:

ASSESSMENT PHASE (funded by the SDWA and performed by the DEQ and the OHD)
1. Delineate the area that serves as the source of the public water supply ("drinking water protection area" for groundwater wells or surface water intakes)
2. Inventory the potential risks or sources of contamination

3. Determine the areas most susceptible to contamination

PROTECTION PHASE (voluntarily performed by local communities)

4. Assemble a local Drinking Water Protection Team
5. Develop a plan to protect the supply (reduce the risks of contamination)
6. Develop a contingency plan to address the potential loss of the system
7. Certify (optional) and implement the "Drinking Water Protection Plan"

The first three steps in this process have been funded through the SDWA for approximately 2700 public water systems in Oregon. The assessments must be completed on all of the public water systems by January 2003.

The public water system will receive a copy of a "Source Water Assessment Plan" (SWAP) report that contains pertinent hydrogeological and/or hydrological information, and details the assumptions and methods pertaining to their individual assessment. The drinking water SWAP will provide communities with an important planning tool. The assessment provides a basis for making more informed decisions regarding the geographic area (i.e., watershed) serving as the source of the community's drinking water. Water quality improvement programs and projects can be focused within the drinking water source areas.

The DEQ is committed to linking drinking water protection efforts to other habitat and water quality improvement efforts for threatened and endangered fish in Oregon, as well as the ongoing work to address water bodies on the 303(d) list. One of the primary means of providing technical assistance is to give the community the information and coordination necessary to create these links. The DEQ and other agencies will also be involved in providing technical assistance to communities that choose to act on the assessments and voluntarily develop a Drinking Water Protection Plan (DWPP).

For more information on creating a voluntary Drinking Water Protection Plan contact DEQ's Drinking Water Protection Coordinator at (503) 229-5279 or http://waterquality.deq.state.or.us/wq/swap/swapcover.htm

2.5 Underground Injection Control Program

DEQ administers the Underground Injection Control (UIC) Program in Oregon, as mandated by the federal Safe Drinking Water Act. The UIC Program manages injection of fluids into the ground in order to protect groundwater for beneficial uses such as drinking water. An owner or operator must be authorized to use an injection system either by registering the system and meeting general regulatory requirements or by obtaining a permit.

Underground injection systems distribute or inject fluids such as waste water or storm water below the ground's surface. Some stormwater infiltration devises may fall under the jurisdiction of the UIC program. Some types of injection systems, such as those injecting hazardous waste are prohibited. Others that are relatively low risk, such as those receiving uncontaminated stormwater, must be registered and meet a performance standard of not adversely impacting groundwater quality.

DEQ expects to adopt new rules on underground injection systems by January 2001. Local jurisdictions should be aware of the UIC regulations when adopting design standards for stormwater infiltration systems. Stormwater dispersed on the ground's surface would not fall under the UIC provisions. Stormwater dispersed underground such as into a french drain or dry-well is considered a underground injection system and must be registered with the UIC program and meet certain siting requirements.

For more information on the Underground Injection Control Program contact DEQ's UIC Program Coordinator at (503) 229-5954 or http://waterquality.deq.state.or.us/wq/groundwa/uichome.htm

2.6 Endangered Species Act (ESA)

The decline of salmon within the Pacific Northwest has caused the National Marine Fisheries Service (NMFS) to list 26 salmon and steelhead evolutionary significant units (ESUs) in Oregon, Washington, California and Idaho as *threatened* or *endangered* under the ESA. Some jurisdictions also may be affected by ESA listings for resident fish, which remain in freshwater lakes or streams for their entire lives such as bull trout and cutthroat trout. The US Fish and Wildlife Service (USFWS) has authority to manage the recovery of these species.

The ESA prohibits "take" of a member of any species listed as *endangered*, and allows the USFWS or NMFS to impose the same prohibitions for any species listed as *threatened*. The term "take" is defined in the ESA as to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." *Take* has been defined to include the intentional or negligent act of habitat modification that significantly impairs essential behavioral patterns such as breeding, spawning, rearing, migrating, feeding, or sheltering, and which results in death or injury of a protected species.

Loss or degradation of habitat resulting from land development can be considered a *take*, and the jurisdiction that permitted or allowed the offending development can be held liable for that *take*. The ESA provides for third-party lawsuits, so private citizens alleging that *take* has occurred because of land development can sue the permitting jurisdiction.

There is a lot of uncertainty about the exact effect of the salmon and steelhead listings on land development activities. Loss or degradation of habitat caused by development can be considered a *take*, and the jurisdiction that permitted or allowed the offending development can be held liable for that take. Section 4(d) of the ESA requires that NMFS list the activities that could result in a take. NMFS has also described certain precautions that, if followed, would preclude prosecution for take even if a listed species were harmed inadvertently. Such a provision is called a *limit* on the *take prohibition*. The intent is to provide local governments and other entities greater certainty regarding their liability for take.

NMFS published their rule in response to Section 4(d) in July of 2000 (see 65 FR 42421, July 10, 2000). The NMFS 4(d) rule lists 12 criteria that will be used to determine whether a local program incorporates sufficient precautionary measures to adequately conserve

fish. The rule provides for local jurisdictions to submit development ordinances for review by NMFS under one, several or all of the criteria. The criteria for the Municipal, Residential, Commercial and Industrial Development and Redevelopment (MRCI*) limit* are listed below:

- Avoid inappropriate areas such as unstable slopes, wetlands and areas of high habitat value
- Prevent stormwater discharge impacts on water quality
- Protect riparian areas
- Avoid stream crossings – whether by roads, utilities, or other linear development
- Protect historic stream meander patterns
- Protect wetlands, wetland buffers, and wetland function
- Preserve ability of permanent and intermittent streams to pass peak flows (hydrologic capacity)
- Stress landscaping with native vegetation
- Prevent erosion and sediment run-off during and after construction
- Ensure water supply demand can be met without affecting salmon need
- Provide mechanisms for monitoring, enforcing, funding and implementing
- Comply with all other state and federal environmental laws and permits

The Water Quality and Model Code includes code language to address most of these criteria, the exception being the criteria addressing water supply, which is a public facilities issue. A guidebook for responding to ESA issues has also been developed by group of organizations including the League of Oregon Cities, Association of Oregon Counties and the Oregon Association of Clean Water Agencies (ACWA). It is available on the ACWA web site: http://www.oracwa.org/.

This discussion is only a brief overview of the NMFS rule. The NMFS publication, *A Citizen's Guide to the 4(d) Rule for Threatened Salmon and Steelhead on the West Cost*, available on the NMFS web site, includes the full text of the criteria and is the best guide meeting these criteria.

For more information on the Endangered Species Act see the NMFS website:
www.nwr.noaa.gov
and the USF&W website
http://endangered.fws.gov/

2.7 Oregon Land Use Planning

Oregon cities and counties have authority to regulate land use activities through local comprehensive plans and related development regulations. This authority begins with a broad charge given to them by the Oregon constitution and the Oregon legislature to protect the public's health, safety, and general welfare.

Every city and county is required to have a comprehensive plan and accompanying development ordinance to be in compliance with state land use planning goals. While the comprehensive plan must serve to implement the statewide planning goals mandated by

state law, cities and counties have a wide degree of local control over how resource protection is addressed in their community.

The Oregon land use planning system provides a unique opportunity for local jurisdictions to address water quality protection and enhancement. Many of the goals have a direct connection to water quality, particularly Goals 5 and 6. In the case of Goal 5 there is a specific rule that requires local jurisdictions to protect riparian areas and wetlands from development. Goal 6 is less specific about how local jurisdictions should protect and enhance water quality, but provides a sound framework for new ordinances that address a wide variety of water quality objectives, based on state or federal regulations.

Chapter 3 specifically describes how many of the land use planning goals can be used to protect and enhance water quality. Chapter 3 provides specific comprehensive language that, in concert with the model ordinances found in this Guidebook, will allow local jurisdictions to adequately addresses the water quality programs and regulations through their development process.

> For more information on Oregon land use planning see the Department of Land Conservation and Development website:
> http://www.lcd.state.or.us/

2.8 Federal Emergency Management Agency and the National Flood Insurance Program

In many communities, the Federal Emergency Management Agency (FEMA) exercises regulatory control over development occurring in flood areas. While FEMA regulations are not specifically geared toward the issue of water quality, because regulatory measures may indirectly support broader efforts to protect water quality, they are mentioned here.

The National Flood Insurance Program (NFIP) is a federal program that allows property owners to purchase flood insurance protection. Participation in the NFIP is based on an agreement between local communities and the federal government. In exchange for the availability of flood insurance within the community, communities must implement measures to reduce future flood risks. Owners and occupants of insurable properties may purchase NFIP flood insurance through licensed property insurance agents or brokers.

Most of the nation's communities with serious flooding potential have joined the NFIP, though FEMA still encourages communities to consider more restrictive flood protection standards. More stringent requirements adopted at the state or local level would take precedence over requirements outlined in the NFIP.

As part of the NFIP, local FEMA administrators work with members from each participating community to establish a local Flood Insurance Rate Map. The map is intended to show areas within the 100-year flood boundary, also known as Special Flood Hazard Areas (SFHAs), which are subject to minimum floodplain management standards.

A 100-year flood is a flood level with a 1 percent or greater chance of being equaled or exceeded in any given year.

Minimum floodplain management standards in SFHAs have two purposes: 1) to prevent new development from increasing the flood threat, and 2) to protect buildings from future flood events. To ensure that appropriate construction materials and methods have been used, local permitting offices are required to obtain detailed documentation on construction techniques for all new development and substantial redevelopment.

FEMA may also designate a *floodway* in urban areas to avoid significantly increasing upstream flood elevations. A *floodway* is defined as the river channel and floodplain that must remain unobstructed in order to discharge the base flood without increasing flood levels by more than one foot. Under NFIP, communities must prohibit any development in the designated floodway that could cause an additional rise in the base flood elevation.

For more information, contact the FEMA, NFIP website:
http://www.fema.gov/nfip/laws.htm

1. Introduction

In Oregon it is no longer possible to ignore the connection between urban development and degraded water quality. Extensive findings demonstrate that our urban streams do not meet state water quality standards, and do not adequately support native salmon populations (See Chapter 2). The best way to reverse these trends is to think differently about land use planning at the local level. Local governments are already rethinking the connection between land use and transportation as it relates to air quality. The new challenge is to amend local plans and codes to protect water quality. But don't panic! Many of the strategies designed to reduce the impact of urbanization on air quality also support efforts to reduce impacts on water quality and aquatic habitat.

The Water Quality Model Code and Guidebook is a companion to the *Model Development Code and User's Guide for Small Cities*. Developed by the Department of Land Conservation and Development and the Department of Transportation under the Transportation and Growth Management Program (TGM). This guidebook integrates many of the "smart development" inspired code recommendations of the TGM project with recommended code language to achieve water quality objectives. Where the two objectives do not overlap, we have tried to assure that there would be no conflicts.

So dig in, and spend some time figuring out what will work for your city or county. How will you and your community reach a level of confidence that new development and re-development in your jurisdiction will not further degrade water quality and aquatic habitat? This task is not an easy one, but the model codes and guidance contained in this document will make it doable.

Urban Impacts on Water Quality

This guidebook is targeted at the cumulative impact of development activities that result in degradation of streams, lakes and groundwater. Water pollution in urban areas can result from land uses and development that:

- Discharge pollution (such as suspended solids, sediments and nutrients) into surface water and groundwater from stormwater;
- Affect water quality by increasing temperature, changing pH, or reducing dissolved oxygen; or
- Diminish the resilience of natural systems by removing vegetation, channelizing streams or increasing impervious areas in a watershed.

The impacts of urban development result from the accumulation of many small actions. Each action may have a small individual impact, but the combined cumulative effects are large. The cumulative impacts of urbanization and other human activities are often called "nonpoint source pollution". The term is in contrast to "point source" pollution, which refers to discharges from sewage treatment plants and factories.

1.1 Local Government's Role in Protecting Water Quality

The values and benefits of protecting water quality are many. Healthy water bodies provide valuable fish and wildlife habitat, aesthetic resources, recreational opportunities, and safe drinking water supplies. Water quality is an integral part of our individual and community well-being. To best protect water quality and aquatic habitat, sensitive environmental

resources such as riparian areas, wetlands, steep slopes, flood plains, etc. need to be identified, mapped and protected before other land use actions are considered. Developments need to occur that limit impervious and its effects on the natural hydrology of a watershed.

Much information is available to local communities and decision makers on the water quality impacts of urban development. Knowledge of these impacts and the rational for selecting a particular management solution is an important step in initiating amendments to comprehensive plans and development codes. (See Chapter 5 for a list of web sites and handbooks designed for local government officials, concerned citizens and planners).

Water quality is regulated and protected through numerous federal laws and regulations, including the Clean Water Act and the Safe Drinking Water Act. The Oregon Department of Environmental Quality (DEQ) implements and enforces provisions of these federal acts and state water quality standards. The National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS) and the Oregon Department of Fish and Wildlife (ODF&W) also play a role in regulating Oregon water quality and aquatic habitat, through their listing of indigenous fish species as threatened or endangered. Many of these regulations have components that place requirements on local governments, or impose a liability on a local government whose actions result in degradation of water quality and salmon habitat.

Local governments have an interest and a responsibility to participate in water quality and aquatic habitat restoration efforts.

1.2 The Goal of this Guidebook

The goal of this guidebook is to provide local communities, both small cities and counties, with a practical guide to protecting and enhancing water quality through improved land use regulations. The guidebook includes both model zoning code ordinances and comprehensive plan policies that are ready for implementation. It also provides references to other publications and resources which provide background information on the link between development activity and water quality.

Protecting Water Quality Means Protecting Beneficial Uses, Including Aquatic Life

The Department of Environmental Quality (DEQ) is mandated by the federal Clean Water Act to protect water quality by establishing standards to protect beneficial uses. Beneficial uses are defined by law, and include such things as recreation, aquatic life, fisheries, irrigation, and drinking water. While there may be competing beneficial uses in a river or a stream, federal law requires the DEQ to protect the most sensitive of these beneficial uses. For most surface waters in Oregon the most sensitive beneficial use is salmonid habitat, and the standards are set to protect salmon.

The DEQ's standards include parameters such as bacteria, pH, turbidity, dissolved oxygen, temperature, total dissolved gas, certain toxic and carcinogenic compounds, habitat and flow modification, and aquatic weeds or algae that affect aquatic life. Chapter 4 contains comparison between these parameters and the best management practices found in this guidebook.

As with any change in local land use regulations, Oregon law requires public involvement. A community discussion about changes to the zoning code and comprehensive plan is a critical step towards protecting and enhancing water quality through the local comprehensive plan and implementing ordinances.

This guidebook includes an evaluation of the Statewide Planning Goals as they apply to water quality and aquatic habitat protection. Many of the model ordinances found in this guidebook can probably be implemented without alteration to existing comprehensive plans. Comprehensive plan amendments are recommended for those communities that have not adequately acknowledged the full range of impacts development activities can have on water quality and aquatic habitat. Model comprehensive plan language is included in Chapter 3 of this guidebook.

This guidebook provides many of the tools needed to comply with state and federal regulations. Staff members from the Department of Land Conservation and Development, Department of Environmental Quality and National Marine Fisheries Service have participated in drafting the guidebook. Each unique jurisdiction is responsible for determining how to best comply with state and federal regulations.

1.3 What's in this Guidebook

This guidebook provides all the information needed for a community to adapt their development codes and comprehensive plan to reduce impacts on water quality and aquatic habitat. It is organized in five chapters plus an appendix.

Chapter 1

Introduction

Chapter 2

Chapter 2 describes the regulatory context for addressing water quality through local land use regulations. The chapter describes all of the federal and state water quality laws and how those laws apply to local jurisdictions.

Chapter 3

Chapter 3 provides model comprehensive plan language, organized by the applicable Statewide Planning Goals. The language recognizes the current understanding of urban impacts on water quality, and highlights sources of information, specific to local jurisdictions, on which policies and implementing ordinances can be based.

Chapter 4

Chapter 4 includes the model zoning ordinance language. The chapter begins with a matrix describing each of the strategies the model ordinance language is meant to implement, from streamside buffers to impervious cover reductions. The matrix shows the effect of each strategy on various types of pollution, based on extensive literature research. The matrix will help explain the relevance of each model ordinance to the enhancement and protection of water quality and aquatic habitat.

Chapter 5
Chapter 5 provides a list of resources and educational materials that local communities can use when updating zoning codes and comprehensive plans to protect and enhance water quality.

Appendix
The appendix contains resources to help a community implement the model ordinances found in Chapter 4, including various manuals and sources of technical information. The appendix includes an ordinance encouraging zero effective impervious surfaces for new development, and an updated flood hazard ordinance.

1.4 Using the Model Code
There are two types of model ordinances found within Chapter 4 of this guidebook. The first type provides alterations to the *Model Development Code & User's Guide for Small Cities* published by the Department of Land Conservation and Development. The changes recommended to the *Model Development Code* are described, and the actual recommended code language is shown within a textbox. The *Model Development Code* numbering is referenced to make cross referencing easy.

Lot Coverage - Sample Code Provisions:
(excerpted from Section 2.1.160 of the Model Development Code and User's Guide for Small Cities)

1. Maximum Lot Coverage. As applicable, the following standards shall apply in the [R-1 and R-2 zones / list appropriate zones]:
   a. Single Family Detached Housing – [30 - 50] percent
   b. Duplex and Triplex Buildings - [40 - 60] percent
   c. Single Family Attached Townhomes - [60 - 70] percent
   d. Multiple Family Housing Developments - [40 - 60] percent
   e. Neighborhood Commercial and Mixed Use Buildings - [70 - 90] percent

The other type of model ordinance is a complete ordinance ready for adoption. These types of ordinances include overlay districts, erosion prevention and sediment control and tree preservation. These ordinances are meant either to replace the current corresponding ordinance in total, or to add a new section to the development code to help protect and enhance water quality.

All model code language is found in text boxes (see example above). Within each text box the material to be customized by the local jurisdiction is included in [brackets]. In the above example the range of suggested maximum lot coverage is included in a bracket for each building type. Brackets also show where a decision needs to be made about what zoning districts should be applied by this provision. When the word [jurisdiction] is in brackets the name of the city or county or the word "city" or "county" should be inserted.

GLOSSARY

Base flow: The portion of stream flow that is not runoff and results from seepage of water from the ground into a channel slowly over time. The primary source of running water in a stream during dry weather.

Best Management Practice:
(BMP), nonstructural Strategies implemented to control stormwater runoff that focus on pollution prevention such as alternative site design, zoning and ordinances, education, and good housekeeping measures.

Best Management Practice:
(BMP), structural Engineered devices implemented to control, treat, or prevent stormwater runoff pollution.

Better site design: A collection of site planning, design, and development strategies that help reduce adverse impacts to the natural environment by recreating, to a certain extent, the original hydrology and plant community of the predevelopment site.

Biochemical Oxygen Demand:
(BOD) The amount of oxygen used by microorganisms in the break- down or decay of organic matter in a water body.

Biofiltration: The use of vegetation (usually grasses or wetland plants) to filter and treat stormwater runoff as it is conveyed through an open channel or swale.

Bioretention: The use of vegetation in retention areas designed to allow infiltration of runoff into the ground. The plants provide additional pollutant removal and filtering functions while infiltration allows the temperature of the runoff to be cooled.

Buffer zone: A designated transitional area around a stream, lake, or wetland left in a natural usually vegetated state so as to protect the water body from runoff pollution. Development is often restricted or prohibited in a buffer zone.

Catchbasin: An inlet to a storm or combined sewer equipped with a sediment sump, and sometimes a hood, on its outlet pipe to the sewer. Catchbasins can collect some of the sediment and debris washed off the streets, and help to provide a water seal against the venting of sewer gases. Catchbasins should be cleaned out regularly to function properly.

Channel erosion: The widening, deepening (called channel scour), and upstream cutting of a stream channel caused by moderate and extreme flow events. Channel erosion is one way that a stream reacts to changes in flow patterns

Conservation Design: Site design that incorporates conservation measures such as on-site tree preservation, concentrating homes on a limited percentage of the site, serving natural areas and open space, and reducing the amount of impervious cover.

Constructed stormwater wetland: A water quality BMP, designed to have similar characteristics and functions to a natural wetland, with the specific purpose of treating stormwater runoff through uptake, retention, and settling.

Detention: The storage and slow release of stormwater following a precipitation event by means of an excavated pond, enclosed depression, or tank. Detention is used for pollutant removal, stormwater storage, and peak flow reduction. Both wet and dry detention methods can be applied.

Eutrophication: Nutrient enrichment (nitrogen, phosphorus, and carbon) from sewage effluent, runoff, or atmospheric deposition to surface waters. This process can increase the growth potential for algae and aquatic plants. Excessive eutrophication can leave water-bodies devoid of most life, impede navigation, and result in aesthetic nuisances.

Evapotranspiration: The loss of water to the atmosphere through the combined processes of evaporation and transpiration, the process by which plants release water they have absorbed into the atmosphere.

Filter Strip: Grassed strips situated along roads or parking areas that remove pollutants from runoff as it passes through, allowing some infiltration, and reductions of velocity.

Floodplain: Can be either a natural feature or statistically derived area adjacent to a stream or river where water from the stream or river overflows its banks at some frequency during extreme storm events.

Groundwater: Water that flows below the ground surface through saturated soil, glacial deposits, or rock.

Hydrology: The science addressing the properties, distribution, and circulation of water across the landscape, through the ground, and in the atmosphere.

Impervious surface: A surface that cannot be penetrated by water such as pavement, rock, or a rooftop and thereby prevents infiltration and generates runoff.

Imperviousness: The percentage of impervious cover within a defined area.

Infill development: Development of vacant lots or enhancement of urban properties.

Infiltration: The process or rate at which water percolates from the surface into the ground. Infiltration is also a general category of BMP designed to collect runoff and allow it to flow through the ground for treatment.

Load Allocation (LA): The portion of a receiving water's loading capacity that is estimated to come from either existing or future nonpoint sources of pollution or natural background sources.

National Pollutant Discharge Elimination System (NPDES): A provision of the Clean Water Act that prohibits discharge of pollutants into waters of the United States unless a special permit is issued by the EPA, a state, or (where delegated) a tribal government and/or Indian reservation.

Natural buffer: A variable width area maintained with natural vegetation between a pollutant source and a water body that provides natural filtration and other forms of protection.

Outfall: The point of discharge from a river, pipe, drain, etc. to a receiving body of water.

Porous pavement and pavers: Alternatives to conventional asphalt that utilize a variety of porous media, often supported by a structural matrix, concrete grid, or modular pavement, which allow water to percolate though to a sub- base for gradual infiltration.

Runoff: Water from rainfall, snowmelt, or otherwise discharged that flows across the ground surface instead of infiltrating the ground.

Smart Growth: Development that uses a variety of strategies to enhance existing communities and protect community character in a way that is compatible with the natural environment and attracts economic development, It encourages more town-oriented, transit-focused, and pedestrian- friendly new development while restoring vitality to existing developed areas.

Stormwater: Water derived from a storm event or conveyed through a storm sewer system.

Surface water: Water that flows across the land surface, in channels, or is contained in depressions on the land surface (e.g. runoff, ponds, lakes, rivers, and streams).

Swale: A natural or human-made open depression or wide, shallow ditch that intermittently contains or conveys runoff. Can be used as a BMP to detain and filter runoff.

Transferrable Development Rights: A form of incentive for developers in which the developer purchases the rights to an undeveloped or underdeveloped piece of property in exchange for the right to increase the number of dwelling units on another site. Often used to concentrate development density in certain land areas.

Total Maximum Daily Load (TMDL): A tool for establishing the allowable loadings of a given pollutant in a surface water resource to meet predetermined water quality standards.

Urban (metropolitan) runoff: Runoff derived from urban or suburban land-uses that is distinguished from agricultural or industrial runoff sources.

Water (hydrologic) cycle: The flow and distribution of water from the sky, to the earth's surface, through various routes on or in the earth, and back to the atmosphere. The main

components are precipitation, infiltration, surface runoff, evapotranspiration, channel and depression storage, and ground water.

Watershed: The land area, or catchment, that contributes water to a specific water body. All the rain or snow that falls within this area flows to the water bodies as surface runoff, in tributary streams, or as groundwater.

Wet detention ponds: A BMP consisting of a permanent pool of water designed to treat runoff by detaining water long enough for settling, filtering, and biological uptake. Wet ponds are also often designed to have an aesthetic or recreational value.

Xeriscaping™: An alternative landscaping technique that focuses on water conservation through plant selection and site design.

X-year storm event: The storm event that has a probability of recurring on average once every X-years based on records from previous years,

Acronyms:
BMP: Best Management Practice
BOD: Biochemical Oxygen Demand
CFR: Code of Federal Regulations
EPA: United States Environmental Protection Agency
ESC: Erosion and Sediment Control
FEMA: Federal Emergency Management Agency
MS4: Municipal Separate Storm Sewer System
NPDES: National Pollutant Discharge Elimination System

Source: Glossary items are from *Stormwater Strategies – Community Responses to Runoff Pollution*: Natural Resources Defense Council.
And
Rapid Watershed Planning Handbook. A Comprehensive Guide for Managing Urbanizing Watersheds: Center for Watershed Protection

Simplified Approach for Stormwater Management Facilities

The [city/county] has produced this form to assist with a quick and simple approach to manage stormwater quality and flow control on projects.
Application of these facilities using the specified sizing factor is required for use of this form.
These facilities, when designed according to the required criteria, are considered to cover both quality and flow.
Alternative design and sizing will not be considered under this simple approach.

INSTRUCTIONS

1. Enter square footage of non-mitigated impervious area (total impervious site area or, from the Mitigation Form, Box C) in Box 1 at the bottom of column 1.

2. Select the desired management measure(s). In Column 1, enter the amount of impervious area that will be managed by the facility(ies).

3. Add all facility impervious areas in column 1 and enter in Box 2. Note Box 1 and Box 2 areas must be equal.

4. Multiply the unmitigated sf in column 1 by the sizing factor in column 2 for each facility.

6. Go to the " Simplified Approach Design Requirements" for facility descriptions and other requirements.

	Column 1			Column 2		Column 3	
Facility	**Non-mitigated Impervious Area**	**Unit**		**Sizing Factor**		**Required Facility Surface Area**	**Unit**
Landscape Swale		sf	x	0.05	=		sf
Vegetative Filter		sf	x	0.065	=		sf
Stormwater Planter		sf	x	0.045	=		sf
Landscape Infiltration		sf	x	0.04	=		sf
Sand Filter		sf	x	0.045	=		sf

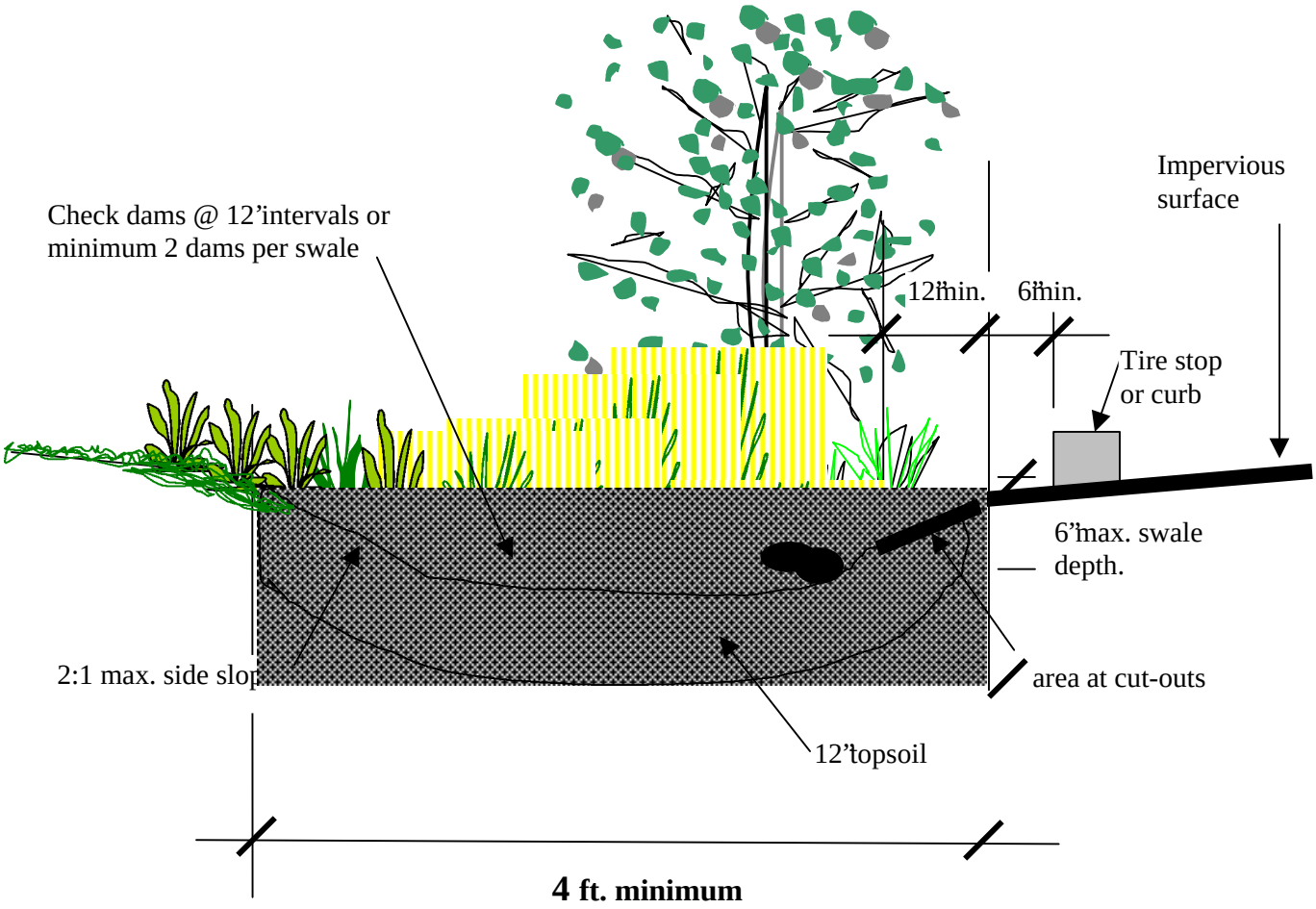
Total Areas _____ Box 2

Total non-mitigated impervious area _____ Box 1
Total impervious area on the site, or the amount of non-mitigated impervious area in Box C, Form MIT

* Soakage Trenches are sized for stormwater disposal and water quality, and therefore cannot be reduced in size with mitigation.
Revised September 1, 2000

Simplified Approach Design Criteria

Landscape Swale



Section Not to Scale

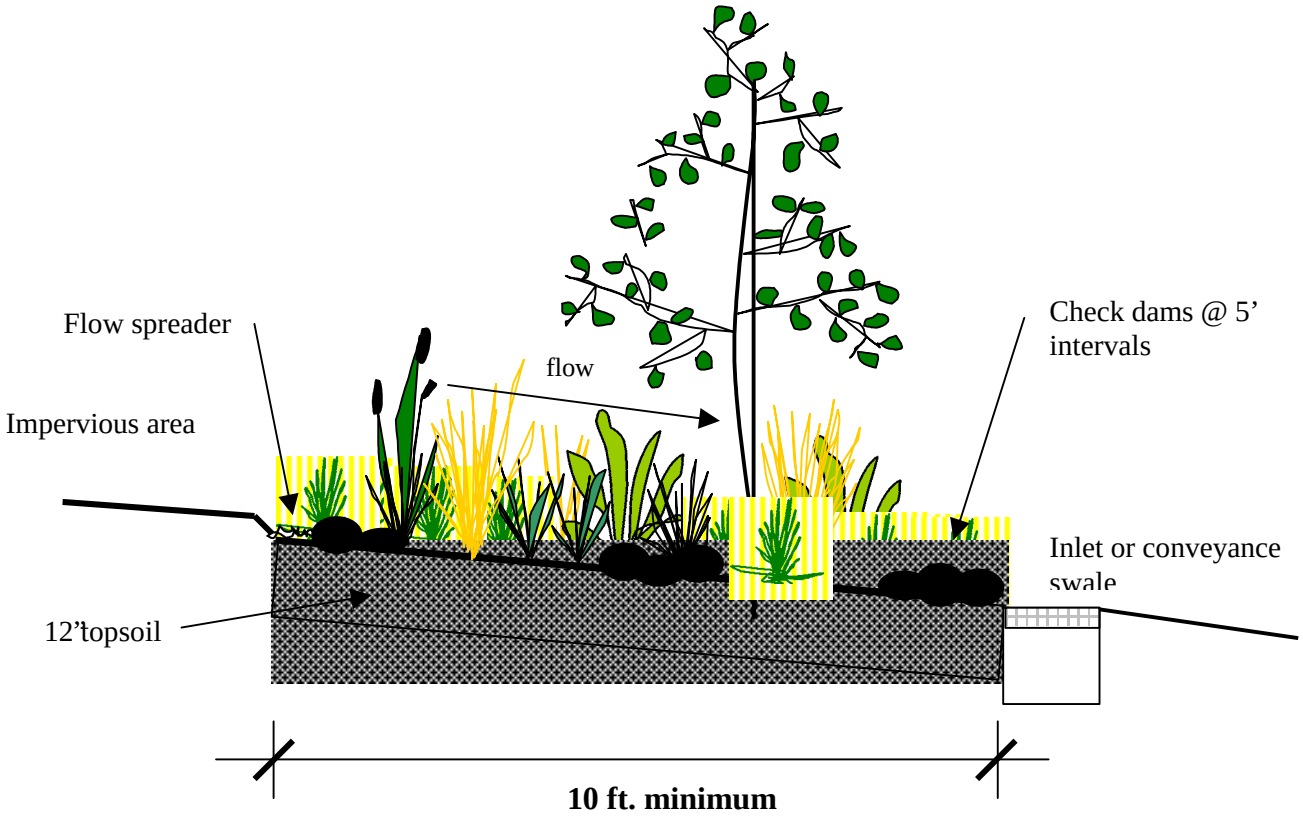
Description

Landscape swales are long narrow facilities easily integrated with the site design. Swales may be used to treat all stormwater runoff from a site. The swales are sized to achieve pollution reduction and flow control. Swales are planted with a variety of trees, shrubs, grasses, and ground cover. The swale is designed with numerous check dams to detain flows and facilitate sedimentation. Pollution reduction is also achieved as flows are filtered through the plantings.

General Specifications Acceptable for all soil types. Soil types C and D may require additional means for disposal. Minimum swale length is 20 ft. Maximum slope is 6%. Plantings shall be in accordance with Chapter 8.0. Clay soils shall be amended with 50% sandy loam in the top 12" of the swale. Check dams shall be of durable, non-toxic materials- i.e., rock, brick, and old concrete. Check dams shall be 12" length x (width of swale) x 3-5" height. Swales using these design criteria will not need to include a bypass of larger storms. Liners are not needed unless required for groundwater protection.

Simplified Approach Design Criteria

Vegetative Filter



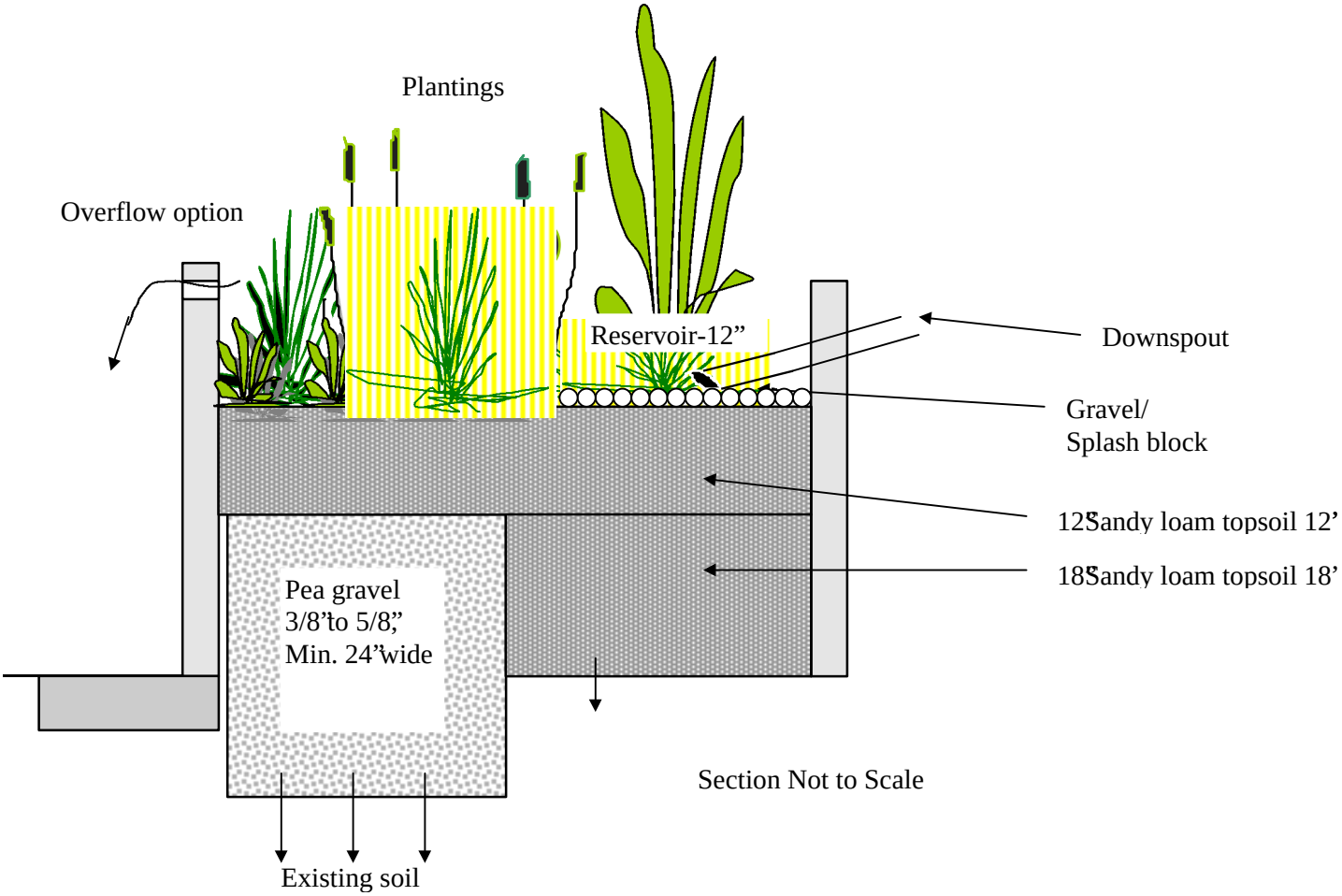
Section Not to Scale

Description
Vegetative filters are gently sloped areas, with direction of stormwater flow conforming to the slope. Stormwater enters the filter as sheet flow from an impervious surface or is converted to sheet flow using a flow spreader. Flow control is achieved using the relatively large surface area and a generous proportion of check dams. Pollutants are removed through filtration and sedimentation. Filters can be planted with a variety of trees, shrubs, and ground covers, including grasses.

General specifications (Acceptable soil types A, B, C, & D)
Filters shall be a minimum of 20 ft. x 10 ft. Maximum slope is 10%. Plantings shall be in accordance with Chapter 8.0,. Check dams shall be of durable, non-toxic materials- i.e., rock, brick, and old concrete. Check dams shall be 12" length x (width of filter) x 3-5" height. Filters designed using these criteria will not need to include a bypass of larger storms. Runoff shall enter the buffer as predominately sheet flow. Check dams and flow spreaders are required.

Simplified Approach Design Criteria

Stormwater Planter AB



Description

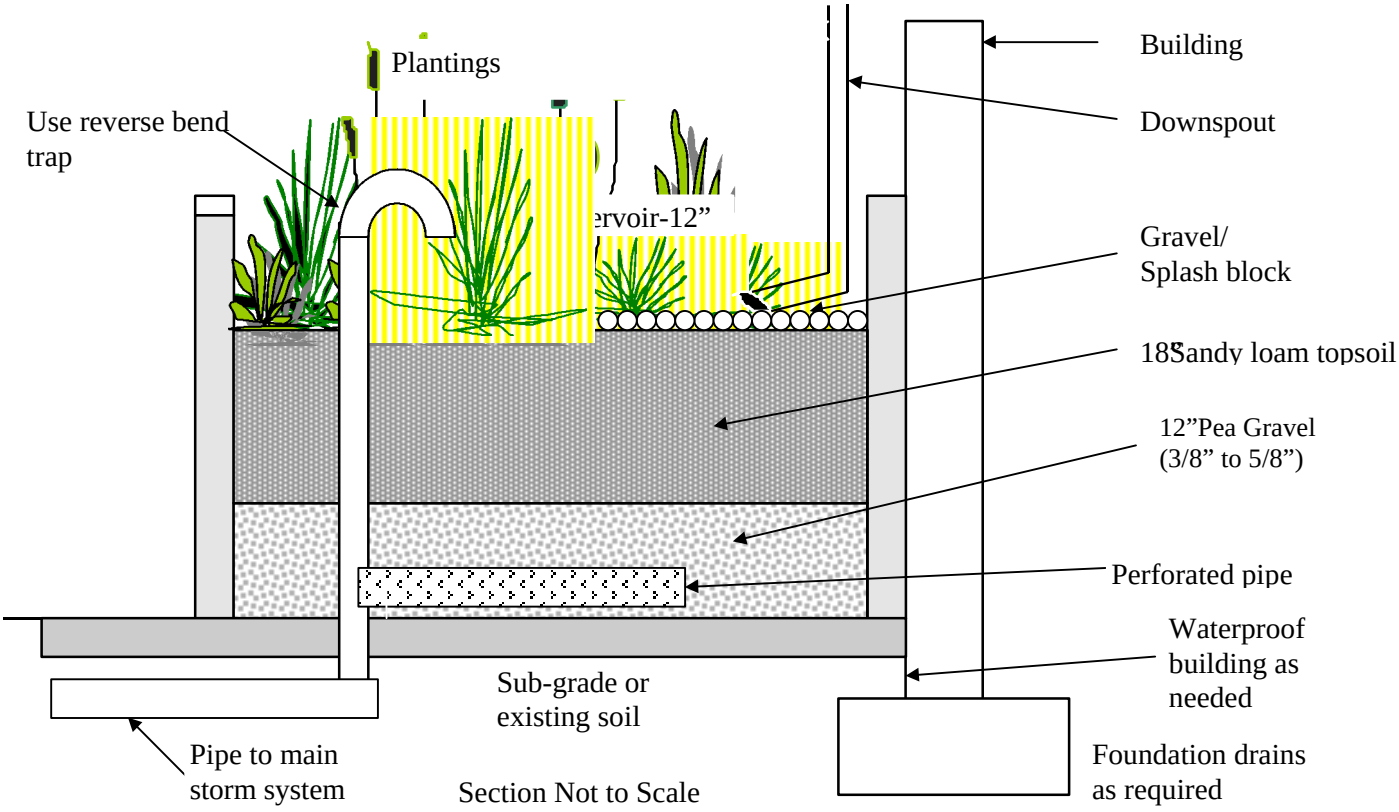
Planter AB is designed to allow runoff to filter through the planter soils (thus capturing pollutants) and then infiltrate into the native soils (flow control). The planter is sized to accept runoff and temporarily store the water in a reservoir on top of the soil.

General specifications (Acceptable soil types A & B)

There are numerous design variations. The planters shall be designed to allow captured runoff to drain out in 3-4 hours after a storm event. Plantings shall be in accordance with Chapter 8.0 and be appropriate for moist and seasonally dry conditions, and can include rushes, reeds, sedges, iris, dogwood, currants, and numerous other shrubs, trees, and herbs/grasses. Topsoil shall have infiltration rate of 2"/hr. Sand/gravel area may not be required if existing soil has at least 5"/hr. infiltration rate. The sand/gravel area width, depth and length are to be determined by a qualified professional. Minimum planter width is 30"; there is no minimum length or required shape. The structural elements of the planters shall be stone, concrete, brick, wood, or other durable material. Treated wood shall not leach out any toxic chemicals. Planters within 10 ft of structure must use Design Criteria for Stormwater Planter CD or request an exception through OPDR to the Building Code requirement that stormwater facilities must be less than 10 ft from the structure.

Simplified Approach Design Criteria

Stormwater Planter CD

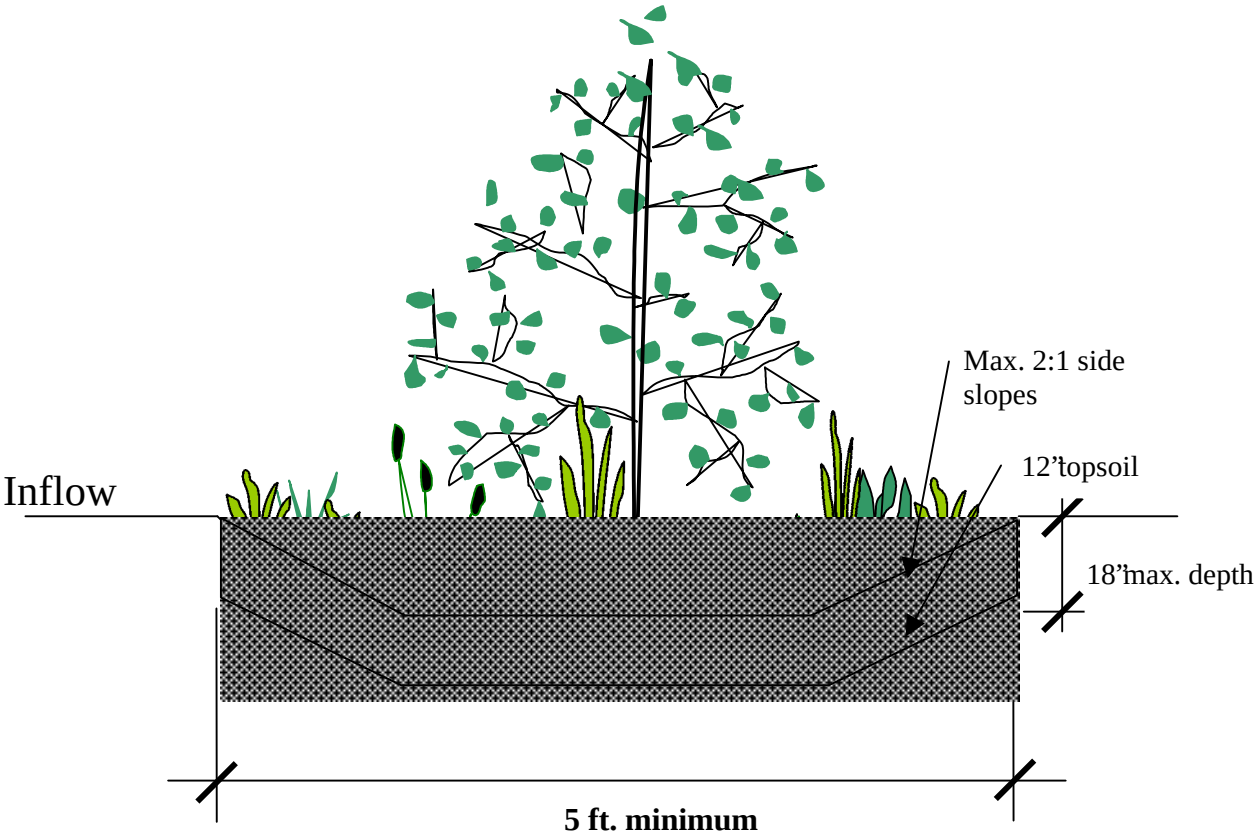


Description
Planter CD is designed with an impervious bottom or is placed on an impervious surface. Pollutant reduction is achieved as the water filters through the soil; flow control is obtained by storing the water in a reservoir above the soil. (Nominal infiltration can be allowed if soils and other geotechnical issues are addressed by a qualified professional.) This planter can be used adjacent to a building with OPDR approval. This planter could be included in setback if less than 30 inches in height (above finished grade)

General specifications (Acceptable soil types C & D)
There are numerous design variations allowed for these planters. The planters shall be designed to hold water for no more than 3-4 hours after an average storm event. Plantings shall be in accordance with Chapter 8.0 and be appropriate for moist and seasonally dry conditions, and can include rushes, reeds, sedges, iris, dogwood, currants, and numerous other shrubs, trees, and herbs/grasses. Minimum planter width is 18”; there is no minimum length or required shape. Topsoil shall have infiltration rate of 2”/hr. Sand/gravel shall have a minimum infiltration rate of 5”/hr. The structural elements of the planters shall be stone, concrete, brick, wood, or other durable material. Treated wood shall not leach out any toxic chemicals. Planter CD is contained and thus is not designed to drain into the ground near a building. Irrigation is optional, although plant viability shall be maintained.

Simplified Approach Design Criteria

Landscape Infiltration



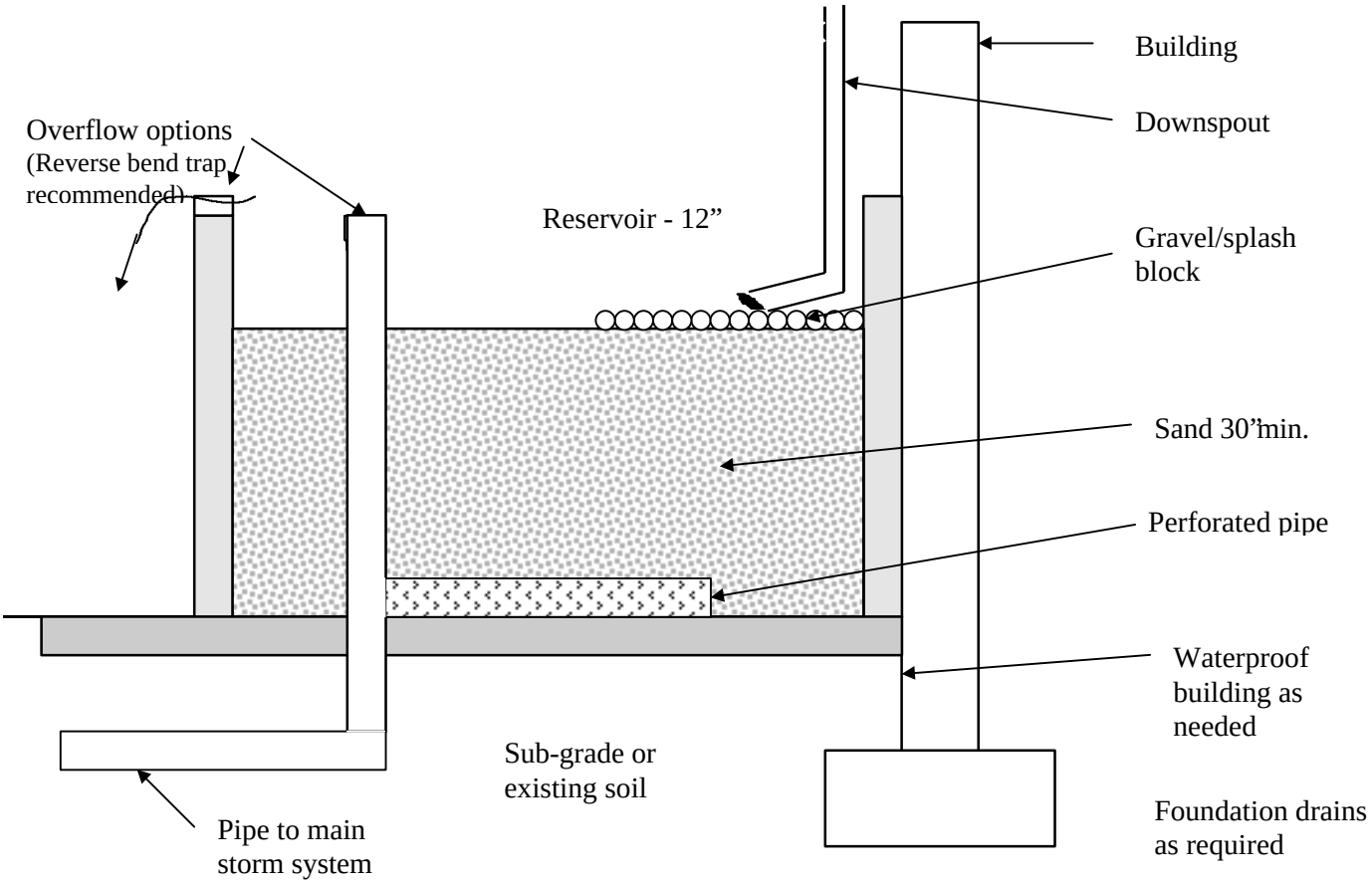
Section Not to Scale

Description
Landscape infiltration areas can be integrated into the site design and required landscaping. The design can be formal or informal in character. The system works by holding runoff and allowing pollutants to settle as the water infiltrates. Flow and volume are also managed with these facilities.

General specifications (Acceptable soil types A & B)
These facilities are appropriate for soils with a minimum infiltration rate of 2 inches per hour. Facility storage depth may vary from 6- 18” maximum. Maximum side slopes are 2H: 1V. Minimum bottom width is 3 ft. Landscape may include a variety of trees, shrubs, grasses, and groundcover appropriate for periodic inundation. Plantings shall be in accordance with Chapter 8.0 requirements. Depending on Soil type & condition this facility may provide disposal as well as treatment. OPDR approval required for disposal method.

Simplified Approach Design Criteria

Sand Filter



Section Not to Scale

Description

There are two filter options. One is designed with an impervious bottom or is placed on an impervious surface. It can be used for NRCS soil types C and D. Some infiltration can be allowed if geotechnical issues are addressed by a qualified professional. The other option, for soils A and B, allows filtered water to infiltrate the ground. For both options, pollutant reduction is achieved as the water filters through the sand; flow control is obtained by storing the water in a reservoir above the sand. Filters may be constructed in-ground or above grade.

General specifications (Acceptable soils types A, B, C, or D, with limitations)

There are numerous design variations allowed for these filters. Filters shall drain within 2-3 hour after a storm event. Sand shall have a minimum infiltration rate of 5”/hr. The structural elements of the planters shall be stone, concrete, brick, wood, or other durable material. Treated wood shall not leach out any toxic chemicals. Where conditions allow (acceptable soil type and land use), the filter may be constructed without an impervious bottom.

Appendix

Best Management Practices Manuals and Resources

The erosion prevention and sediment control, and the stormwater management model ordinances, require the use of handbooks and/or manuals that describe the proper methods for designing and maintaining the Best Management Practices required by the ordinances. Since compiling these handbooks is expensive and time consuming, the following references are offered as examples of handbooks that could be referenced by a model ordinance, and made available for developers and builders in the community.

City of Portland, Bureau of Environmental Services, 503-823-7740
Stormwater Management Manual
http://www.enviro.ci.portland.or.us/swm1.htm
Portland's manual can be found online at the above address. The manual covers everything from design requirements for pollution reduction facilities to a thorough description of Best Management Practices. While not all of this manual is applicable to smaller jurisdictions, some of the sections could be referenced and easily incorporated into the model codes in Chapter 4.

Unified Sewerage Agency (USA) 503-846-8621
Erosion Control Technical Guidance Handbook and Design and Construction Standards
The Design and Construction Standards includes design requirements for stormwater and surface water as well as technical guidance on BMP design. The first copy is free by calling USA. The Erosion Control Handbook covers building practices and is free.

Oregon Department of Transportation (ODOT) 503-986-3720
Erosion and Sediment Control Manual
The ODOT Erosion and Sediment Control Manual is included in the draft 4d rules (see Chapter 2) and describes how state roads are to be maintained to protect and enhance water quality. While this manual focuses on road maintenance activities there is information about common BMPs and erosion control planning and design. Copies are available for $20.00 by calling the above number.

Oregon Department of Transportation (ODOT)
Routine Road Maintenance -
Water Quality and Habitat Guide Best Management Practices
http://www.odot.state.or.us/eshtm/images/4dman.pdf
Includes a wide variety of road maintenance activities and BMPs that can be employed to reduce the impacts to water quality and habitat.

Incorporation of Risk Assessment in Erosion Control Ordinances

In adopting an Erosion and Sediment Control (ESC) ordinance, a local government must strike a balance between addressing the relative risk of each land disturbing activity and ease of enforcement. The risk of damaging sediments traveling from a disturbed site to a water body depends on the following factors:

- Amount of soil disturbed
- Occurrence of rain
- Erosivity of the soil
- Slope
- Proximity to water body or storm drain

Common Approach

Most erosion control ordinances address all of these factors in some way. Usually they start with a threshold for area of disturbance. Some also include a threshold in terms of cubic yards of soil. The ordinance applies when the threshold is exceeded. The potential threat of rain may be addressed by setting a time window for when erosion control measures are required. In western Oregon that window is usually form October to May. Other jurisdictions require some level of erosion control year round and extra measures, such as stabilization of all exposes soil, during high-risk months. A site's slope and proximity to a water body or storm drains are typically addressed within specifications for erosion control plans for all activities needing such plans. Sites on slopes need more preventative measures than flat sites, and the location of water is a prime concern for designing the ESC plan. Soil erosivity is not often addressed in ordinances, however, it may be a factor for adopting an ordinance in jurisdictions having significant areas of erosible soils.

This approach requires only an estimate of exposed soil to determine whether an ESC ordinance applies. All other variation in risk is handled on a site-by-site basis through review of the ESC plan, or not at all.

Alternative Approach

It is possible for a jurisdiction to enter into more risk assessment up front so that enforcement activity can be focused on high-risk sites. This approach requires inventory and mapping of the risk factors throughout the jurisdiction or a more detailed evaluation of risks for each activity at the time of proposal. Strategies for using risk factors to target enforcement activity are recommended below:

- <u>Amount of soil disturbed</u> – It is not possible to map this factor, but it can be used in conjunction with landscape factors to assess overall risk of an activity. Whether used alone or in conjunction with other factors, a jurisdiction should consider establishing two thresholds based on size, one to distinguish low risk from medium risk, and one to distinguish between medium and high risk. See table below. Jurisdictions should encourage builders to phase their projects. If the risk assessment and required ESC measures are based on the amount of soil disturbed at any one time, rather than the entire project, a builder will have an incentive to keep the disturbed area to a minimum.

- Occurrence of rain – Although rain is less likely during summer months, rain does occur in western Oregon even in the "dry season", sometimes with great intensity. Since the water level in streams and rivers is low at this time, they may be less able to recover from a discharge of sediment. Suspension of all ESC requirements for any period of time is not recommended, although more protective ESC measures should be required for medium and high-risk sites during the rainy season.
- Erosivity of the soil – The occurrence of sand, a very low-risk soil, and various highly erosible soils is specific to certain regions. The relative benefits of mapping these areas to assist in risk assessment will be unique to each jurisdiction. If highly erosible soils are widespread, a jurisdiction may want to require the same ECS measures everywhere.
- Slope – Slope is a critical factor for ESC since water traveling downhill gains erosive force as it speeds up. Raindrops falling on a flat surface can only dislodge a few grains of soil, but can not move it. Water flowing over exposed soil can eat away hundreds of small "rills" or even wide "gullies", if it gets moving fast enough. If the slope continues beyond the construction site, the dislodged soil can be carried hundreds of feet to a drainage or to surface water. Moderate and high-risk areas based on slope are relatively easy to map. Some jurisdictions may already have or are considering hillside protection ordinances. These provisions often have a threshold of about 20% slope and address the most extreme erosion and sedimentation risk.
- Proximity to water body or storm drain – Even in the flattest valleys, the area within a couple hundred feet of a stream tends to slope toward the stream. Soil disturbing activities near surface waters are therefore high risk. Jurisdictions are expected to have riparian protection ordinances. The ESC benefit of their existing or proposed riparian ordinance should be considered when setting thresholds for this risk factor. A wide riparian buffer, such as 100 feet, for all streams in an area where the streamside vegetation is intact, may eliminate the need for a high risk threshold based on proximity to a surface water, since no construction or limited public facilities could occur in these areas anyway. Smaller buffers, those that only protect fish bearing streams, or those along streams which do not have healthy vegetation are probably not sufficient to protect against sedimentation from construction related erosion. A jurisdiction must also consider intermittent drainages that run near or through a site.

  The presence of a storm drain system provides a direct link from a construction site to a surface water. Jurisdictions should regulate all land disturbing activity, above some minimal threshold in areas served by a storm drain system. The minimal threshold should be chosen to avoid regulation of a typical garden plot.

The following table offers a strategy to address the three main risk variables that arecommon to all jurisdictions. The overall risk of an activity is determined by the combined risk of the three factors.

High Risk: Any activity assessed to fall in the high risk category for any one factor or the moderate risk category for any two risk factors.
Moderate Risk: Any activity assessed to be below all high risk thresholds and at moderate risk for one risk factors.

Low Risk: Any activity assessed to be at low risk for all risk factors **or** any activity resulting in soil disturbance below the minimum area threshold would not be regulated.

Matrix of Relative Risk for Three Risk Factors

	Diminimus	Low	Moderate	High
Area of disturbance in square feet	<500	500 - 5000	5000 - 10,000	>10,000
Proximity to water or storm drain system	NA	> 200 feet	100 – 200 feet	<100 feet
Slope	NA	<3%	3% to 8%	>8%
Note: Thresholds given here are for illustration only. Jurisdictions will need to determine thresholds based on landscape conditions and water quality concerns specific to their area. A storm drain system includes ditches and roads by which storm water can travel.				

Recommended ESC Measures for Moderate and High Risk Sites

Moderate risk sites:

- Storm drain protection
- Gravel entryway if vehicles will be driven on site
- Soil stockpile coverage with mulch, grass or plastic
- Permanent stabilization of site at completion of project

High risk sites:

- Erosion and sediment control plan including the following:
  - Present and proposed site contours
  - Location of surface water and storm drain inlets
  - Areas designated for vehicle access
  - Location of soil stockpiles
  - Areas of existing vegetation to be preserved
- Storm drain protection
- Gravel entryway
- Soil stockpile coverage with mulch, grass or plastic
- Slope stabilization, silt fence, straw waddles, etc.
- Straw mulch or equivalent on disturbed areas not actively being worked
- Permanent stabilization of site at completion of project

The assessment strategy and recommended ESC measure listed here are not adequate to serve alone as an ESC ordinance. Other model codes, however, could be adapted to address risk more critically with the inclusion of these concepts.

Incorporation of Water Quality Treatment Facilities in the Erosion and Sediment Control Ordinance

The following section can be included in the erosion and sediment control ordinance found in section 4.4.9 of the Guidebook. The purpose of the following language is to protect specific water resources from erosion or sediment generated by a single large development. This section requires a manual or a referenced manual that describes water quality treatment facility standards.

VII. Special Water Quality Treatment Facilities

[List water resources to be protected] are vitally important to [jurisdiction's recreational-based economy] and to the quality of life of [jurisdiction] residents. Special water quality detention and treatment facilities may be required for major developments draining to [list water resources to be protected], designed in accordance with the [list manual referenced for water quality treatment facilities or the adopted erosion control plan if appropriate].

A. Applicability. The [planning official] shall require water quality treatment or detention facilities for developments which qualify under any of the following:
   1. The development involves [10] acres or more.
   2. The development occupies [one acre] or more of steep slope or constrained slope area as defined by [Chapter X.X of this development code].
   3. The development will cause degradation of water quality in the receiving stream without detention or treatment.
   4. The development involves paved parking areas (exclusive of single family and two-family residences), fuel storage or dispensing areas, vehicle wash areas, or vehicle maintenance or dismantling areas.

B. Responsibility and Treatment Options. Water quality facilities for major developments shall be required for purposes of minimizing water quality impacts on [list protected water resources], prior to deposition into natural drainageways.
   1. Water quality facilities shall be designed and constructed by the developer, to ensure that stormwater runoff is treated on site, prior to discharge.
   2. Treatment may include infiltration devices, grassy swales, treatment ponds or other methods approved by the [jurisdiction], consistent with the [list manual referenced for water quality treatment facilities or the adopted erosion control plan if appropriate].

C. Placement of Water Quality Facilities. Placement of water quality facilities shall be limited as follows:
   1. The water quality facilities shall not be constructed within an existing or created wetlands unless a mitigation plan is approved by the [jurisdiction] and the Oregon Division of State Lands.
   2. The water quality facility shall not be placed on land with slopes of [15% or greater], within [50] feet of the top of the bank of a stream, or within a defined floodway area.
   3. The water quality facility may be constructed within the 100 year floodplain, provided that the area is (a) outside the area covered by the 25-year flood event,

and (b) the water quality facility effectively and exclusively uses native plant species.

4. Where the approval authority determines that a more efficient and effective regional site exists within the sub-basin, the water quality facility may be constructed off-site.

D. Water Quality Facility Standards. The design and functions of required water quality control facilities shall be determined based on the recommendations of the [list manual referenced for water quality treatment facilities or the adopted erosion control plan if appropriate].

1. The preliminary subdivision plat, site plan, or permit application shall include plans and a certification prepared by a professional engineer registered in Oregon that the proposed stormwater quality control facilities have been designed in accordance with the [list manual referenced for water quality treatment facilities or the adopted erosion control plan if appropriate].
2. The plan shall specifically consider source control of pollution (oil and water separators), runoff treatment, streambank erosion control, wetland impacts, impacts on water quality sensitive areas, and off-site analysis and mitigation.
3. A long-term (20-year) operation and maintenance plan shall be required. This plan shall document how and by whom the water quality facility will be maintained.
4. If the water quality facility is dedicated to the [jurisdiction], maintenance of the facility shall be the responsibility of the developer for at least two years after the facility has been constructed and approved by the [jurisdiction]. If the facility is not dedicated to the [jurisdiction], then it shall be the continuing responsibility of the developer.
5. In all cases, runoff from impervious areas used for repair, cleaning, refueling, storing or servicing of vehicles and machinery shall be treated on site to remove oil, grease and other chemicals.

Additional Model Codes

The following two model codes are referenced in Chapter 4. The first code is an example of how to include a performance-based code that encourages careful site design to eliminate effective impervious surfaces. The second code is a FEMA Model Flood Hazard Ordinance to meet National Flood Insurance Program requirements. This code is provided to help communities update old flood hazard codes.

Zero Effective Impervious Surfaces – Sample Code Provisions

Sections:
X.50.010 Goal and Purpose.
X.50.020 Definitions.
X.50.030 Applicability.
X.50.040 Development Review Process.
X.50.050 Deviation from [jurisdiction] code.
X.50.060 Authorized Deviations from Engineering Design and Development Guidelines and Public Works Standards
X.50.070 Evaluation and Monitoring.

X.50.010 Goal and Purpose.
This Chapter is enacted with the goal of retaining the critical functions of the landscape including evapotranspiration and infiltration after site development such that near "zero effective impervious surface" is achieved. As part of meeting such a goal, this chapter is intended to fulfill the following purposes:

(1) Provide those developing the land the opportunity to demonstrate environmental benefits related to site development with significantly reduced offsite drainage from development;
(2) Improve the conditions of habitat and ground and surface waters within a watershed with innovative urban residential design and development techniques;
(3) Foster broad community acceptance of the use of significantly less impervious surface and greater natural habitat conservation on housing and other development sites; and
(4) Provide the opportunity to identify and evaluate potential substantive changes to land use development regulations which support and improve natural functions of watersheds.

X.50.020 Definitions.
As used in this demonstration program, the words hereinafter defined shall have the meaning set forth in this section, unless the context clearly requires otherwise.

(1) "Forested area" means a treed area which functions, or which over time will be restored to function, as a mature native forest characterized by an undisturbed native plant understory.
(2) "Drainage collection system" means a system for conveying, treating and detaining stormwater runoff including but not limited to pipes, culverts, ditches, swales, ponds, and outfalls.

(3) "Innovative site design" means development techniques for residential housing using creative approaches to site design, habitat and tree and native plant retention, significant reduction of impervious surfaces, changes in traditional site features such as roads and drainage structures in favor of natural habitat features which result in zero or near-zero drainage discharge from the site after development.
(4) "Zero effective impervious surface" means impervious surface reduction to a small fraction of that resulting from traditional site development techniques such that usual manmade drainage collection systems are not necessary.
(5) "Zero effective impervious surface project" means those projects characterized by an absence of a traditional manmade drainage collection system. It is a project for which total impervious surface has been reduced to a small fraction of that resulting from traditional development. Necessary impervious surface will be placed in discontinuous increments such that runoff travel distance to a forested and native vegetation buffer is minimized and does not exceed 50 feet. Landscaped areas will be minimized and buffered on the downslope side by forest. Forested area comprises at least 60% of the project. Forested areas substitute for the traditional drainage system and are to be maintained in perpetuity. It is preferred that the site be characterized by a predominance of Soils Conservation Service Class C or D soils.

X.50.030 Applicability
The provisions of this chapter apply to the following land use districts (list districts that apply).

X.50.040 Development Review Process.
(1) Selected housing and other development projects shall submit project applications and all required documentation, per [jurisdiction] code, to the department of planning and development services. The [jurisdiction] shall coordinate review. Project applications shall comply with applicable provisions of the [jurisdiction] code and may deviate from certain code provisions pursuant to subsection (6) herein.
(2) Development in the following districts are permitted to submit applications under the provisions of this ordinance: [list appropriate districts]
(3) If a proponent fails to demonstrate progress on a selected project six (6) months following receipt of a letter from the development review team outlining project requirements, the project selection committee may de-designate the project for inclusion in this program. In the event of de-designation, the proponent may submit the project subject to existing land use development regulations of the county.
(4) Pursuant to the purpose, procedures and guidelines of the demonstration program and considering the recommendations of the project selection committee and development review team, deviations from requirements of the [development code] and engineering design and development standards (EDDS) may be approved by the [Director of Planning] and or by the Hearings Officer. Projects granted deviations from the EDDS shall demonstrate adequate provision for fire safety and access.

(5) An official site plan shall be prepared in compliance with [list appropriate section] for all projects selected under this section, shall be recorded, and shall be binding on the owners, heirs and successors of the property. Changes to the official site plan shall require a plat alteration or other appropriate process to be approved by the [jurisdiction]. The [Planning Director] shall approve minor revisions and shall make recommendations on major revisions to official site plans to the hearings officer. The [jurisdiction] may require Codes, Covenants and Restrictions (CC & Rs) to be developed as a condition of plat approval. Development of land, site design, landscaping, natural drainage features, habitat protection, stormwater design, project design, placement and size, and other site features related to this program shall be consistent with the approved site plan. A specific land clearing and tree retention plan shall be submitted as part of the approved site plan package.

X.50.050 Authorized Deviations from Engineering Design and Development Guidelines and Public Works Standards.

In order to accomplish the purpose and goal of this chapter, the director may approve, or for those projects requiring review and approval by either the hearings officer or by the [city council/county commission], recommend approval of deviations from engineering design and the provisions of the [jurisdiction's] development code and public works standards in accordance with the requirements set forth in this chapter. Deviations shall be based on the following criteria.

A. The deviations contribute to and are consistent with the zero effective impervious surface goals of this chapter.
B. The proposed development project offers reasonable assurance that near zero effective impervious surface will be achieved and maintained.
C. The deviations do not threaten public health or safety.
D. The change is consistent with generally accepted engineering and design criteria, except as necessary to achieve the purpose of this chapter.
E. The change promotes one or more of the following:
    1. innovative site or project design furthering the purposes of the program,
    2. increased on site stormwater retention using a variety of vegetation and landscape conditions,
    3. retention or redevelopment of original natural habitat conditions over a significant portion of the site,
    4. improved on-site water quality beyond that required by current applicable regulations,
    5. retention or re-creation of pre-development and/or natural hydrologic conditions to the maximum extent possible, and
    6. The reduction of effective impervious surfaces to near zero.
F. The deviations do not increase density by more than [twenty (20)] percent than what would otherwise be allowed under [jurisdiction] regulations then in effect.
G. The deviations meet the minimum required density in the district [does not reduce the maximum density allowed without the use of this ordinance by more than ten percent]

The applicant will be required to list and document the justification for each deviation requested. In order for such a project to be approved, it must be demonstrated that the

project meets all other requirements of the [jurisdiction] Development Code except for such specific deviations, and that such project has a reasonable assurance of long term success. Binding covenants, conditions and restrictions shall be submitted in conjunction with each project and shall require retention of forest and other environmentally sensitive areas (streams, wetlands, steep slopes, etc), no net increases in impervious surface, and such other critical features as the [jurisdiction] may require.

X.50.060 Official Approval
All projects proposed under the terms of this chapter shall require approval of either a plat or the official site plan pursuant to the provisions of this code. The site plan or plan shall be in recordable form which shall be binding upon the owners of the real property, their heirs and assigns. The plat or official site plan shall include a specific land clearing and tree retention plan which shall be referenced upon the face of the plat or binding site plan. All development of the land, site design, landscaping, natural drainage features, habitat protection, stormwater design, and the design, placement and size of housing or other buildings and any additional site features shall be consistent with the approved plat or site plan. Any changes will require a formal application and amendment of either the plat or the official adopted site plan pursuant to the provisions of this code.

18.50.070 Evaluation and Monitoring.
Each application for approval of a project pursuant to the terms of this chapter shall be accompanied by a proposed monitoring and evaluation process designed to measure the performance of specific elements addressed in the deviations sought for the project. After the approval of a project, the city shall, with such cooperation as may be required of the property owner, document project progress, and in particular, those innovations and code deviations granted as part of such project approval. Written progress evaluations shall be prepared by [Director] and provided to the Planning Commission and City Council. An annual report on all such approved projects shall be prepared for the City Council and Planning Commission, including a summary description and evaluation of each selected project and any recommendations regarding substantive changes to the [jurisdiction] Development Code which are supported by such evaluation.

FEMA Model Flood Hazard Ordinance for Oregon to meet National Flood Insurance Program requirements

Adoption of this ordinance will comply with the standards for participation in the National Flood Insurance Program. The model includes standards and provisions that encourage sound flood plain management and if implemented allows property owners to obtain flood insurance at a more affordable rate.

FEMA recommends that non-residential construction have the lowest floor elevated one foot above the base flood elevation; or that the area below one foot above the base flood elevation be flood proofed.

The minimum requirement for participation in the NFIP non-residential construction requires that the lowest floor be elevated to or above the base flood elevation or that the area below the base flood elevation be flood proofed.

Even though the minimum standards only require elevation to the base flood elevation, it is recommended that communities adopt the higher standard because elevating one foot above the base flood elevation will allow your industries and businesses to receive a substantial reduction in the cost of their flood insurance. Also, as increased development happens, flood elevations can increase, and the one-foot-above standard allows for an additional margin of safety.

Because of the substantial number of manufactured homes that have experienced foundation failure, this model recommends that dry stacked blocks not be used to support manufactured homes in areas of high velocity and/or high water depths.

The model ordinance also includes sections for development in Shallow Flooding Areas (AO Zones), Section 5.5 and Coastal High Hazard Areas (V1-V30, VE and/or V), Section 5.6. If your community does not have either of these zones designated on your Flood Insurance Rate Map, it is not necessary to adopt these sections of the model ordinance.

If you have any questions concerning adoption of this model or participation in the NFIP please contact the Federal Emergency Management Agency Regional Office at (206) 487-4679.

This page intentionally left blank.

OREGON MODEL
FLOOD DAMAGE PREVENTION ORDINANCE

SECTION 1.0
STATUTORY AUTHORIZATION, FINDINGS OF FACT, PURPOSE, AND OBJECTIVES

1.1 STATUTORY AUTHORIZATION

The Legislature of the State of Oregon has delegated the responsibility to local governmental units to adopt regulations designed to promote the public health, safety, and general welfare of its citizenry. Therefore, the [jurisdiction] does ordain as follows:

1.2 FINDINGS OF FACT

(1) The flood hazard areas of [jurisdiction] are subject to periodic inundation which results in loss of life and property, health, and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety, and general welfare.
(2) These flood losses are caused by the cumulative effect of obstructions in areas of special flood hazards which increase flood heights and velocities, and when inadequately anchored, damage uses in other areas. Uses that are inadequately floodproofed, elevated, or otherwise protected from flood damage also contribute to the flood loss.

1.3 STATEMENT OF PURPOSE

It is the purpose of this ordinance to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in specific areas by provisions designed:

(1) To protect human life and health;
(2) To minimize expenditure of public money and costly flood control projects;
(3) To minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
(4) To minimize prolonged business interruptions;
(5) To minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets, and bridges located in areas of special flood hazard;
(6) To help maintain a stable tax base by providing for the sound use and development of areas of special flood hazard so as to minimize future flood blight areas;

(7) To ensure that potential buyers are notified that property is in an area of special flood hazard; and,
(8) To ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.

1.4 METHODS OF REDUCING FLOOD LOSSES

In order to accomplish its purposes, this ordinance includes methods and provisions for:

(1) Restricting or prohibiting uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities;
(2) Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;
(3) Controlling the alteration of natural flood plains, stream channels, and natural protective barriers, which help accommodate or channel flood waters;
(4) Controlling filling, grading, dredging, and other development which may increase flood damage; and
(5) Preventing or regulating the construction of flood barriers which will unnaturally divert flood waters or may increase flood hazards in other areas.

SECTION 2.0
DEFINITIONS

Unless specifically defined below, words or phrases used in this ordinance shall be interpreted so as to give them the meaning they have in common usage and to give this ordinance its most reasonable application.

"APPEAL" means a request for a review of the interpretation of any provision of this ordinance or a request for a variance.

"AREA OF SHALLOW FLOODING" means a designated AO, or AH Zone on the Flood Insurance Rate Map (FIRM). The base flood depths range from one to three feet; a clearly defined channel does not exist; the path of flooding is unpredictable and indeterminate; and, velocity flow may be evident. AO is characterized as sheet flow and AH indicates ponding.

"AREA OF SPECIAL FLOOD HAZARD" means the land in the flood plain within a community subject to a one percent or greater chance of flooding in any given year. Designation on maps always includes the letters A or V.

"BASE FLOOD" means the flood having a one percent chance of being equaled or exceeded in any given year. Also referred to as the "100-year flood." Designation on maps always includes the letters A or V.

"BASEMENT" means any area of the building having its floor subgrade (below ground level) on all sides.

"BREAKAWAY WALL" means a wall that is not part of the structural support of the building and is intended through its design and construction to collapse under specific lateral loading forces, without causing damage to the elevated portion of the building or supporting foundation system.

"COASTAL HIGH HAZARD AREA" means an area of special flood hazard extending from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high velocity wave action from storms or seismic sources. The area is designated on the FIRM as Zone V1-V30, VE or V.

"CRITICAL FACILITY" means a facility for which even a slight chance of flooding might be too great. Critical facilities include, but are not limited to schools, nursing homes, hospitals, police, fire and emergency response installations, installations which produce, use or store hazardous materials or hazardous waste.

"DEVELOPMENT" means any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations located within the area of special flood hazard.

"ELEVATED BUILDING" means for insurance purposes, a non-basement building which has its lowest elevated floor raised above ground level by foundation walls, shear walls, post, piers, pilings, or columns.

"EXISTING MANUFACTURED HOME PARK OR SUBDIVISION" means a manufactured home park subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed before the effective date of the adopted floodplain management regulations.

"EXPANSION TO AN EXISTING MANUFACTURED HOME PARK OR _____ means the preparation of additional sites by the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads).

"FLOOD" OR "FLOODING" means a general and temporary condition of partial or complete inundation of normally dry land areas from:

(1) The overflow of inland or tidal waters and/or
(2) The unusual and rapid accumulation of runoff of surface waters from any source.

"FLOOD INSURANCE RATE MAP (FIRM)" means the official map on which the Federal Insurance Administration has delineated both the areas of special flood hazards and the risk premium zones applicable to the community.

"FLOOD INSURANCE STUDY" means the official report provided by the Federal Insurance Administration that includes flood profiles, the Flood Boundary-Floodway Map, and the water surface elevation of the base flood.

"FLOODWAY" means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot.

"LOWEST FLOOR" means the lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for parking of vehicles, building access or storage, in an area other than a basement area, is not considered a building's lowest floor, provided that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirements of this ordinance found at Section 5.2-1(2).

"MANUFACTURED HOME" means a structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when attached to the required utilities. The term "manufactured home" does not include a "recreational vehicle."

"MANUFACTURED HOME PARK OR SUBDIVISION" means a parcel (or contiguous parcels) of land divided into two or more manufactured home lots for rent or sale.

"NEW CONSTRUCTION" means structures for which the "start of construction" commenced on or after the effective date of this ordinance.

"NEW MANUFACTURED HOME PARK OR SUBDIVISION" means a manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed on or after the effective date of adopted floodplain management regulations.

"RECREATIONAL VEHICLE" means a vehicle which is:

(a) Built on a single chassis;
(b) 400 square feet or less when measured at the largest horizontal projection;
(c) Designed to be self-propelled or permanently towable by a light duty truck; and
(d) Designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use.

"START OF CONSTRUCTION" includes substantial improvement, and means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, placement or other improvement was within 180 days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading and filling; nor does it include the installation of streets and/or walkways; nor does it include excavation for a basement, footings, piers, or foundations or the erection of temporary forms; nor does it include the installation of the property or accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

"STRUCTURE" means a walled and roofed building including a gas or liquid storage tank that is principally above ground.

"SUBSTANTIAL DAMAGE" means damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

"SUBSTANTIAL IMPROVEMENT" means any repair, reconstruction, or improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure either:

(1) Before the improvement or repair is started; or
(2) If the structure has been damaged and is being restored, before the damage occurred. For the purposes of this definition "substantial improvement" is considered to occur when the first alteration of any wall, ceiling, floor, or other structural part of the building commences, whether or not that alteration affects the external dimensions of the structure.

The term does not, however, include either:

(1) Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions or
(2) Any alteration of a structure listed on the National Register of Historic Places or a State Inventory of Historic Places.

"VARIANCE" means a grant of relief from the requirements of this ordinance which permits construction in a manner that would otherwise be prohibited by this ordinance.

"WATER DEPENDENT" means a structure for commerce or industry which cannot exist in any other location and is dependent on the water by reason of the intrinsic nature of its operations.

SECTION 3.0
GENERAL PROVISIONS

3.1 LANDS TO WHICH THIS ORDINANCE APPLIES

This ordinance shall apply to all areas of special flood hazards within the jurisdiction of _____ .

3.2 BASIS FOR ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD

The areas of special flood hazard identified by the Federal Insurance Administration in a scientific and engineering report entitled "The Flood Insurance Study for the _____," dated _____, 19__, and as amended, with accompanying Flood Insurance Maps, as amended, are hereby adopted by reference and declared to be a part of this ordinance. The Flood Insurance Study is on file at _____ .

3.3 PENALTIES FOR NONCOMPLIANCE

No structure or land shall hereafter be constructed, located, extended, converted, or altered without full compliance with the terms of this ordinance and other applicable regulations. Violations of the provisions of this ordinance by failure to comply with any of its requirements (including violations of conditions and safeguards established in connection with conditions), shall constitute a misdemeanor. Any person who violates this ordinance or fails to comply with any of its requirements shall upon conviction thereof be fined not more than _____ or imprisoned for not more than ____ days, or both, for each violation, and in addition shall pay all costs and expenses involved in the case. Nothing herein contained shall prevent the _____ from taking such other lawful action as is necessary to prevent or remedy any violation.

3.4 ABROGATION AND GREATER RESTRICTIONS

This ordinance is not intended to repeal, abrogate, or impair any existing easements, covenants, or deed restrictions. However, where this ordinance and another ordinance, easement, covenant, or deed restriction conflict or overlap, whichever imposes the more stringent restrictions shall prevail.

3.5 INTERPRETATION

In the interpretation and application of this ordinance, all provisions shall be:

(1) Considered as minimum requirements;
(2) Liberally construed in favor of the governing body; and,
(3) Deemed neither to limit or repeal any other powers granted under State statutes.

3.6 WARNING AND DISCLAIMER OF LIABILITY

The degree of flood protection required by this ordinance is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Larger floods can and will occur on rare occasions. Flood heights may be increased by man-made or natural causes. This ordinance does not imply that land outside the areas of special flood hazards or uses permitted within such areas will be free from flooding or flood damages. This ordinance shall not create liability on the part of_____ , any officer or employee thereof, or the Federal Insurance Administration, for any flood damages that result from reliance on this ordinance or any administrative decision lawfully made hereunder.

SECTION 4.0
ADMINISTRATION

4.1 ESTABLISHMENT OF DEVELOPMENT PERMIT

4.1-1 Development Permit Required

A development permit shall be obtained before construction or development begins within any area of special flood hazard established in Section 3.2. The permit shall be for all structures including manufactured homes, as set forth in the "DEFINITIONS," and for all development including fill and other activities, also as set forth in the "DEFINITIONS."

4.1-2 Application for Development Permit

Application for a development permit shall be made on forms furnished by the_____ and may include but not be limited to plans in duplicate drawn to scale showing the nature, location, dimensions, and elevations of the area in question; existing or proposed structures, fill, storage of materials, drainage facilities, and the location of the foregoing. Specifically, the following information is required:

(1) Elevation in relation to mean sea level, of the lowest floor (including basement) of all structures;
(2) Elevation in relation to mean sea level to which any structure has been floodproofed;
(3) Certification by a registered professional engineer or architect that the floodproofing methods for any nonresidential structure meet the floodproofing criteria in Section 5.2-2; and

(4) Description of the extent to which a watercourse will be altered or relocated as a result of proposed development.

4.2 DESIGNATION OF THE (local administrator)

The (local administrator) is hereby appointed to administer and implement this ordinance by granting or denying development permit applications in accordance with its provisions.

4.3 DUTIES AND RESPONSIBILITIES OF THE (local administrator)

Duties of the (local administrator) shall include, but not be limited to:

4.3-1 Permit Review

(1) Review all development permits to determine that the permit requirements of this ordinance have been satisfied.
(2) Review all development permits to determine that all necessary permits have been obtained from those Federal, State, or local governmental agencies from which prior approval is required.
(3) Review all development permits to determine if the proposed development is located in the floodway. If located in the floodway, assure that the encroachment provisions of Section 5.3(1) are met.

4.3-2 Use of Other Base Flood Data

When base flood elevation data has not been provided in accordance with Section 3.2, BASIS FOR ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD, the (local administrator) shall obtain, review, and reasonably utilize any base flood elevation and floodway data available from a Federal, State or other source, in order to administer Sections 5.2, SPECIFIC STANDARDS, and 5.3 FLOODWAYS.

4.3-3 Information to be Obtained and Maintained

(1) Where base flood elevation data is provided through the Flood Insurance Study or required as in Section 4.3-2, obtain and record the actual elevation (in relation to mean sea level) of the lowest floor (including basement) of all new or substantially improved structures, and whether or not the structure contains a basement.
(2) For all new or substantially improved floodproofed structures:
    (i) Verify and record the actual elevation (in relation to mean seal level), and
    (ii) Maintain the floodproofing certifications required in Section 4.1-2(3).
(3) Maintain for public inspection all records pertaining to the provisions of this ordinance.

4.3-4 Alteration of Watercourses

(1) Notify adjacent communities and the Department of Land Conservation and Development prior to any alteration or relocation of a watercourse, and submit evidence of such notification to the Federal Insurance Administration.
(2) Require that maintenance is provided within the altered or relocated portion of said watercourse so that the flood carrying capacity is not diminished.

4.3-5 Interpretation of FIRM Boundaries

Make interpretations where needed, as to exact location of the boundaries of the areas of special flood hazards (for example, where there appears to be a conflict between a mapped boundary and actual field conditions). The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretation as provided in Section 4.4.

NOTE - If you do not include Section 4.4 (Variance Procedure), end the above sentence after the word "interpretation," and add the following sentence: "such appeals shall be granted consistent with the standards of Section 60.6 of the Rules and Regulations of the National Flood Insurance Program (44 CFR 59-76).

4.4 VARIANCE PROCEDURE

4.4-1 Appeal Board

(1) The _____ as established by _____ shall hear and decide appeals and requests for variances from the requirements of this ordinance.
(2) The _____ shall hear and decide appeals when it is alleged there is an error in any requirement, decision, or determination made by the _____ in the enforcement or administration of this ordinance.
(3) Those aggrieved by the decision of the _____, or any taxpayer, may appeal such decision to the _____ , as provided in _____ .
(4) In passing upon such applications, the _____ shall consider all technical evaluations, all relevant factors, standards specified in other sections of this ordinance, and:

(i) The danger that materials may be swept onto other lands to the injury of others;
(ii) The danger to life and property due to flooding or erosion damage;
(iii) The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner;
(iv) The importance of the services provided by the proposed facility to the community;
(v) The necessity to the facility of a waterfront location, where applicable;

(vi) The availability of alternative locations for the proposed use which are not subject to flooding or erosion damage;
(vii) The compatibility of the proposed use with existing and anticipated development;
(viii) The relationship of the proposed use to the comprehensive plan and flood plain management program for that area;
(ix) The safety of access to the property in times of flood for ordinary and emergency vehicles;
(x) The expected heights, velocity, duration, rate of rise, and sediment transport of the flood waters and the effects of wave action, if applicable, expected at the site; and,
(xi) The costs of providing governmental services during and after flood conditions, including maintenance and repair of public utilities and facilities such as sewer, gas, electrical, and water systems, and streets and bridges.

(5) Upon consideration of the factors of Section 4.4-1(4) and the purposes of this ordinance, the _____ may attach such conditions to the granting of variances as it deems necessary to further the purposes of this ordinance.
(6) The _____ shall maintain the records of all appeal actions and report any variances to the Federal Insurance Administration upon request.

4.4-2 Conditions for Variances

(1) Generally, the only condition under which a variance from the elevation standard may be issued is for new construction and substantial improvements to be erected on a lot of one-half acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level, providing items (I-xi) in Section 4.4-1(4) have been fully considered. As the lot size increases the technical justification required for issuing the variance increases.
(2) Variances may be issued for the reconstruction, rehabilitation, or restoration of structures listed on the National Register of Historic Places or the State Inventory of Historic Places, without regard to the procedures set forth in this section.
(3) Variances shall not be issued within a designated floodway if any increase in flood levels during the base flood discharge would result.
(4) Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief.
(5) Variances shall only be issued upon:

(i) A showing of good and sufficient cause;
(ii) A determination that failure to grant the variance would result in exceptional hardship to the applicant;
(iii) A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary

public expense, create nuisances, cause fraud on or victimization of the public as identified in Section 4.1-4(4), or conflict with existing local laws or ordinances.

(6) Variances as interpreted in the National Flood Insurance Program are based on the general zoning law principle that they pertain to a physical piece or property; they are not personal in nature and do not pertain to the structure, its inhabitants, economic or financial circumstances. They primarily address small lots in densely populated residential neighborhoods. As such, variances from the flood elevations should be quite rare.

(7) Variances may be issued for nonresidential buildings in very limited circumstances to allow a lesser degree of floodproofing than watertight or dry-floodproofing, where it can be determined that such action will have low damage potential, complies with all other variance criteria except 4.4-2(1), and otherwise complies with Sections 5.1-1 and 5.1-2 of the GENERAL STANDARDS.

(8) Any applicant to whom a variance is granted shall be given written notice that the structure will be permitted to be built with a lowest floor elevation below the base flood elevation and that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced lowest floor elevation.

SECTION 5.0
PROVISIONS FOR FLOOD HAZARD REDUCTION

5.1 GENERAL STANDARDS

In all areas of special flood hazards, the following standards are required:

5.1-1 Anchoring

(1) All new construction and substantial improvements shall be anchored to prevent flotation, collapse, or lateral movement of the structure.

(2) All manufactured homes must likewise be anchored to prevent flotation, collapse, or lateral movement, and shall be installed using methods and practices that minimize flood damage. Anchoring methods may include, but are not limited to, use of over-the-top or frame ties to ground anchors (Reference FEMA's "Manufactured Home Installation in Flood Hazard Areas" guidebook for additional techniques).

5.1-2 Construction Materials and Methods

(1) All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.

(2) All new construction and substantial improvements shall be constructed using methods and practices that minimize flood damage.

(3) Electrical, heating, ventilation, plumbing, and air-conditioning equipment and other service facilities shall be designed and/or otherwise elevated or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

5.1-3 Utilities

(1) All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system;
(2) New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharge from the systems into flood waters; and,
(3) On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding.

5.1-4 Subdivision Proposals

(1) All subdivision proposals shall be consistent with the need to minimize flood damage;
(2) All subdivision proposals shall have public utilities and facilities such as sewer, gas, electrical, and water systems located and constructed to minimize flood damage;
(3) All subdivision proposals shall have adequate drainage provided to reduce exposure to flood damage; and,
(4) Where base flood elevation data has not been provided or is not available from another authoritative source, it shall be generated for subdivision proposals and other proposed developments which contain at least 50 lots or 5 acres (whichever is less).

5.1-5 Review of Building Permits

Where elevation data is not available either through the Flood Insurance Study or from another authoritative source (Section 4.3-2), Applications for building permits shall be reviewed to assure that proposed construction will be reasonably safe from flooding. The test of reasonableness is a local judgment and includes use of historical data, high water marks, photographs of past flooding, etc., where available. Failure to elevate at least two feet above grade in these zones may result in higher insurance rates.

5.2 SPECIFIC STANDARDS

In all areas of special flood hazards where base flood elevation data has been provided as set forth in Section 3.2, BASIS FOR ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD or Section 4.3-2, Use of Other Base Flood Data, the following provisions are required:

5.2-1 Residential Construction

(1) New construction and substantial improvement of any residential structure shall have the lowest floor, including basement, elevated one foot above the base flood elevation.
(2) Fully enclosed areas below the lowest floor that are subject to flooding are prohibited, or shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must be either be certified by a registered professional engineer or architect or must meet or exceed the following minimum criteria:

(i) A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided.
(ii) The bottom of all openings shall be no higher than one foot above grade.
(iii) Openings may be equipped with screens, louvers, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.

5.2-2 Nonresidential Construction

New construction and substantial improvement of any commercial, industrial or other nonresidential structure shall either have the lowest floor, including basement, elevated at or above the base flood elevation; or, together with attendant utility and sanitary facilities, shall:

(1) Be floodproofed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water;
(2) Have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy;
(3) Be certified by a registered professional engineer or architect that the design and methods of construction are in accordance with accepted standards of practice for meeting provisions of this subsection based on their development and/or review of the structural design, specifications and plans. Such certifications shall be provided to the official as set forth in Section 4.3-3(2);
(4) Nonresidential structures that are elevated, not floodproofed, must meet the same standards for space below the lowest floor as described in 5.2-1(2);
(5) Applicants floodproofing nonresidential buildings shall be notified that flood insurance premiums will be based on rates that are one foot below the

floodproofed level (e.g. a building floodproofed to the base flood level will be rated as one foot below.

5.2-3 Manufactured Homes

(1)All manufactured homes to be placed or substantially improved within Zones A1-A30, AH, and AE on the community's FIRM on sites:

(i) Outside of a manufactured home park or subdivision,
(ii) In a new manufactured home park or subdivision,
(iii) In an expansion to an existing manufactured home park or subdivision, or
(iv) In an existing manufactured home park or subdivision on which a manufactured home has incurred "substantial damage" as the result of a flood;

shall be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated one foot above the base flood elevation and be securely anchored to an adequately designed foundation system to resist flotation, collapse and lateral movement.

(2) Manufactured homes to be placed or substantially improved on sites in an existing manufactured home park or subdivision within Zones A1-30, AH, and AE on the community's FIRM that are not subject to the above manufactured home provisions be elevated so that either:

(i) The lowest floor of the manufactured home is elevated one foot above the base flood elevation, or
(ii) The manufactured home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than 36 inches in height above grade and be securely anchored to an adequately designed foundation system to resist flotation, collapse, and lateral movement.

5.2-4 Recreational Vehicles

Recreational vehicles placed on sites within Zones A1-30, AH, and AE on the community's FIRM either:

(i) Be on the site for fewer than 180 consecutive days,
(ii) Be fully licensed and ready for highway use, on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions; or
(iii) Meet the requirements of 5.2-3 above and the elevation and anchoring requirements for manufactured homes.

5.3 FLOODWAYS

Located within areas of special flood hazard established in Section 3.2 are areas designated as floodways. Since the floodway is an extremely hazardous area due to the velocity of flood waters which carry debris, potential projectiles, and erosion potential, the following provisions apply:

(1) Prohibit encroachments, including fill, new construction, substantial improvements, and other development unless certification by a registered professional civil engineer is provided demonstrating that encroachments shall not result in any increase in flood levels during the occurrence of the base flood discharge.
(2) If Section 5.3(1) is satisfied, all new construction and substantial improvements shall comply with all applicable flood hazard reduction provisions of Section 5.0, PROVISIONS FOR FLOOD HAZARD REDUCTION.

5.4 ENCROACHMENTS

The cumulative effect of any proposed development, where combined with all other existing and anticipated development, shall not increase the water surface elevation of the base flood more than one foot at any point.

5.5 STANDARDS FOR SHALLOW FLOODING AREAS (AO ZONES)

Shallow flooding areas appear on FIRMs as AO zones with depth designations. The base flood depths in these zones range from 1 to 3 feet above ground where a clearly defined channel does not exist, or where the path of flooding is unpredictable and where velocity flow may be evident. Such flooding is usually characterized as sheet flow. In these areas, the following provisions apply:

(1) New construction and substantial improvements of residential structures and manufactured homes within AO zones shall have the lowest floor (including basement) elevated above the highest grade adjacent to the building, one foot or more above the depth number specified on the FIRM (at least two feet if no depth number is specified).
(2) New construction and substantial improvements of nonresidential structures within AO zones shall either:

    (i) Have the lowest floor (including basement) elevated above the highest adjacent grade of the building site, one foot or more above the depth number specified on the FIRM (at least two feet if no depth number is specified); or
    (ii) Together with attendant utility and sanitary facilities, be completely flood proofed to or above that level so that any space below that level is watertight with walls substantially impermeable to the passage of water

and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy. If this method is used, compliance shall be certified by a registered professional engineer or architect as in section 5.2-2(3).

(3) Require adequate drainage paths around structures on slopes to guide floodwaters around and away from proposed structures.

(4) Recreational vehicles placed on sites within AO Zones on the community's FIRM either:

(i) Be on the site for fewer than 180 consecutive days,

(ii) Be fully licensed and ready for highway use, on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions; or

(iii) Meet the requirements of 5.5 above and the elevation and anchoring requirements for manufactured homes.

5.6 COASTAL HIGH HAZARD AREAS

Located within areas of special flood hazard established in Section 3.2 are Coastal High Hazard Areas, designated as Zones V1-V30, VE and/or V. These areas have special flood hazards associated with high velocity waters from surges and, therefore, in addition to meeting all provisions in this ordinance, the following provisions shall also apply:

(1) All new construction and substantial improvements in Zones V1-V30 and VE (V if base flood elevation data is available) shall be elevated on pilings and columns so that:

(i) The bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated one foot or more above the base flood level; and

(ii) The pile or column foundation and structure attached thereto is anchored to resist flotation, collapse and lateral movement due to the effects of wind and water loads acting simultaneously on all building components. Wind and water loading values shall each have a one percent chance of being equaled or exceeded in and given year (100-year mean recurrence interval);

(2) A registered professional engineer or architect shall develop or review the structural design, specifications and plans for the construction, and shall certify that the design and methods of construction to be used are in accordance with accepted standards of practice for meeting the provisions of (i) and (ii) of this Section.

(3) Obtain the elevation (in relation to mean sea level) of the bottom of the lowest structural member of the lowest floor (excluding pilings and columns) of all new and substantially improved structures in Zones V1-30 and VE, and

whether or not such structures contain a basement. The local administrator shall maintain a record of all such information.

(4) All new construction shall be located landward of the reach of mean high tide.

(5) Provide that all new construction and substantial improvements have the space below the lowest floor either free of obstruction or constructed with nonsupporting breakaway walls, open wood lattice-work, or insect screening intended to collapse under wind and water loads without causing collapse, displacement, or other structural damage to the elevated portion of the building or supporting foundation system. For the purpose of this section, a breakaway wall shall have a design safe loading resistance of not less than 10 and no more than 20 pounds per square foot. Use of breakaway walls which exceed a design safe loading resistance of 20 pounds per square foot (either by design or when so required by local or State codes) may be permitted only if a registered professional engineer or architect certifies that the designs proposed meet the following conditions:

(i) Breakaway wall collapse shall result from water load less than that which would occur during the base flood; and

(ii) The elevated portion of the building and supporting foundation system shall not be subject to collapse, displacement, or other structural damage due to the effects of wind and water loads acting simultaneously on all building components (structural and nonstructural). Maximum wind and water loading values to be used in this determination shall each have a one percent chance of being equaled or exceeded in any given year (100-year mean recurrence interval).

(6) If breakaway walls are utilized, such enclosed space shall be useable solely for parking of vehicles, building access, or storage. Such space shall not be used for human habitation.

(7) Prohibit the use of fill for structural support of buildings.

(8) Prohibit man-made alteration of sand dunes which would increase potential flood damage.

(9) All manufactured homes to be placed or substantially improved within Zones V1-V30, V, and VE on the community's FIRM on sites:

(i) Outside of a manufactured home park or subdivision,

(ii) In a new manufactured home park or subdivision,

(iii) In an expansion to an existing manufactured home park or subdivision, or

(iv) In an existing manufactured home park or subdivision on which a manufactured home has incurred “substantial damage” as the result of a flood;

(v) meet the standards of paragraphs 5.6(1) through (8) of this section and that manufactured homes placed or substantially improved on other sites in an existing manufactured home park

or subdivision within Zones V1-30, V, and VE on the FIRM meet the requirements of Section 5.2-3.

(10) Recreational vehicles placed on sites within Zones V1-30, V, and VE on the community's FIRM either:

(i) Be on the site for fewer than 180 consecutive days,

(ii)Be fully licensed and ready for highway use, on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions; or

(iii) Meet the requirements of Section 4.1-1(Permitting requirements) and paragraphs 5.6(1) through (8) of this section.

Simplified Approach Design Criteria for Stormwater Management

The following text is from Chapter 4 of the City of Portland's Stormwater Management Manual from City of Portland.. The "simplified" or "combined" approach to designing stormwater management facilities was incorporated into the stormwater management model code included in the Water Quality Model Code (Section 4.4.7). The design criteria in the Portland manual were selected to meet environmental conditions in the northern Willamette Valley. It is probable that these design criteria will be found adequate for much of Western Oregon. **However, if a jurisdiction is interested in adopting these design criteria, a finding must first be made that the soil permeability and precipitation patterns for the area are such that these criteria will provide adequate treatment.**

Design criteria for pollution reduction and flow control facilities in this chapter of City of Portland's stormwater Management Manual are included on this CD in a separate file titled **Portland Design Standards.pdf**. This file must be opened in Adobe Acrobat. Adobe Acrobat version 4.0 is available on this CD. The software can also be obtained free of charge from the Adobe web site at. http://www.adobe.com/.
)

From: City of Portland Stormwater Management Manual.

See http://www.enviro.ci.portland.or.us/swm2.htm for full document.

Chapter 4.0
SIMPLIFIED APPROACH FOR POLLUTION REDUCTION AND FLOW CONTROL FACILITIES

Summary of Chapter 4.0

This chapter provides a relatively simple approach for selecting and designing facilities that provide both pollution reduction and flow control. It identifies which types of development can use the simplified approach. Specific design criteria are provided for each facility.

4.1 INTRODUCTION

The simplified approach is a relatively simple process for selecting and designing pollution reduction and flow control facilities. This approach addresses small projects where a combination facility is more practical than separate pollution reduction and flow control facilities.

BES staff went through a technical process to determine facility designs and sizes that would be effective on such sites. The process included a review of technical literature, review of BES monitoring data, calculations, and theoretical analysis.

Facilities designed in accordance with the simplified approach are presumed to comply with the City's pollution reduction requirements and flow control policies.

A facility that is used as a mitigation measure (see Chapter 1.0, Section 1.4) may not also be used as a simplified approach.

4.2 APPLICABILITY

The simplified approach may be used if the proposed development meets the following criteria:

- Falls under Management Level 2 or 3
- Creates less than 15,000 square feet of non-mitigated impervious area
- Is a parking lot that exceeds 15,000 square feet, but has simplified measures designed to receive stormwater from no more than 15,000 square feet of impervious area

If the development does not meet the above criteria, the applicant is required to use either the presumptive or performance approach for pollution reduction (Chapter 5.0) and the performance approach for flow control (Chapter 6.0).

Because the simplified approach uses combination facilities, applicants who wish to design separate pollution reduction and flow control facilities shall use the approaches specified in Chapters 5.0 and 6.0.

Applicants who do not qualify for the simplified approach, but wish to use a simplified measure that is not included in Chapter 5.0 or 6.0, shall do so using the performance approach in those chapters. The applicant will be required to demonstrate that the facilities will control for the appropriate storm events and will treat to a 70 percent removal standard for total suspended solids (TSS).

4.2.1 Combined Sewer Areas

Because combined sewers overflow to the Willamette River in wet weather, it is important to minimize the quantity of stormwater flow entering the system. For that reason, development projects discharging to the combined sewer system (see Exhibit 1-1 in Chapter 1.0) are required to use **either** the mitigation measures identified in Chapter 1.0 (Section 1.4) **or** the simplified approaches identified in this chapter to the maximum extent practicable. Complete on-site disposal of stormwater will be required where feasible.

4.2.2 Total Maximum Daily Loads (TMDLs)

The simplified approach may be used if stormwater from the applicable project will discharge into a stream that has established total maximum daily loads (TMDLs). However, the applicant shall also demonstrate through the performance approach (*see Chapter 5.0*) that the development proposal is consistent with specific TMDL requirements. (*See Chapter 5.0, Section 5.4, for a discussion of TMDLs and water quality limited streams.)*

4.2.3 Discharging to Existing Systems

A development may discharge to an existing **publicly** owned and maintained pollution reduction facility (PRF) if all of the following criteria are met:

- The conveyance system and facility to which the development is connecting has capacity (*see definition of capacity in Chapter 1, Section 1.3*).

- To the maximum extent practicable, the development has used mitigation measures (*as described in Chapter 1.0, Section 1.4*) or simplified approaches (as described in this chapter) within the area of the project that will be private property.

A development may discharge to an existing off-site **privately** owned and maintained PRF if the following criteria are met:

- To the maximum extent practicable, the development has used mitigation measures (*as described in Chapter 1.0, Section 1.4*) or simplified approaches (as described in this chapter) within the area of the project that will be private property.

- The PRF has capacity (*see definition of capacity in Chapter 1.0, Section 1.3*).

- The development owner or applicant receives written approval from the owner of the PRF.

- There is no history of maintenance violations at the PRF to which the development will be discharging.

- The owner of the PRF retains all responsibility for operation and maintenance of the PRF (agreements between the parties for shared responsibility notwithstanding).

- The design criteria used for the facility are equivalent or better than those in the *Stormwater Management Manual* (in effect at the time of the request).

If the development meets these criteria and discharges to an existing PRF, no additional treatment or flow control is required.

4.3 STORMWATER DISPOSAL

The stormwater management requirements in this manual may not always sufficiently manage stormwater **volume** (as opposed to flow control). Additional disposal measures may be required through building and plumbing codes, and must be approved by the Office of Planning and Design Review (OPDR). Contact the Development Services Center at 503-823-7760 for more information.

Drywells and/or sumps will be treated as a piped storm sewer system. The Oregon Department of Environmental Quality (DEQ) has identified drywells and/or sumps as "Class V Injection Wells" under the federal Underground Injection Control (UIC) Program. Since the UIC Program states that these types of wells have a direct impact on groundwater, stormwater pollution controls (as identified in Chapter 9.0) will apply. More information about the UIC program can be found at DEQ's web site: http://waterquality.deq.state.or.us/wq/groundwa/uichome.htm

4.4 FACILITY SELECTION AND DESIGN

Form SIM: Simplified Approach for Stormwater Management Facilities shows how to select and size facilities. Applicants using the simplified approach shall submit Form SIM as part of their submittal package (*see Chapter 3.0*).

(Form SIM is located in a separate file on this CD, either in PDF or Excel format. See "simform.xls" or "simform.pdf")

Descriptions and design criteria for the various facilities are provided following Form SIM, showing the applicability and limitations of each facility. The design criteria were specifically developed for use with this simplified approach. The required facility surface areas in column 3 of Form SIM shall be used to size the facility, and the specified facility sizes cannot be altered. Minimum/maximum dimensions are provided in the design criteria drawings, and shall be made relative to the surface area requirement.

Facilities designed under the simplified approach shall also fulfill the requirements identified in Chapter 7.0 (Landscape, Aesthetics, Fencing, and Access) and Chapter 8.0 (Operations and Maintenance Requirements).

(For design standards graphics please see the separate file titled wq_appendix_portland design.pdf.)