EWEB Source Water Protection Project: Best Management Practices and Model Ordinance Review

Draft Report:

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Eugene Water and Electric Board

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Chapter 1
Introduction

The McKenzie River is the sole source of drinking water for more than 250,000 people. In 2001, the Eugene Water and Electric Board (EWEB) established a source water protection program to evaluate and mitigate water quality risks. The overall concept of source water protection is to have the ability to measure the balance between watershed health and human use over time and implement actions that maintain a healthy balance for production of exceptional water quality.

The Eugene Water and Electric Board (EWEB) wants to better understand the implications of development activity in the McKenzie River Basin on water quality. The McKenzie River is Eugene's sole source of drinking water. This project includes an analysis of the Lane County Development Code, how the code is interpreted and applied to development, and the implications for water quality and is part of EWEB's broader source water protection initiative. This report summarizes the results of a series of case studies on best management practices and model ordinances that focus on drinking water quality.

Background

In 2001, the Eugene Water and Electric Board (EWEB) prepared a drinking water source protection plan, which includes a risk assessment of all potential threats to Eugene's drinking water. To implement the plan, EWEB launched a program to protect the high water quality of the McKenzie River. The overall concept of source protection is to balance watershed health and human use over time and implement actions that maintain exceptional water quality.

EWEB initiated a research program to better understand other threats and vulnerabilities to the McKenzie. EWEB contracted with the University of Oregon's Community Planning Workshop (CPW) to conduct a review of the Lane County Code to evaluate which regulations have implications for source water protection.

The intent of this work is to help EWEB understand the long-term implications of land-use on water quality in the McKenzie Basin and to develop a set of programmatic recommendations on how to best manage those impacts. The project includes four key deliverables:

1. Analysis of historical development patterns. This product is presented in the form of a "risk atlas" which contains a series of maps showing the location of development in the context of key physical features of the McKenzie River.

2. Analysis of development applications. CPW conducted a series of case studies to document how Lane County interprets specific sections of the Lane County Development Code and if the code creates risks and vulnerabilities to water quality.

3. Best management practices and model ordinances. This product identifies approaches that other jurisdictions use to manage source water quality.

4. Action plan. This document summarizes CPW's research into a set of conclusions and potential actions.

Purpose and methods

The purpose of this report is to demonstrate the range of regulatory standards and non-regulatory programs that various jurisdictions employ to protect drinking water quality. In particular, the ordinances and incentive-based strategies reviewed here address development activities with water quality implications. The findings are meant to inform EWEB's water protection strategy for the McKenzie River.

CPW reviewed source water protection ordinances, general incentive strategies used to protect water quality, and ordinances and programs addressing the following development activities:

- Riparian vegetation removal
- Development within the floodplain
- Location and maintenance of septic systems
- Development on sensitive soils and steep slopes
- Creation of impervious surfaces/stormwater management

CPW identified these development activities as having critical impacts on water quality. To the extent possible, CPW identified ordinances and programs that include elements applicable to Lane County (specifically, the McKenzie River Basin), including ordinances and programs from jurisdictions that rely heavily on surface water for drinking water sources, jurisdictions with similar populations, and jurisdictions relying on similar planning controls.

Organization of this report

The remainder of this report is organized into two chapters and nine appendices. Chapter 2 is a review of general source water protection strategies and Chapter 3 is a discussion of water protection strategies related to development activities listed above. Appendix A is a matrix of development-related drinking water protection strategies. Appendices B through J summarize CPW's case studies of water quality protection strategies from other jurisdictions.

Chapter 2
Review of Source Water Protection Strategies

This chapter summarizes key findings from CPW's review of source water protection strategies addressing multiple types of development activities. In the chapter, CPW reviews both source water protection ordinances and incentive strategies limiting risky development. It includes the following model ordinances:

- Environmental Protection Agency (EPA) Reservoir Protection Overlay Zone
- Oregon Department of Environmental (DEQ) Quality Surface Water Drinking Water Protection Overlay Zone
- National Flood Insurance Program (NFIP) Community Rating System
- Metropolitan North Georgia Water District
- Highland Lakes Watershed Ordinance

The chapter also describes the following incentive strategies:

- Purchase of Development Rights
- Transfer of Development Rights
- Development Impact Fees

Source Water Protection Ordinances

Several agencies and jurisdictions have model source water protection ordinances to explicitly protect drinking water sources. The ordinances include multiple regulatory strategies to protect water quality. This section describes model source water protections ordinances, some of which are models and others have been implemented.

EPA Reservoir Protection Overlay Zone[1]

The EPA model ordinance designates a Reservoir Protection Overlay Zone. The zone prohibits hazardous materials, as well as hazardous activities including service stations and junkyards. The ordinance requires that land-use applications for areas within the zone include an impact study

[1] http://www.epa.gov/owow/nps/ordinance/mol7.htm

conducted by a registered professional engineer. The ordinance requires that application be reviewed to prevent runoff, erosion, and vegetation removal. Businesses must submit a spill control plan if they are using hazardous materials and have received a special-use permit. In addition, the ordinance recommends stream buffers of 200'. The buffer can be modified to an absolute minimum of 75' if the applicant can show that the reduced buffer will provide the same level of protection as the full buffer.

Oregon DEQ Surface Water Drinking Water Protection Overlay Zone[2]

This ordinance describes a Surface Water Drinking Water Protection Overlay Zone (DWP). The DWP prohibits the storage, use or production of hazardous materials and limits approval of non-conforming uses to activities that do not increase threats to water quality. Existing business and new developments within the zone are required to prepare and submit a Safe Drinking Water Plan (SDWP), which includes erosion and runoff controls. Developments with lesser impact (such as less impervious surface area) are exempted from the SDWP. In addition, owners of septic systems within the DWP are required to have their septic system inspected within one year of the ordinances effective date and every five years thereafter.

NFIP Community Rating System (CRS)[3]

Though not intended to protect water quality, the CRS includes a series of recommendations that limit development related impacts to water quality. The CRS is an incentive program that encourages community floodplain management activities that exceed the minimum National Flood Insurance Program (NFIP) requirements by providing discounted flood insurance rates. Among the regulations that CRS incentivizes are prohibitions to floodplain activities that may be hazardous to public health and prohibitions to fill in the floodplain; and low-density zoning. The prohibition on activities hazardous to public health is particularly important because it includes water quality measures in addition to property protection.

Metropolitan North Georgia Water District[4]

The ordinance requires that an undisturbed vegetative buffer is maintained on 50 feet of each bank and impervious cover prohibited for an additional 25 feet. Septic tanks are prohibited within the buffer or setback. Site plans are required before permits are issued for any development within the

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[2] http://www.deq.state.or.us/wq/pubs/factsheets/drinkingwater/ModelOrdinanceSurfaceWater.pdf

[3] http://training.fema.gov/EMIWeb/CRS/

[4] http://www.northgeorgiawater.com/files/mngwpd_floodplainmodord.pdf

buffer or setback. The ordinance allows for "grandfathered" variances, but requires that those development activities have mitigation plans. In addition, variances are prohibited except when the shape or topography of a parcel prevents implementation of the buffer or setback.

Highland Lakes Watershed Ordinance, Texas (HLWO)[5]

The HLWO requires permits for development or redevelopment that creates more than 10,000 sq. ft. of impervious surface, disturbs more than one acre of land or activities that dredge more than 500 cubic feet of soil. Developments causing lesser effects must either provide written notification of the project or have no additional development requirements. The ordinance requires a BMP Maintenance Permit be issued to the developer at the completion of construction. Multi-family developments over 20 acres and commercial developments over 3 acres must undertake pre-development planning before applying for a development permit. The HLWO provides permitting incentives for developments that limit impervious cover and manage stormwater. The ordinance requires riparian buffers that increase according to the size of the body of body of water, up to 300 ft. from the centerline for rivers draining more than 640 acres. Finally, the HLWO requires erosion and sedimentation controls.

General Incentive Strategies

CPW also identified several incentive strategies that could potentially be used as part of a source water protection strategy.

- Purchase of Development Rights (PDR): PDR programs pay landowners to protect critical lands through easements. Landowners can sell easements to government agencies, non-profit organizations, or private corporations. PDR programs can be funded through bonds, federal programs or tax revenues (see Washtenaw County, MI).[6]

- Transferable Development Rights (TDR): TDR programs sell development credits in exchange for permanent easements on critical lands. The resellable credits can be used to increase development intensity in other areas beyond the limits of local regulations. TDR programs create a market to push development to the areas where it can best accommodated (see Snohomish County, WA) .[7]

- Development Impact Fees (DIF): DIF programs add fees to development activities which are then used to create the infrastructure necessary for that development. As an example, DIF

[5] maps.lcra.org/getPDF.aspx?ID=96&MapPath=WatershedManagerRegions.pdf

[6] http://www.rff.org/rff/Documents/RFF-DP-04-20.pdf

[7] http://www.rff.org/rff/Documents/RFF-DP-04-20.pdf

revenue can be used to create community stormwater treatment systems to mitigate the effects of development (see City of Macon, GA).[8]

[8] http://www.rff.org/rff/Documents/RFF-DP-04-20.pdf

Chapter 3
Best Management Practices

This chapter summarizes key findings from CPW's review of best management practices (BMPs) addressing specific development activities. It includes ordinances and incentive-based strategies related to the following development activities:

- Riparian vegetation removal
- Development within the floodplain
- Location and maintenance of septic systems
- Development on sensitive soils and steep slopes
- Creation of impervious surfaces/stormwater management

For each type of development activity, CPW describes its impact on water quality, how it is addressed in Lane Code, and BMPs that other jurisdictions employ to regulate the development activity.

Riparian Modifications

Riparian habitat is important in minimizing erosion, capturing surface runoff, and reducing stream water temperatures. Currently, Lane County regulations state that the riparian setback will be 50 feet along streams, except in F1 – Non-Impacted Forest Lands, F2 – Impacted Forest Lands and EFU - Exclusive Farm Use zones where the setback will be 100 feet (LC 16.253). In addition, Lane Code limits removal of existing vegetation from within the riparian setback area of any legal lot to the shoreline linear frontage and square footage limitations outlined in Table 1.

Table 1. Removal of Vegetation Within the Riparian Setback Area, LC 16.253(2)

Legal Lot Frontage	Allowable Shoreline Removal	Allowable removal within riparian setback area	
		Nonresource Zone	Resource Zone
<200 ft	50 linear ft	2,500 sq ft	5,000 sq ft
200 - 400 ft	no more than 25% linear ft	25% of the total sq footage within setback area	
>400 ft	100 linear ft	5,000 sq ft	10,000 sq ft

-Applies to all Class I streams

Vegetation removal within the riparian setback area is permitted under certain conditions including the removal of dead or diseased trees that are hazardous, in the process of structural shoreline stabilization, and for riparian enhancement projects.

Modification[9] to the applicable riparian setback standard for a structure may be allowed provided the Oregon Department of Fish and Wildlife is consulted by the Planning Director at least 10 working days prior to the initial permit decision. The Planning Director may grant a modification to allow a structure in the riparian setback area if the vegetation alteration or removal caused by the structure does not exceed the regulations in Table 1; if the riparian vegetation does not actually extend all the way to the riparian setback at the location of the structure; or if the landowner can demonstrate that an unduly restrictive burden would be placed on the property owner if the structure was not allowed to be located within the riparian setback area (LC 16.253(3)).

CPW identified the following water protection strategies in ordinances restricting development in riparian areas:

- Prohibit the division of a parcel that would wholly or partially within the Stream Protection Overlay Zone and would result in an unbuildable parcel due to setback requirements unless it is included in a conservation easement that prohibits development on the site (see Hood River County, OR).

- Include a buffer strip of a specific width (ranging between 50 to 200 feet in the model ordinances reviewed), maintained in its natural state to the maximum extent possible and planted with an erosion resistant vegetative cover in those areas that have been disturbed (see the EPA's Model Surface Water Ordinance).

- Prohibit dangerous land uses within 500 feet of the buffer strip as part of a Watershed Management and Protection Area Overlay Zone. Prohibited land uses include: septic tanks and drainfields; trash containers and dumpsters located so that leachate can escape unfiltered and untreated; and fuel storage in excess of 50 gallons. (see County of York, VA).

- Incorporate the extent of a wetland plus an additional 20 feet extending out from the edge of the wetland (see Michigan's Model Riparian Buffer Implementation Plan).

- Expansion of riparian/vegetative buffers on parcels with steep slopes. The increased buffers range from an additional 10 feet on 15% - 17% slopes to an additional 70 feet on slopes greater than 25%, or can include the entire distance of sloped area up to 300 feet on parcels with slopes over 15% (see Michigan's Model Riparian Buffer Implementation Plan and New Jersey Department of

[9] A modification differs from a variance because a modification limits the reduction of the standards in a particular section of code to prescribed amounts. A variance allows reduction beyond the minimum allowed by the code. For example, a riparian modification allows the riparian setback to be modified to a minimum of 25 feet. Reducing the riparian setback to a greater degree requires a variance.

Environment Protection's Riparian Zone Model ordinance, respectively).

- Locate land uses that pose a particular threat to water quality 150 to 300 feet away from stream corridors. Land uses regulated include septic drainfields, hazardous substances storage, and petroleum tanks (see Michigan's Model Riparian Buffer Implementation Plan).
- Extend the riparian zone to cover the entire floodway in areas where the floodway has been delineated per the Flood hazard Area Control Act or the State's adopted floodway delineations (see New Jersey Department of Environmental Protection's Riparian Zone Model Ordinance).
- Provide tax credits to landowners who restore and enhance existing riparian zones. The program CPW reviewed provided tax credits from $100 to $5,000 to participating landowners. Restoration and enhancement activities have to meet state standards (see Arkansas Soil and Water Conservation Commission).

Development in the Floodplain

Developments such as dwellings, septic tanks, and drainage fields that occur within a floodplain may impact water quality by leaking hazardous materials and sewage into the waterway. During a flood event entire structures and waste systems may be damaged or washed into the waterway, impacting water quality and potentially causing further property damage. Additionally, revetments and other bank stabilizing structures can cause increased velocity, turbidity, and water levels, especially during a flood event, which increase risk to human life, property, and water quality.

The Lane County flood ordinances are generally structured to protect property and not water quality. Lane Code includes a Floodplain Combining Zone, which requires development within a floodplain or flood hazard area[10] to use designs and materials to minimize flood damage (LC 16.244(8)). The code includes specific regulations for development within a floodway and the process for acquiring a variance. The Planning Director must approve all proposed developments within a flood hazard area. Floodway development is prohibited unless a registered professional engineer certifies that the development will not increase flood levels during a base flood (16.244(8)(c)(i)). Where the floodway has not been delineated, development can be approved with verification from a professional engineer that development will not combine with existing and anticipated development to increase water surface elevation during a base flood by more than one foot at any point (LC 16.244(8)(c)(ii)).

[10] The Federal Insurance Administration (FIA) determined flood hazard areas for unincorporated Lane County.

CPW identified the following water protection strategies in ordinances restricting development in the floodplain:

- Designate more land as flood hazard areas. Kitsap County includes "frequently flooded areas" and "critical drainage areas" within the scope of the County's Critical Areas Ordinance (see Kitsap County, WA).
- Integrate water quality, natural floodplain functions, and ecosystem services when designing floodplain regulations. Title III of the Portland Metro Functional Plan limits development in a flood hazard area to prevent the need for new flood conveyance systems. In addition, Title III establishes water quality performance standards and Water Quality Resource Areas that include water features and associated vegetation corridors (see Portland, OR).
- Prohibit construction of new septic systems in the regulatory floodplain as part of public heath protection standards (see Kane County, IL).
- Prohibit construction of new conventional septic systems in the regulatory floodplain. Require aerobic septic systems, which pose a lesser threat to water quality, for new developments in the floodplain (see Montgomery County, TX).

Septic Systems

Septic sytems impact water quality by releasing wastewater and sewage into water sources during flood events or system failures. Within the study area, there are approximately 4,000 households and 8 larger commercial developments which rely on septic systems for wastewater and sewage disposal. According to the EPA, approximately 10% to 25% of septic systems fail within their lifetime, often releasing untreated wastewater and sewage into water sources (U.S. EPA, 2003; Schueler and Holland, 2000).

Oregon Department of Environmental Quality (DEQ) regulations govern septic systems in Lane County. These regulations include the Three Basin Rule (OAR 340-041-0350) and On-Site Sewage Disposal rules (OAR 340-071 and OAR 340-073).

The Three Basin Rule was established to preserve or improve existing high quality water in the Clackamas, McKenzie, and Santiam rivers for municipal drinking water use. The rule prohibits new or increased waste discharges in these watersheds, excepting domestic sewage facilities that discharge less than 5,000 gallons per day.

The On-Site Sewage Disposal rules detail standards and materials for septic construction and repair, and include a list of conditions necessary for permitting septic systems on certain slopes and soil types. The rules increase septic system depth requirements on slopes above 12% and

include special steep slope regulations for slopes above 30%. Septic system siting is regulated based on soil type, with less porous soils requiring deeper and larger drainfields than more porous soils. Other rules dictate minimum separation distances between septic systems and wells, public surface waters, property lines, and other elements (see Appendix J). The rules also regulate drainage field placements and require a "Time of Transfer" evaluation of waste disposal systems for properties with alternative treatment technologies. In addition, the rules establish more stringent rules for particular locations. Within Lane County, septic systems in the DEQ designated River Road/Santa Clara Protection Area and the North Florence Dunal Aquifer Protection Area must meet restrictions on the daily sewage loading rates of nitrogen-nitrates.

Lane County Land Management Division (LMD) acts as DEQ's agent for the regulation of on-site disposal systems that do not require a WPCF permit. DEQ retains authority over larger sewage disposal systems that require a Water Pollution Control Facility (WPCF) permit.

Lane County Code regulates periodic pumping of septic tanks, but does not address other issues with septic systems. Model codes and other jurisdictions offer more stringent regulation of septic systems. CPW identified the following water protection strategies in ordinances restricting siting, construction and maintenance of septic systems:

- Implement rotating septic inspections so that all septic systems are evaluated every five years in specific water protection areas or across the county. A less intensive alternative is to require septic inspections only as part of a real estate transaction (see Charlotte County, FL, Santa Rosa County, FL, or Escambia County, FL, respectively).
- Use regular dye tests to ensure that septic systems are functioning properly (see Onondaga County Water Authority, Syracuse, NY).
- Prohibit sub-surface sewage disposal systems within 300 feet of springs (see Wallowa, OR).
- Prohibit privies (outhouses) within designated water protection areas (see Wallowa, OR).
- Amend code language to allow innovative waste-disposal technologies; including composting toilets (see State of Massachusetts).
- Provide low-interest loans to landowners with non-compliant septic systems to facilitate an upgrade (Sibley County, MN).

Creation of Impervious Surfaces/Stormwater Management

Impervious surfaces impact water quality by contributing to stormwater runoff, which increases erosion and non-point source pollution. Currently, Lane County only regulates impervious surfaces in the riparian setback area (LC16.253(6)(b)) and in the Clear Lake Watershed Protection Zone (LC 16.258(8)(b)(i)). Lane County prohibits impervious surfaces in the riparian setback area unless they are roads, part of water-related uses, or replacements for existing structures that do not create new disturbances. Development is only exempted from these if it will have a positive effect on the riparian habitat. In Clear Lake, Lane County restricts impervious surfaces that create offsite stormwater discharge.

In contrast to Lane County, other jurisdictions have implemented ordinances with broader regulation of impervious surfaces. CPW identified the following water protection strategies in ordinances restricting impervious surfaces:

- Limit impervious surfaces to a fraction of a parcel's land area. The ordinances restrict impervious cover to as little as 8% of a parcel's area (see Montgomery County, MD).
- Calculate and limit impervious surface area based on a parcel's buildable area rather than the gross parcel area (see Austin, TX).
- Implement stormwater management fees based on parcel size and impervious cover (see Jefferson County, WA).
- Create stormwater management plans for developments with significant amounts of impervious surfaces. The stormwater management plans require a significant reduction of stormwater compared to the same development without a plan (see Dane County, WI).

Development on Steep Slopes and Sensitive Soils

Sensitive soils and steep slopes exacerbate development impacts on water quality. Soils affect how pollutants travel from their source to a body of water. Slopes impact the rate of erosion associated with development activities.

Lane County does not regulate development based on slopes, except on lands zoned F1 – Non-Impacted Forest Lands to prevent wildfires. Lane County regulates development by soil type to reserve acreage for agricultural and forestry land-uses rather than to protect water quality.

Other jurisdictions regulate development based on slopes and soil type in order to protect water quality. CPW identified the following water

protection strategies in ordinances restricting development on steep slopes and sensitive soils:

- Prohibit construction on slopes greater than 20% - 25% (see State of New Jersey).
- Limit construction on slopes between 15% - 20% (see Washington Morris County, NJ).
- Regulate development based on soil permeability in areas draining into water sources (See Whatcom County, WA).
- Require erosion management plans in areas with steep slopes (see Antrim County, MI).

Appendix A: Summary of Model Ordinances

Location	Program/Ordinance Name	Description	Who Implements?	Links/Sources
Antrim County, MI	Soil Erosion, Sedimentation, and Stormwater Runoff Control Ordinance	The permitting process may require applicant to develop a erosion control management plan, including maps of purposed earth moves; Ensures incorporation of plans into permitting process, runoff control systems may be required both on and off-site. All earth movement within 500 feet of water edge or greater than 1 acre must apply for permit. Larger scale projects may install off-site storm-water control facilities, provided property rights are available and agreement in recognized by officer.	Antrim county, Soil Erosion Control Officer, under authority granted by Natural Resources Env. Protection Act, Michigan Drain Code	http://www.antrimcounty.org/downloads/final_antrim_county_soil_erosion_ordinance_1.pdf
Arkansas Soil and Water Conservation Commission	N/A	The Arkansas Soil and Water Conservation Commission includes a tax incentive program, where landowners who restore or enhance riparian areas are provided with a tax incentive of $100 - $5,000 per year up to a maximum of $50,000 over nine years. The restoration or enhancement activities must meet state standards; must be followed through to completion and maintained according to state standards; and must meet any relevant riparian regulations.	Arkansas Soil and Water Conservation Commission	http://www.mawpt.org/pdfs/WZRTC_Fact_Sheet.pdf
Austin, TX	Comprehensive Watershed Ordinance	As part of the Comprehensive Watershed Ordinance (CWO), Austin limited impervious surfaces based on proximity to drinking water sources. Development closer to water sources is limited to less impervious surfaces (less than 20%) than development in less sensitive areas (e.g., further from water source). In addition, the CWO calculated impervious surface based on net (buildable) parcel area rather than gross (total) parcel area.	City of Austin	Handbook on Urban Runoff Pollution Prevention and Control Planning.
Austin, TX	N/A	The City of Austin has implemented multiple ordinances to protect drinking water. The ordinances impose limits on impervious cover; create water quality buffer zones; institute erosion controls; protect critical environmental features; restrict wastewater disposal; and develop sedimentation and filtration basins.	N/A	http://www.ci.austin.tx.us/watershed/

Location	Program/Ordinance Name	Description	Who Implements?	Links/Sources
Bellingham, WA	N/A	Bellingham passed ordinances imposing a construction moratorium near Lake Whatcom for four months. The moratorium was recently renewed for another four months. In addition, the city instituted a land purchase program to acquire land along the watershed.	N/A	http://www.cob.org/services/environment/water-quality/lake-whatcom.aspx
Charles County, MD	Variable-width Zoning District	The county uses a variable-width zoning district to protect riparian buffers. The minimum width is based on the 100-year floodplain, the width is extended to include nontidal wetlands, when a 100-year floodplain is not present the width is 50 or 100 feet depending on stream order, for slopes greater than 15% the width is doubled or extended to the top of the slope (whichever is less). In addition, the county's Planning Commission has the authority to extend the buffer to include other important features. The complexity of the program makes it more difficult to implement than a fixed-width buffer because the buffer is a dedicated zoning district; changes to buffer width are considered changes to the zoning map and may only occur twice a year.	Charles County Planning Commission	http://www.rivercenter.uga.edu/publications/pdf/riparian_buffer_guidebook.pdf
Cheasapeake Bay, MD	N/A	The most interesting and applicable aspect of this case study is the use of Incentive-Based Land Use Policies to shift development away from the bay and into higher density development in other areas. The program also focuses on urban contaminants.	N/A	http://www.rff.org/rff/Documents/RFF-DP-04-20.pdf
City of Alpharetta, GA	N/A	An impervious surface setback that must average 150 feet in width and cannot be less than 75 feet in width; septic tank drainfields are prohibited in this zone. Difficulties: Georgia's Environmental Protection Division (EPD) retains sole authority to issue variances for the riparian buffer requirements of erosion and sedimentation ordinances. So, while Alpharetta rarely issues variances EPD routinely issues such exceptions.	Georgia Environmental Protection Division and Alpharetta, Georgia	http://www.rivercenter.uga.edu/publications/pdf/riparian_buffer_guidebook.pdf

Location	Program/Ordinance Name	Description	Who Implements?	Links/Sources
City of Macon, GA	Development Impact Fees	The City of Macon charges impact fees on new developments to pay for the provision of water, sewer and stormwater infrastructure that will be needed to serve the new developments. The impact fees internalize the true costs of development into the development process.	City of Macon	http://www.dca.state.ga.us/toolkit/ProcessExamplesSearch.asp?GetExample=368
Clackamas County, OR	Water Quality Resource Area District (WQRAD)	A minimum of 75% of the setback area (distance) shall be preserved with native vegetation. The width of protected vegetated areas is to be measured horizontally from the water resource and be based off of at least 3 slope measurements.	Clackamas County, Oregon	http://www.clackamas.us/code.htm
Clackamas County, OR	Surface Water Management Plan	The Surface Water Management Plan was implemented in 1993 and focuses on storm water management and stream protection and restoration efforts. The program is paid for by county residents and developers who benefit from water quality protection.	N/A	http://www.co.clackamas.or.us/wes/swm.htm
County of York, VA	Watershed Management and Protection Area Overlay District	A 200 foot wide buffer strip shall be maintained along the edge of any tributary stream or reservoir. Such buffer strip shall be maintained in its natural state or shall be planted with an erosion resistant vegetative cover. Some uses shall not be permitted within the buffer strip required above or within 500 feet of the required buffer strip: septic tanks and drain fields, livestock impoundments, trash containers and dumpsters located so that leachate can escape unfiltered and untreated, fuel storage tanks in excess of 50 gallons, sanitary landfills, and certain manufacturing activities	County of York, Virginia	http://www.epa.gov/owow/nps/ordinance/documents/york_va.pdf
Crystal Creek, IL	N/A	Code requires that leak-tight designs shall be used in sanitary sewer construction to minimize stormwater and groundwater infiltration and contamination, and that; Septic tank disposal systems shall be prohibited in the out-wash soils area, with the exception of existing fanning activities.	City of Crystal Lake, IL	http:/www.epa.gov/safewater/sourcewater/pubs/techguide_ord_il_crystallake_watersheds.pdf

Location	Program/Ordinance Name	Description	Who Implements?	Links/Sources
Dane County, WI	Erosion Control and Stormwater Management Ordinance	The ordinance requires stormwater management plans for any development that creates over 20,000 square feet of impervious surfaces. The ordinance also requires that all drainage areas are directed to pervious surfaces where possible. In addition the ordinance requires 80% reduction of sediment in runoff for new construction, a 40% reduction of sediment in runoff for redevelopment, the predevelopment peak rate of runoff for 2 and 10 year storm events must be maintained, and a stable runoff outlet must be constructed.	Dane County	www.co.dane.wi.us/press/details.aspx?id=146, http://cfpub.epa.gov/npdes/stormwater/casestudies_specific.cfm?case_id=9
Deschutes County, OR	Deschutes County Comprehensive Code	The comprehensive plan points to future directions for protecting drinking water. It describes the use of market driven, transferable development credits such that property owners are not allowed to build dwellings in the water protection area. They are provided with alternative sites in a nearby neighborhood to build houses that are served by a municipal sewage system. Deschutes requires a lot size of 1.5 acres for a new dwelling to accommodate septic systems.	Deschutes County	http://www.co.deschutes.or.us/dccode/title23/pdf%20files/chapter%2023.44.pdf
Federal Emergency Management Agency	Model criteria for floodplain management ordinances	Counties should require permits for all proposed construction or other development within the floodplain to determine whether proposed development is within flood-prone areas. Review all permit applications to ensure building sites will be reasonably safe from flooding. Proposed building sites within a flood-prone area should be constructed to minimize flood damages. Prohibit development in the floodway unless it is demonstrated that proposed development will not increase the water surface elevation of the base flood more than one foot at any point within the community.	Local jurisdiction, in this case the County	http://edocket.access.gpo.gov/cfr_2002/octqtr/44cfr60.3.htm, http://www.fema.gov/plan/prevent/floodplain/nfipkeywords/permit.shtm

Location	Program/Ordinance Name	Description	Who Implements?	Links/Sources
Grants Pass, OR	N/A	The City of Grants Pass has codes focusing on erosion control and slope hazards through storm drain inlet protection, construction regulations, undisturbed stream buffer zones, slope stabilization, and vegetation plants and retention.	City of Grants Pass	http://www.grantspassoregon.gov/Index.aspx?page=557
Hood River County, OR	Stream Protection Overlay Zone	Creation of a parcel that would be wholly or partially within the Stream Protection Overlay Zone and would result in an unbuildable parcel due to the stream protection overlay zone setback requirements is prohibited unless it is included in a conservation easement that prohibits development on the site (Section 42.40F-G).	Hood River County	http://co.hood-river.or.us/vertical/Sites
Jefferson County, WA	N/A	Jefferson County created a stormwater fee assessment system for the Port Ludlow drainage district. The fee structure is based both on a parcel's acreage and amount of impervious surface. 30% of the fee is based on the parcel's relative acreage compared to the total acreage in the drainage district and 70% of the fee is based on the amount of impervious surface.	Jefferson County	www.co.jefferson.wa.us/publicworks/pdf/Ordinance.pdf
Kane County, IL	N/A	Kane County Code prohibits the placement of new septic systems within the regulatory floodplain.	Kane County	Kane County Code Section 406 (b) http://www.sterlingcodifiers.com/IL/Kane%20County/index.htm
Kent County, MI	N/A	Septics must be inspected and approved before property sale. The ordinance authorizes that the Public Health Officer shall have jurisdiction to administer and enforce the provisions of this regulation.	Kent County Health Department, Health Officer and Environmental Health Section	http://www.gvsu.edu/cms3/assets/6BDDB6FE-EF92-1DFF-13B97ABEB2F2651C/septage/maintenance_ordinance.pdf

Location	Program/Ordinance Name	Description	Who Implements?	Links/Sources
Kitsap County, WA	N/A	Development permits are required before construction or development begins within a special flood hazard area, which is the 100-year floodplain in Kitsap County. The following criteria must be met for a permit: elevation in relation to mean sea level, of the lowest floor (including basement) of all structures; elevation in relation to mean sea level to which any structure has been floodproofed; certification by a registered professional engineer or architect that the floodproofing methods for any nonresidential structure meet the floodproofing criteria; and description of the extent to which any watercourse will be altered or relocated as a result of proposed development. Development in a floodway is prohibited unless certified by an engineer who determines no impact to flood levels during base flood discharge. Chapter 19.50 includes frequently flooded areas in the scope of the Critical Areas Ordinance and makes critical drainage areas subject to special flood hazard regulations as well.	Kitsap County Department of Community Development	http://www.codepublishing.com/wa/kitsapcounty/
Kitsap County, OR	Kitsap County Surface and Stormwater Management Program	Kitsap County's *Surface and Stormwater Management Program* represents the collaboration between the Kitsap County Health District, Public Works, Community Development, and Kitsap Conservation District to address the common need for funding to implement programs to support water quality, watershed health, and public safety. The program combines regulation and enforcement strategies with public education, voluntary, and incentive based strategies. Specifically, the program addresses unincorporated areas of Kitsap County and mandates a surface and stormwater management fee, which is assessed based on land use and the amount of impervious surface on each property. The program does not charge residents of incorporated cities.	Kitsap County	http://www.kitsapgov.com/sswm/

Location	Program/Ordinance Name	Description	Who Implements?	Links/Sources
Lacey, WA	Low Impact Development Ordinance	Lacey created a Low Impact Development Ordinance to encourage stormwater mitigation. The ordinance makes low impact development a legal alternative to conventional development. The ordinance created a 60/0 definition of low impact development - 60% of a lot's forested land must remain intact and 0% of the parcel can have impervious surfaces that impact water quality. This can be achieved by disconnecting impervious surfaces from drainage infrastructure by creating an on-site stormwater treatment system. The ordinance requires monitoring and evaluation activities.	No implementation as the ordinance only makes low impact development legal, but does not require it.	http://www.nrdc.org/water/pollution/storm/chap12.asp
Marion County, OR	Marion County Water Management Plan	Marion County Water Management Plan includes measures to protect and regulate development in riparian zones. The plan stipulates that "the county will adopt comprehensive plan and ordinance amendments implementing the rule requirements," addressing statewide Goal 5 to protect riparian vegetation. While the county doesn't have direct authority over water-use, its land use planning and zoning functions enable it to influence water resources by limiting or prohibiting land uses that would degrade water quantity or quality.	Marion County, OR	http://www.co.marion.or.us/PW/Planning/zoning/comprehensiveplan/environmental.ht

Location	Program/Ordinance Name	Description	Who Implements?	Links/Sources
Montgomery County, MD	Upper Paint Branch Special Protection Area Overlay Zone	The ordinance limits impervious surfaces to 8% of the parcel area (this was reduced from 10% in 2007 due to water quality concerns). The ordinance applies to all development after the passage of the ordinance, unless it is part of a subdivision with more than 20 structures in which case it applies to existing development. The ordinance can only be superseded by a waiver from the Director of Permitting Services. The ordinance does not apply to additions or accessory units on existing single-family homes. The Director can only grant a waiver if the ordinance causes undue hardship.;	Department of Permitting Services	www.montgomerycountymd.gov/content/council/pdf/Ordinance/20071002_16-09.pdf
Montgomery County, TX	N/A	Montgomery County Code prohibits conventional septic systems in the regulatory floodplain. The ordinance allows aerobic septic systems in the floodplain, which pose a lesser threat to water quality. In addition, aerobic septic systems must be maintained regularly, decreasing the likelihood of failaure.	Montgomery County Permitting Department	http://www.co.montgomery.tx.us/ehealth/PermitRejectionLetter.pdf
Onandaga, NY	N/A	Regular dye tests help ensure that all the septic systems near its source water are in good working order.	N/A	http://www.ongov.net/WEP/index.html
Pomperaug River Watershed Coalition (PRWC), CT	N/A	This living management plan is the first of its kind in New England and has been designated by the Connecticut Water Planning Council as a model for Connecticut's water resource user community. Part of this plan involved conducting an impervious surface build-out analysis for each of the towns in region. Maps displayed current and future levels of impervious coverage.	N/A	http://www.pomperaug.org/wmp/inventory.htm

Location	Program/Ordinance Name	Description	Who Implements?	Links/Sources
Portland, ME	N/A	To avoid traditional regulation and involve more lakeside residents in watershed protection efforts, the Portland Water District instituted three innovative programs. Plant Grant Program provides $200 matching grants to Sebago Lake-shore property owners who buy plants and establish buffers to control existing erosion. Master Gardener Program teaches the owner environmental gardening techniques. Camp Grant Program incorporates education and erosion remediation at lakeside sites.	Portland Water District	http://www.maine.gov/dhhs/eng/water/Templates/newDWPServices/SourceProtection/PL353/Final%20Report/ReportResolveCh140.pdf
Portland Metro Regional Government, OR	Metro Functional Plan, Title III	Integrative regulatory approach requiring development proposals to obtain a permit and align with the intent of the functional plan. Development must demonstrate that no impact on water quality, fish and wildlife habitat, or floodplain functioning (stream flow storage and conveyance during flood events) will result. The plan outlines restrictions for development within Water Quality Resource Areas and Fish and Wildlife Habitat Conservation areas as well.	Planning departments at the city or county level	http://www.oregonmetro.gov/index.cfm/go/by.web/id=274
Roseburg, OR	N/A	Land Use and Development Ordinances used to implement riparian setbacks, determine if dedications must be made to the public storm drain easements, and ensure structures containing a plumbing fixture use the City's water supply system (this cuts down on individual wells).	N/A	http://www.ci.roseburg.or.us/commDevelop/planning/LUDO.php

Location	Program/Ordinance Name	Description	Who Implements?	Links/Sources
Salt Lake City, UT	Salt Lake City Watershed Master Plan	The Department of Public Utilities is updating its 1988 watershed master plan to reflect increasing recreational use and development of the watershed, which pose challenges to the watershed's protection. Legal challenges caused by fact that private landowners in the watershed do not automatically own the rights to water on their sites. There is limited inappropriate water available in the watershed, and there are growing development pressures. The utility also has hired an environmental consulting firm to examine the issues and help prepare a new master plan.	N/A	http://www.ci.slc.ut.us/Utilities/PDF%20Files/slcwatershedmgtplan.pdf
Sawyer County, WI	No, part of shoreland zoning (lands within 1,000 feet of lakes, ponds and flowages and 300 feet of rivers)	Shoreland zoning limits impervious surfaces to 15% of the parcel area in parcels within 300 feet of the Ordinary High Water Mark (OHWM). The amount of impervious surface can be increased to 25% by a special-use permit. Parcels within the Shoreland zone but beyond 300 feet from the OHWM can have up to 30% impervious surfaces.	Sawyer County	www.cfla.us/ShorelandZoning.pdf,
Seattle, WA	Cedar River Watershed Habitat Conservation Plan	The City of Seattle is working towards establishing an ecological reserve on 64% of the land within the Cedar River Watershed. Develop a program to manage the commercial harvest of timber on lands not part of the ecological reserve. Create facilities and promote health of sensitive aquatic species.	N/A	http://www.seattle.gov/util/About_SPU/Water_System/Habitat_Conservation_Plan--HCP/COS_001620.asp

Location	Program/Ordinance Name	Description	Who Implements?	Links/Sources
Sibley County, MN	High Island Creek Watershed Implementation Project	Sibley County provides low-interest loans (3%) over 10 years for landowners with non-compliant septic systems. The land-owners are to use the loan to bring their septic system up to code through replacement	N/A	http://www.co.sibley.mn.us/file.aspx?Id=1095a8ab-87da-4993-bad9-a0e6463fc200
Snohomish County, WA	Stillaguamish Valley Transfer of Development Rights	The Stillabuamish Valley TDR program is a collaboration between Snohomish County, the City of Arlington, and landowners. The program is designed to preserve farmland. The landowners can sell development rights to their land to developers who want to create higher than allowed density in urban areas. This creates an economic incentive to maintain farmland.	Snohomish County/Arlington, WA	http://www.ci.arlington.wa.us/index.aspx?NID=305
St. Joseph County, IN	Source Water Protection Ordinance Standards and Requirements for Property Transfers	Ordinances require the inspection and monitoring of septics with property transfers, with the concurrent testing of well water if a septic is within 50 feet.	St. Joseph County Source Water Protection Ordinance	http://www.stjosephcountyindiana.com/departments/sjchd/PDFs/Source_Water_Property_Transfer_S&R.pdf
State of Massachusetts	No	Since 1993, Massachusetts has managed water quality through a Clean Water Strategy. The Strategy emphasizes watersheds as the fundamental hydrologic unit around which programs should be integrated. Individual solutions are pursued for each of the state's 27 watersheds. Septic codes requirements include checking siting areas for vulnerabilities such as proximity to water and soil types. Code includes general language permitting the use of composting toilets.	Massachusetts DEP	http://www.mass.gov/dep/about/organization/aboutbrp.htm#aboutt5

Location	Program/Ordinance Name	Description	Who Implements?	Links/Sources
State of Michigan	Model Riparian Buffer Implementation Plan	A buffer of 50 ft in total width is recommended for both sides of the stream. The buffer is divided into two zones, a Streamside and an Outer one; different activities are permitted in each zone. Several exceptions are made to buffer width. The extent of a wetland is incorporated plus an additional 20 feet extending out from the edge of the wetland. Steep slopes have expanded riparian buffers from an additional 10 feet on 15-17% slopes to an additional 70 feet on >25% slopes. Land uses that pose a particular threat to water quality are sited 150 to 300 feet away from stream corridors; these uses include septic drainfields, storage of hazardous substances, and petroleum storage tanks.	Model Ordinance recommended by EPA and the Michigan Dept. of Environmental Quality	www.superiorwatersheds.org/file.php?file=riparianbufferreportnew.pdf
State of New Jersey	Department of Environmental Protection Riparian Zone Model Ordinance	Where slopes are greater than 15%, the riparian zone shall be extended to include the entire distance of this sloped area to a maximum of 300 feet. For areas adjacent to surface water bodies for which the floodway has been delineated per the Flood Hazard Area Control Act or the State's adopted floodway delineations, the riparian zone shall cover the entire floodway area. Requests for alterations to the adopted delineations are considered on site specific information. Discontinued nonconforming uses may be resumed any time within one year from discontinuance but not thereafter when showing clear indications of abandonment.	New Jersey Department of Environmental Protection	http://nj.gov/dep/watershedmgt/DOCS/WQMP/riparian_model_ordinance.pdf
State of New Jersey	No	In areas of steep slopes, any disturbance is prohibited unless the action takes place on impervious surfaces or is in protection of human health and safety. Steep surfaces are defined as more than 20% as measured over any given 10 foot segment. This model ordinance would be put into place within a given municipality.	Municipality	http://www.state.nj.us/dep/watershedmgt/DOCS/WQMP/steep_slope_model_ordinance062408.pdf

Location	Program/Ordinance Name	Description	Who Implements?	Links/Sources
Town of Skaneateles, New York	Lake Watershed Overlay District	All sewage disposal systems will be monitored, inspected and maintained regularly to ensure proper functioning and protection of water quality. Where 2 or more dwelling units share a common sewage disposal system, a perpetual maintenance contract enforceable by the town may be required. The acceptable area for building a single-family residence shall be larger than 30,000 square feet and shall contain at least 90% buildable land.	Town of Skaneateles, New York	http://www.epa.gov/owow/nps/ordinance/documents/skaneateles_ny.pdf
U.S. Environmental Protection Agency (EPA)	Model Surface Water Ordinance	A buffer strip of a certain width shall be maintained along the edge of all public water supply reservoirs and any tributary stream discharging into these reservoirs. The buffer strip shall be maintained in its natural state to the maximum extent possible, and shall be planted with an erosion resistant vegetative cover in those areas that have been disturbed. Certain uses shall not be permitted within the buffer strip or within x-feet of the required buffer strip: septic tanks and drainfields, livestock impoundments, trash containers and dumpsters located so that leachate can escape unfiltered and untreated, fuel storage in excess of 50 gallons, and certain manufacturing activities.	Model Ordinance recommended by EPA	http://www.epa.gov/owow/nps/ordinance/mol7.htm
Vermont Rural Water Association	N/A	VRWA is a nonprofit trade association of water and wastewater systems throughout the state. The association works one-on-one with systems to assist with financial, managerial, or technical problems. The group has been so successful at obtaining federal and state funding that they offer onsite assistance and consultations at minimal or no cost (annual operating budget= $1.5 million).	N/A	http://www.vtruralwater.org/

Location	Program/Ordinance Name	Description	Who Implements?	Links/Sources
Wallowa, OR	Water Protection Area Overlay	Wallowa County Code Section 24.060 states that: No septic tank or other on-site subsurface sewage disposal system shall be installed within three hundred feet of the city's springs. Privies shall not be permitted within the WPA, except for portable privies used on a temporary basis in conjunction with construction activity.	Wallowa County, OR	http://www.epa.gov/safewater/sourcewater/pubs/techguide_ord_or_wallowa_wpa.pdf
Washington County, OR	N/A	Washington County currently has an extensive Community Development Code. Relevant sections include development standards for flood plain and drainage hazard area development, significant natural resources, and alterations to each of the aforementioned.	Washington County, OR	http://washtech.co.washington.or.us/LDS/?id=7
Washington, Morris County, New Jersey	N/A	All tracts are assessed for improvable lot area, as calculated by the gross tract area minus a number of resource conservation areas. Each area is totaled and removed from the gross improvable lot area based on a specified ratio. Erodable slopes are one such resource conservation area of concern. In terms of slope, no development can be built on slopes greater than 20%, but 25% of total improvable lands are preserved for slopes between 15% and 20% (a 0.75 resource conservation ratio). Building on all areas of slope less than 15% is permitted.	Township of Washington	http://www.washtwpmorris.org/PDF/ordinances/2005/0536ro.pdf
Washtenaw County, MI	Purchase of Development Rights	The Purchase of Development Rights (PDR) program allows Washtenaw County to purchase development rights from land owners who own important agricultural lands. The PDR allows landowners to retain the rights to certain activities, but prevents future development of the land. One of the reasons Washtenaw County does the PDR program is to protect water quality.	N/A	http://www.ewashtenaw.org/government/departments/planning_environment/farmland/background_html

Location	Program/Ordinance Name	Description	Who Implements?	Links/Sources
Whatcom County, WA	Whatcom County's Critical Areas	Aquifer recharge zones are protected by the Critical Area Overlay and are designated as low, medium or high infiltration areas based on DOE methodology (primarly based on soil). In addition, wellheads are protected from nearby development based on a three grade system, dictated distance of Critical Area from wellhead.	Whatcom County	http://www.co.whatcom.wa.us/pds/shorelines_critical_areas/cao_update.jsp
Wisconsin Department of Natural Resources	Model ordinance	Uncontrolled development and use of the floodplains and rivers within a municipality could potentially impair the public health, safety, convenience, general welfare and tax base. The community shall review all permit applications to determine whether proposed building sites will be reasonably safe from flooding. If a proposed building site is in a flood-prone area, all new construction and substantial improvements shall be designed or modified and adequately anchored to prevent flotation, collapse, or lateral movement of the structure; built with materials resistant to flood damage; and be constructed by methods and practices that minimize flood damages. The zoning administrator shall deny the permit application if a proposed building within the floodway will increase flood elevations upstream or downstream by 0.01 foot or more.	Local jurisdiction, in this case the County	http://www.dnr.wisconsin.gov/org/water/wm/dsfm/flood/communities.htm

Appendix B
Case Study: Almador and Calaveras Counties, CA

The purpose of this case study is to describe the integrated water management planning occurring within Amador and Calaveras Counties in California. This case study provides a brief background on water management in Amador and Calaveras counties; describe the draft Amador & Calaveras Watershed Plan; and make a recommendation on whether CPW should pursue future research into Amador and Calaveras counties' drinking water protection strategies

Background

In 2002, the voters of the State of California recognized and codified the need for integrated regional planning for the management of water resources with the passage of Proposition 50 (Prop 50) - the Water Security, Clean Drinking Water, Coastal and Beach Protection Act[11]. Prop 50 motivated the creation of Integrated Water Management Plans (IRWMPs) throughout California. IRWMPs are intended to act as umbrella documents that coordinate local documents related to development and water quality. IRWMPs identify strategies that allow for regional management of water resources in at least four main areas: water supply, groundwater management, ecosystem restoration, and water quality.

The Amador & Calaveras A/C watershed covers 1.25 million acres, extending from 9,500 ft elevation in the Sierras of the east, to just above sea-level in Central Valley in the west. Agriculture, grazing, and open spaces are the dominant land-uses in the region. Development within the region, both urban and rural, is clustered around the major cities and highways. Approximately 60% of the water-needs of the 140,000 people of Stockton, CA, are delivered from surface water of the A/C watershed.

With funding from the California Water Boards in 2004, the Local Government Commission (LGC) set out link water-quality and development within the watershed by developing the a set of commonly agreed Water Principles. The principles have subsequently served to guide both water and land planning and management. The Commission formed additional partnerships in 2006, receiving additional support and financing from the two counties and numerous local organizations. The timing was ideal, as both counties were updating their general plans. The plan's writing, still in draft form, has been overseen by the Stakeholder Advisory Committee (SAC), part of the LGC. The SAC meets approximately four

[11] http://www.ccwd.org/pages/Mokelumne.Amador.Calaveras_IRWMP.htm

times annually, assisted by workshops hosted by the Sierra Nevada Alliance to discuss the land-use water connection.

Plan Structure

The comprehensive nature of this plan makes it impractical to cover all parts in this memorandum. However, the Watershed Plan is novel in structure and approach. As a result, the following memo section explores the plan's organizational hierarchy by looking at one branch of the plan's recommendations related to Community Design and Planning. Discussion of the plan's structure follows:

The plan's discussion of watershed-based planning issues is split into four general sections (left), each organized according to a common framework (right):

I.	*Open Space and Natural Infrastructure (detailed below)*	a.	Background linking land-use decisions, watershed health, water quality, and water quality regulations;
II.	*Community Design and Planning (detailed below)*	b.	Assessment of existing conditions and policies;
III.	Sustainable Water and Watershed Management	c.	Selected strategies and recommendations that match local needs/conditions; and
IV.	Collaborative Water Resource Planning	d.	Implementation measures including model policies, tools and resources.

Selected strategies from most sections (italicized above) are detailed below.

I. Section I : Open Space and Natural Infrastructure highlights two strategies

- Strategy 1: Open Space Conservation
- Strategy 2: Use of Natural Infrastructure in Built Environment: Use of Low Impact Design principles (although neither county currently implements LID techniques through code or ordinance).

Strategy 1, Section I, discusses several options for protection of open spaces at multiple scales, recognizing the difficulty in working with land-rights on private property. As a result, several market-based strategies are recommended:

- Transfer of Development Rights (TDR)
- Payment for Ecosystem Services based on PES framework (several pilot studies mentioned).
- Acquisition of land by water utilities, recognizing that land-management may be as cost effective as end-of-pipe treatments.

NOTE: Other strategies addressing land-use from this section are not included here.

II. Section II Community Design and Planning recommends four strategies related to how and where community development should occur. These strategies are:

- Strategy 1: Strategic Location (Infill Development)
- Strategy 2: Compact Design
- Strategy 3: Mixed Use Development
- Strategy 4: Transportation Network and Street Design (Complete & Green Streets)

Strategy 1, Section II, discusses several options to promote infill development after having developed the linkage between low-density housing and the degree of sensitive ecosystem areas affected. Note that the three strategies are interrelated, since promotion of infill development also limits increases in impermeable surface area caused by the transportation infrastructure necessary to support low-density growth. Strategy 1 recommends the following implementation measures:

- Updating Local Codes: Add flexibility to address minimum parking and setback requirements and maximum height and site coverage (building footprint of FAR) requirements
- Vacant Land Studies: identify and assess undeveloped parcels that are poised for infill and redevelopment.
- Density Bonuses: allocate additional development rights to a parcel so a project can be built above zoned densities (e.g. similar to that afforded to low-income housing). Can be used in conjunction with new zoning overlays.
- TDR Programs: TDR programs can support open space goals while helping stimulate development in strategic areas.
- Financial Tools and Incentives: Vary sewer hookup fees for existing and suburban fringe locations; Offer different development fees based on location and project type; Sliding scale of mitigation requirements based on project type (i.e., mix use); Streamline approval for infill and redevelopment projects.
- New Land Use Classifications: the following new land-use codes were recommended to coordinate infill growth, Town Center, Regional Service Center, Special Planning Area- Residential.

NOTE: Other strategies addressing land-use from this section are not included here.

Appendix C
Case Study: Austin, TX

The purpose of this case study is to describe Austin, Texas' use of land-use regulation to protect drinking water. This case study provide a brief background on Austin's water sources and previous water protection strategies; it describes current water quality regulations; and explains the significance of the case.

Background

The Lower Colorado River is the principal water source for the City of Austin. The City draws water from two reservoirs formed by dams along the river: Lake Austin and Lady Bird Lake. In addition, several other watersheds flow into reservoirs, including Barton Creek and Williamson Creek among others. The Austin Water Utility serves 850,505 people over a service area of 538 square miles.[12] In 2007 the city's drinking water was found to be in compliance with the Safe Water Drinking Act standards.[13]

In 1980 and 1981 Austin adopted several ordinances protecting specific watersheds within the city's jurisdiction. More recent legislation superceded all the ordinances, as is described below.

Current Regulations

The City of Austin currently has two major drinking water protection ordinances: The Comprehensive Water Ordinance (1986) and the Save our Springs Ordinance (1992). In addition, the City has a Smart Growth Initiative that discourages development along sensitive watersheds.

Comprehensive Watersheds Ordinance

The Comprehensive Water Ordinance (CWO) and the preceding ordinances were a response to regular closures of Barton Springs due to contamination from stormwater runoff and leaking sewage lines. For the creation of the CWO, the City Council appointed a task force consisting of environmental groups, citizens, developers, and a city-appointed environmental board.[14]

The CWO superceded all previous water quality ordinances. It protected all watersheds throughout Austin's planning area with the exception of the

[12] http://www.ci.austin.tx.us/water/default.htm

[13] http://www.ci.austin.tx.us/water/waterreports.htm

[14] http://books.google.com/books?id=mPAfbrviCKEC&pg=RA1-PA130&lpg=RA1-PA130&dq=%22comprehensive+watersheds+ordinance%22&source=bl&ots=hAPKwUU4AL&sig=Ix1gX9btGje2kYHlilYwLGlrAdQ&hl=en&sa=X&oi=book_result&resnum=1&ct=result#PRA1-PA130,M1

urban watersheds. The ordinance included the following water quality protection features:

- Limits on impervious cover
- Creation of water quality buffer zones
- Erosion control requirements
- Protection of critical environmental features
- Restrictions on wastewater disposal
- Development of sedimentation and filtration basins.[15]

The ordinance was unique in that it calculated impervious surfaces based on net surface area (which only includes buildable lands) rather than gross surface area. The ordinance also created a system for designating watersheds by their relationship to the city. For example, one designation was for watersheds used as drinking water.

The CWO was amended in 1991 to include urban watersheds, however many of the protections of the CWO (including restrictions on impervious surfaces) were not applied to the urban watersheds.

Save Our Springs Ordinance

The Save Our Springs Ordinance (SOS) was a citizen-led effort in response to a plan to develop 4,000 acres along Barton Creek. The ordinance was applied to the area around Barton Springs and required non-degradation of the watershed and stricter limits on impervious cover. The ordinance was a ballot initiative and approved by a 2 to 1 ratio of voters.[16]

Smart Growth Initiative

The City of Austin's Smart Growth Initiative divides the city into a Desired Development Zone (DDZ) and a Drinking Water Protection Zone (DWPZ). The DDZ has reduced development fees and utility reimbursements to create a financial incentive for development in that area. [17]

Significance

Austin's water protection strategy is both unique and highly relevant to our study of the McKenzie River Basin. Austin's program is particularly well-developed, having been in place (in the form of different ordinances) for 29 years. The Austin strategy demonstrates multiple forms of ordinance formation, as it combines government-led development efforts as well as citizen-led initiatives. In addition, the program is unique in combining regulations as well as financial disincentives to prevent development near sensitive watersheds.

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[15] http://books.google.com/books?id=mPAfbrviCKEC&pg=RA1-PA130&lpg=RA1-PA130&dq=%22comprehensive+watersheds+ordinance%22&source=bl&ots=hAPKwUU4AL&sig=Ix1gX9btGje2kYHlilYwLGlrAdQ&hl=en&sa=X&oi=book_result&resnum=1&ct=result

[16] http://austin.bizjournals.com/austin/stories/2007/04/09/daily20.html?jst=b_ln_hl

[17] http://www.ci.austin.tx.us/smartgrowth/

Austin is a relevant case study in relation to the McKenzie River because surface water is the primary source of drinking water; the population served by the local utility is large; and growth was the catalyst for regulation.

Appendix D
Case Study: Bellingham, WA

The purpose of this case study is to describe and evaluate Belllingham, Washington's drinking water protection strategy. This case study provides a brief background on Bellingham's water sources and regulating bodies; describe the current water quality protection strategy; and explain the significance of the case.

Background

The City of Bellingham draws all of its drinking water from Lake Whatcom watershed. The watershed covers 36,000 acres and consists of 36 creeks and tributaries flowing into Lake Whatcom. In addition to the natural tributaries, water is diverted into the lake from the Middle Fork of the Noosack River via Anderson Creek. Lake Whatcom empties into the Pacific Ocean at Bellingham Bay. The City of Bellingham only has jurisdiction over 8% of the lake's surface area and 3% of the watershed. Whatcom County and the Lake Whatcom Water and Sewer District control the rest of the lake and watershed.[18]

The Department of Public Works serves as the City of Bellingham's water utility and provides 95,000 residents (82,000 Bellingham residents and 13,000 Whatcom County residents) with drinking water.

Residential development has compromised Lake Whatcom's water quality. In 1998 the Washington Department of Ecology discovered Lake Whatcom did not meet water quality standards due to high phosphorous levels. The designation of Lake Whatcom as a substandard watershed led to a water quality improvement plan mandated by the Clean Water Act. Despite the plan, phosphorous levels have increased dramatically since 2004 due to continued development. If Lake Whatcom's water quality continues to decline, the City of Bellingham anticipates upgrading its water treatment system at a cost of several million dollars.[19]

As part of its intervention, the Washington Department of Ecology ordered Bellingham and Whatcom County to reduce the impact of development by 74% from current levels. In other words, current developments must be adjusted to create 74% less impact on the watershed. New developments cannot add to the impact on the watershed.[20] Under current zoning, 5,552 currently undeveloped acres of the watershed could be developed, creating approximately 3,200 new single-family homes.

[18] Stewards of the Lake: A City of Bellingham Guide to the Lake Whatcom Watershed

[19] Stewards of the Lake: A City of Bellingham Guide to the Lake Whatcom Watershed

[20] http://crosscut.com/2008/05/27/science-environment/14541/?pagejump=1

Current Programs

The City of Bellingham takes a multi-faceted approach to drinking water protection. The City's strategy includes a land acquisition and protection program, preventive septic system evaluations, and restrictive land-use ordinances.

Land Acquisition and Protection

The City of Bellingham protects lands in the watershed through a land acquisition program and a coordinated protection effort by the City and County governments, the regional water district, non-profit organizations and landowners. Since establishing the Lake Whatcom Watershed Property Acquisition Program in 2001, the City has purchased 1,178 acres of land in the watershed at a cost of approximately $16 million. The City of Bellingham partnered with Whatcom County, Whatcom Land Trust, and landowners to execute the program.[21]

The City of Bellingham, Whatcom County, Sudden Valley Community Association, Lake Whatcom Water and Sewer District, Whatcom Land Trust, Washington State Department of Natural Resources, and individual landowners, protect an additional 1,341 acres through public ownership, community organization ownership, and public and private easements.[22]

Septic System Evaluations

The Bellingham Department of Public Works annually inspects 20% of the on-site septic system in the Lake Whatcom Watershed (presumably the portion within its jurisdiction) to ensure proper functioning.[23]

Land-Use Ordinances

In 2001, the City of Bellingham instituted restrictive building ordinances in the Silver Beach neighborhood. The Silver Beach neighborhood lies primarily within the watershed and stormwater runoff flows into the lake. The City approved ordinances that limit land displacement to 500 square feet during the wettest parts of the year. The ordinances require that incomplete excavations be covered to prevent erosion, and impose limits on impervious surfaces.[24]

In May 2008, Bellingham instituted a 4-month emergency moratorium on construction in the Lake Whatcom Watershed within the City of Bellingham's jurisdiction. In September 2008 the City of Bellingham extended the moratorium until March 2009. In addition, the City approved an ordinance banning any land-disturbance activity affecting more than 500 square feet.[25]

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[21] Stewards of the Lake: A City of Bellingham Guide to the Lake Whatcom Watershed

[22] Stewards of the Lake: A City of Bellingham Guide to the Lake Whatcom Watershed

[23] Dept. of Public Works, Consumer Confidence Report, 2007

[24] Stewards of the Lake: A City of Bellingham Guide to the Lake Whatcom Watershed

[25] http://www.cob.org/issues/lw-moratorium.aspx

Significance

Bellingham's water protection strategy is both unique and highly relevant to our study of the McKenzie River Basin. Bellingham employs a varied approach to water quality protection, combining land acquisition, preventive septic system evaluation, and land-use ordinances.

Bellingham is a relevant case study in relation to the McKenzie River because surface water is the sole source of drinking water; the population served by the local utility is approximately the same size; and residential development threatens water quality. In addition, the watershed spans multiple jurisdictions and the protection strategy requires institutional cooperation.

Appendix E
Case Study: Clackamas County, OR

The purpose of this case study is to describe Clackamas County's use of land-use regulations for drinking water protection. The case study provides a description of the drinking water service area, relevant regulations, agency participation, the regulatory process, and this case study's relevance to the Eugene Water and Electric Board.

Background

Clackamas County is located in north central Oregon within the Portland metropolitan area. The county includes 1,879 square miles of land with portions of the Willamette, Tualatin, and Sandy Rivers all passing through the county. The Clackamas River is 83 miles long and has a drainage area of about 940 square miles. Approximately 367,000 people (2006 estimate) live in the county. About one-eighth of the county is composed of urban land with the rest being rural. There are several major urban centers of over 20,000 people within the county: Lake Oswego, Milwaukie, Oregon City, Tualatin, and West Linn.

Vulnerability

Storm water runoff is one of the most significant sources of water pollution in Clackamas County as well as the rest of Oregon. During storm events silt, oil, chemicals, trash, industrial and home chemicals, and pesticides are washed into storm drains and ditches, which then carry these pollutants to the nearest creek, stream, or wetland. Clackamas County implemented the Surface Water Management Program (SWM) in 1993 to manage non-point source pollution as required by the Clean Water Act. SWM directly impacts water quality by implementing regulations created to protect and improve water quality.

Regulations

The SWM focuses on storm water management, stream protection, and restoration efforts. The Surface Water Management Agency developed Surface Water Rules and Regulations, Standard Specifications, and Administrative Procedures as well as an Erosion Control Planning & Design Manual. Specific tasks that have been identified include:

- Stream Rehabilitation and Design – riparian corridor enhancement, stream stability, stream bank erosion control, soil bioengineering, and naturescaping. The construction costs for these projects are funded through Surface Water Management fees.

- Sensitive Land Advance Planning – planning for, and protection of, sensitive lands along riparian corridors.
- Monitoring – area wide water quality monitoring and best management practice (BMP) monitoring.
- NPDES Permitting – permit application to comply with the National Pollutant Discharge Elimination System (NPDES).
- Erosion Control – inspection of construction site erosion controls, enforcement, and complaint response.

The SWM is paid for by county residents and developers. Community residents pay a yearly fee to fund their use of buildings, streets, and other paved surfaces that contribute to storm water runoff. The fee is $400.00 per year or 4% of the estimated cost of any required surface water management system, whichever is greater. However, no fee will be due where there is no additional impervious surface area. This service fee is authorized by ORS 451, which provides for the establishment of master plans for the development of service facilities.

Developers pay for the cost of building the new drainage systems and water quality facilities that will serve their developments; this might cost between $1 and $1.5 million for a 42 acre development with 176 lots.

Clackamas County Code provides for establishment of a Zone of Benefit Recovery Charges (Chapter 4.03). This provides a mechanism for property owners benefitting from road improvements made by another property owner to pay a future recovery charge for such improvements. The property owner's degree of benefit is assessed to determine their financial contribution to the improvements to avoid disputes over property rights. This ordinance may be applied to road improvements that exceed $25,000 in cost.

Chapter 7.03 of Clackamas County Code provides drainage requirements for residential entrances onto public roads and non-curbed county and local access roads. All driveways shall have culverts for proper road drainage unless the County Road Official or his agent determines that they are not required. All driveways should have a valley gutter to direct storm runoff into the road ditch line. In addition, steep uphill driveways having greater than ten percent grade shall be constructed with diagonal water bards (berms) to assure that water from uphill properties is directed into the ditch line.

The Water Quality Resource Area District (WQRAD) within the Clackamas County Zoning and Development Ordinance provides for certain water quality protection regulations. A Construction Management Plan must be submitted for development within the WQRAD regardless of whether development will occur within a Water Quality Resource Area (WQRA). The plan shall include a topographic map of the site, the location of all existing natural features, an inventory and location of existing debris and hazardous materials, and a mitigation plan. The ordinance also requires

that all stormwater be collected on-site and passed through a treatment facility, such as a detention/composting facility or filter as approved by the surface water management regulatory authority, prior to being discharged into the WQRA. Regulations also apply to the location of the stormwater preteatment facility in relation to the WQRA.

Players

The planning effort was helmed by the Department of Water Environmental Services (WES) of Clackamas County to develop a Surface Water Master Plan for the county. The Surface Water Management Agency, a branch of WES, is the primary developer, enforcer, and expert involved in this effort. The agency conducts surface water management for two county districts in addition to providing wastewater management to seven cities and several unincorporated areas in the county.

The Commissioners, WES, and several citizens' advisory committees work together to develop and implement the programs and standards relating to surface water and storm water management.

The utilities company, Clackamas River Water (CRW), can process up to 30 million gallons of water per day from the Clackamas River. The CRW filter plant provides drinking water to much of northern Clackamas County and purchases water from the South Fork Water Board to service the southern portion of the county. The South Fork Water Board also draws its water from the Clackamas River.

Uniqueness

An interesting component of this approach is Clackamas County's use of GIS as an informational and outreach tool. The system includes information on parcel lots, rivers, wetlands, flood zones, building permits, zoning, soils, service district boundaries, topography, tax map images, sanitary and sewer system data, and digital ortho-photography. This system is located at a terminal in the Surface Water and Technical Services Division offices and is available for walk-in use by developers and other community members. In addition to being user-friendly this system has allowed the Division's small staff to work on other higher priority projects and was relatively inexpensive to develop ($40,000 excluding commercial software).

The Surface Water Management Program (SWM) charges a management fee that is based on the amount of impervious surface on each site, which indicates the amount of runoff into the storm drainage system. For example, SWM charges $4 per month for each 2,500 square feet of impervious surface.

Relevance

The Clackamas County Surface Water Management Plan is relevant to the McKenzie River Basin because of its operation within the larger ecological context of the Willamette River Basin and the political context of Oregon

and the Pacific Northwest. The case study is looking at the same jurisdictional level as our study area of Lane County. In addition, both areas gain their water supply from surface water.

Clackamas County faces similar source water protection issues, development related sources of vulnerability to water quality, as the McKenzie River Basin for source water protection. The use of a management fee based on impervious surface area may be an option the Eugene Water and Electric Board may wish to explore to both discourage impervious surfaces and fund stormwater protection efforts.

Sources

http://www.co.clackamas.or.us/

http://www2.q-city.com/shelbayreports/stormwater-urban/urban_stormwater_treatment.pdf

http://www.clackamas.us/wes/swm.htm

http://www.crwater.com/

http://www.co.clackamas.or.us/docs/wes/waterfacts1207.pdf

http://web12.clackamas.us/alfresco/download/direct/workspace/SpacesStore/017f4630-736d-11dc-8c0c-a31c1adff8cc/wesfees.pdf

http://www.leg.state.or.us/ors/451.html

Appendix F
Case Study: Kitsap County, WA

The purpose of this case study is to describe and evaluate Kitsap County, WA's surface water quality and watershed protection program. This case study provides a brief background on Kitsap County's water sources; describes Kitsap County's Surface and Stormwater Management Program and its implementing agencies; and explains the significance of the case.

Background

Kitsap County is located between Hood Canal and the Puget Sound in Washington State. The County covers 396 square miles and has a population of nearly 241,000 people, giving it the second highest population density in the state with approximately 586 people per square mile. Historically a rural and agricultural region, farms in Kitsap County have been subdivided into small-acre lots. Small lots have increased density and concurrent non-point sources of pollution affecting streams and coastal waters. Kitsap County obtains its drinking water from groundwater sources.[26]

Water Quality Protection and Regulation

Kitsap County completed a Surface and Stormwater Management Program in April 2005 and adopted in the Kitsap County Code as Chapter 12.36 and the associated fee structure established in Chapter 12.40. The program was created primarily to "protect public health and natural resources…and provide a permanent funding source to address nonpoint source pollution."[27] It represents the collaboration between the Kitsap County Health District, Public Works, Community Development, and Kitsap Conservation District to address the common need for funding to implement programs to support water quality, watershed health, and public safety. The program combines regulation and enforcement strategies with public education, voluntary, and incentive-based strategies.

The Kitsap County Code states that the program "shall be administered by the Kitsap County Department of Public Works, who shall have the authority, subject to approval by the county commissioners, to exercise all lawful powers necessary and appropriate for the construction, acquisition and condemnation of property rights, maintenance, management, operations and regulation of storm drainage and surface water runoff systems including, without limitation, all lawful powers to fix, alter, regulate and control the rates and charges for the use thereof. (Ord. 156

[26] www.psparchives.com/publications/our_work/stormwater/stormwater_resource/stormwater_management/kitsap_manual05.pdf

[27] www.codepublishing.com/wa/kitsapcounty/

(1993) § 4, 1993)"28 In addition, program elements outlined in the code include "basin and watershed planning, education, capital improvements, operations and maintenance, monitoring, source control and shellfish protection."[29]

Partner Organizations

Kitsap County Public Works

Manages programs providing the following services: roads, solid waste, storm water, and wastewater. The department also manages the Surface and Stormwater Management Program as the chief agency responsible for its implementation, as well as providing administrative needs such as office space and program staff.[30]

Kitsap County Community Development

Responsible for Kitsap County Code, land use regulations, and planning and permitting procedures. The Natural Resources Division conducts watershed planning, administers management planning for the Water Resource Inventory Area 15, and coordinates habitat restoration planning and projects.[31]

Kitsap Conservation District

Administers programs designed to conserve natural resources by working with private landowners to reduce soil erosion and preserve water quality. The Conservation District is a non-regulatory agency that depends on voluntary cooperation with landowners.[32]

Kitsap County Health District

Administers the Environmental Health Division, which conducts the Drinking Water Program along with four other major programs including solid and hazardous waste, on-site sewage, water quality, and food safety and living environment. The programs were established by federal, state and local regulations to provide residents of Kitsap County with a healthy and safe environment. The Environmental Health Division emphasizes education over enforcement of regulations in order to promote resource protection and quality of life. Kitsap County Health District Environmental Division's Drinking Water Program has regulatory authority to oversee public and private water sources relating to both new development and replacement projects, specifically regarding wells.[33]

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[29] www.codepublishing.com/wa/kitsapcounty/

[30] www.kitsapgov.com/pw/default.htm

[31] www.kitsapgov.com/dcd/nr/nr.htm

[32] www.kitsapcd.org/about_kcd.htm

[33] www.kitsapcountyhealth.com

Summary of the Process

Kitsap County's Surface and Stormwater Management Program addresses only unincorporated areas of Kitsap County. The program mandates a surface and stormwater management fee, which is assessed based on land use and the amount of impervious surface on each property. The Kitsap County Code explains, "The rates and service charges shall be based on the service provided and relative contribution of surface and storm water runoff from a given parcel to the storm water control facilities. The average estimated percentage of impervious surfaces on the parcel, the land use classification, the total parcel acreage and/or measured impervious surface area will be used to determine the relative contribution of surface and storm water runoff from the parcel."[34] Cities within Kitsap County that already charge stormwater fees include Poulsbo, Bremerton and Bainbridge Island. The program does not charge residents of incorporated cities. Table 1 below describes the rate structure for different land uses.

Table 1: Rate structure

Land Use	Surface and Stormwater Management Fee
Undeveloped and forest land	No fee
Single-family residence (unit rate)	$5.19 per month or $67.30 per year
Multifamily residences	Unit rate * # of dwelling units
Apt, Commercial, Industrial, Institutional uses	Estimated or measured square feet of impervious surface area divided by 4200 square feet, times the unit rate35

Commercial property owners who qualify may receive a 50% reduction in annual fees. To qualify, at least one of the following criteria must be met:

- Direct discharge of all site-generated stormwater treated prior to discharge in tidal waters must meet current county water quality treatment standards.
- Stormwater infiltration with water quality treatment to current county standards.
- Collection and reuse of 100% of the runoff from building surfaces for onsite use to achieve zero surface water runoff.[36]

[34] www.codepublishing.com/wa/kitsapcounty/

[36] *Op.Cit.*, www.psparchives.com/…kitsap_manual05.pdf

Table 2 below lists the different activities each county agency conducts, funded by the fees appropriated by the Surface and Stormwater Management Fee, to achieve the program's goals.

Table 2: Partners and roles

County Department	Activities
Public Works	• Maintain ponds, catch basins, other stormwater facilities • Design and construction of new stormwater facilities for water quality, fish passage, and flood control • Stormwater outfall monitoring, soil testing, respond to water quality complaints • Education programs and GIS mapping and drainage planning
Health District	• Water quality, pollution identification and correction, wellhead protection programs
Conservation District	• Landowner assistance, public education and involvement
Community Development	• Watershed planning, stream team, public education programs[37]

Uniqueness

Kitsap County residents depend solely on groundwater for drinking water. While this situation differs from Eugene residents' dependence on the surface water source provided by the McKenzie River, government agencies at the state and regional level collaborate to implement a coordinated water quality program.

Relevance

The Kitsap County Health District mirrors the McKenzie River Watershed in that both watersheds have growing urban populations and potential for development and growth in sensitive areas susceptible to nonpoint pollution sources. Each jurisdiction also benefits from active public agencies that collaborate and take the initiative to enhance regional protection of water resources.

Kitsap County represents an innovative and collaborative approach to protecting water quality through a combination of regulation enforcement, education, and taxation strategies.

[37] *Op.Cit.*, www.psparchives.com/…kitsap_manual05.pdf

Appendix G
Case Study: Mohawk Watershed Partnership, OR

The purpose of this case study is to describe the Mohawk Watershed Partnership (MWP) in the McKenzie Watershed Basin, and explain its relevance in relation to water quality protection. This case study provides a brief history of the MWP; describes the organizational strategy of the MWP; and explains the MWP's relevance to protecting water quality on the McKenzie River. The Mohawk Watershed Partnership highlights how to successfully involve residents in actively working to protect the health of their environment and safeguard their drinking water.

History of the Mohawk Watershed Partnership

With its headwaters in the foothills below the Cascade Mountain Range, the Mohawk River flows more than 30 miles to its confluence with the McKenzie River, just below the EWEB intake station. The McKenzie River then flows into the Willamette River which in turn flows into the Columbia River. The Columbia River eventually flows into the Pacific Ocean.

The MWP is part of the McKenzie Watershed Council (MWC). It was started in 1997 by a citizen who was involved with MWC, and who thought that a local effort on the Mohawk River would have a significant effect on protecting the drinking water throughout the watershed area. The Mohawk River is the largest tributary flowing into the McKenzie River.

When the group formed, they determined their mission to be: "The Mohawk Watershed Partnership exists to assess, evaluate, improve and restore the condition of the Mohawk River watershed through promotion, involvement, education, coordination, and development of goals and plans, using the collective wisdom and voluntary action of our community members."

- The MWP developed an action plan with priorities that include:
- Promote community awareness and good stewardship of the land.
- Maintain and improve water quality.
- Improve native fish habitat.
- Encourage maintenance or restoration of native ecosystems.
- Have a voice on issues involving government in the watershed.

Roles

The main role of the MWP is to build community awareness and provide the community with the opportunity to be stewards of "their water." The MWP's four standing committees offer several options for involvement, and ad-hoc committees are formed as needed. Committee members do not need to be Partnership members. The standing committees are the

- Executive Committee
- Education and Outreach Committee
- Project Committee
- Citizen Water Quality Monitoring Team

The Executive Committee is responsible for governance of the organization and includes board officers. They review budgets, supervise staff and ensure proper procedures. The Education and Outreach Committee plan events, build awareness, and talk to school classes. The Project Committee plans and carries out projects such as invasive weed removal and native species plantings. The Citizen Water Quality Monitoring Committee spends about an hour and a half each month collecting and testing water samples.

We discussed the effectiveness of the partnership on protecting the area supporting the Mohawk River with Karl Morgenstern, Drinking Water Source Protection Coordinator for EWEB, during our field trip. He felt that their efforts at water quality testing and monitoring were helpful, but the usefulness was questionable due to the volunteer nature of the group. More effective, is the partnership's ability to encourage participation and to help the residents understand how important the environment is to their quality of life. MWP activities like restoration plantings of native species, invasive plant removal and river clean up make a significant difference in the preservation of clean water and a healthy riparian area. The MWP has the ability to influence how the local residents respond to land use issues by educating residents about political and regulatory actions, such as Measure 37.

Regulations

The MWP is not a regulatory entity; rather, the organization educates the community about regulations, and provides a forum for citizen input into the regulatory process. Community awareness has a positive impact in encouraging people to work with land-use ordinances, and in the future this will continue to be valuable. As a grassroots group, the partnership is less threatening to property owners who are concerned about their land use rights. The Partnership's effectiveness lies in the fact that they are a non-regulatory group, as opposed to other local land-use officials.

Relevance and Uniqueness

The partnership is interesting because it is a long-term, grassroots, voluntary effort by rural people to monitor the health of the river. This example could be relevant in understanding why people voluntarily work for environmental health, how they understand the issues, and what moves them to act. The MWP can provide a model for citizen engagement in watershed protection plans.

References

About the Partnership
http://www.mckenziewc.org/mohawkWSP_history_org.html

2007 Workplan
http://www.mckenziewc.org/pdf/FY07WorkPlan.pdf

Discussion of Measure 37, and the Partnership's role in supporting protective land use regulation
http://www.eweb.org/Public/commissioners/meetings/2007/070220/WS3.pdf

Appendix H
Case Study: Seattle, WA

The purpose of this case study is to describe and evaluate Seattle's watershed management of the Cedar River, principle water supply to the Seattle metropolitan area. This case study provides a brief background on the Cedar River; and describes the Cedar River Watershed Habitat Conservation Plan (HCP).

Background

The Cedar River Municipal Watershed consists of 90,638 acres and 99.9% of the lands within the watershed are owned and protected for water supply and habitat protection. Melting snow and rain are gathered and stored in two reservoirs -- Chester Morse Lake and the Masonry Pool created by the Masonry Dam. Southeast of the city, approximately 22% of the river is diverted for use as drinking water, after being screened, chlorinated, fluoridated, ozonated, exposed to ultraviolet light and lime.[38] The Cedar River Municipal Watershed supplies drinking water to two thirds of the greater Seattle population (1.3 million).[39]

The 2001 Cedar River Watershed Habitat Conservation Plan (HCP) builds from a long history of watershed planning in the region. Specifically, planning for water quality and fish habitat first began in 1993 when it became evident that Chinook salmon would soon be listed for protection under the ESA. In 1997, after multiple years of work, King County completed the Lower Cedar River Basin and Nonpoint Pollution Action Plan (Basin Plan). The Basin Plan provided the goal structure, which served to justify and direct land-acquisition proposed under the current HCP. The HCP is a program of Seattle Public Utilities. Since withdrawal of surface water will grow with Seattle's increasing population, the HCP addresses a current and future liability for both the public and Chinook salmon—what is considered an 'incidental taking' of protected species under the ESA. In addition, several other species of concern were also known to inhabit the Watershed, including bull trout, marbled murrelet, bald eagle and spotted owl.[40] Similar species of concern inhabit the McKenzie watershed, although the area's smaller population lessens impacts.

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[38] http://www.seattle.gov/util/About_SPU/Water_System/Water_Sources_&_Treatment/Cedar_River_Watershed/CEDARRIVE_200312081358174.asp

[39] http://www.seattle.gov/util/About_SPU/Water_System/Water_Sources_&_Treatment/Cedar_River_Watershed/index.asp

[40] http://www.cedarriver.org/watershed/conservation.shtml

Plan Structure

There are 3 major components of the HCP[41]:

- Landsburg Mitigation & Cedar River Sockeye Hatchery: Mitigation for the blockage to salmon and steelhead trout at the Landsburg Diversion Dam.
- Instream Flow Management: Stream-flow managed to provide habitat for salmon and steelhead in the mainstream of the Cedar River.
- Watershed Management: Watershed forest and land management related to habitat for a wide variety of fish and wildlife species in the municipal watershed. This component addresses elements related to land-use and water quality. Further detail is provided below.

Watershed Management Mechanisms

The HCP includes several methods to protect water quality through habitat restoration and protection. They are described below:

- Land Acquisition - Outright acquisition or purchase of development rights provides the greatest long-term assurance that land will be maintained for habitat and water quality. As a general rule, lands acquired under the HCP will be owned and managed by a non-City entity, such as King County Department of Parks and Recreation, or by non-profit land conservation organizations. There are three approaches to land acquisition available:
- Outright fee simple acquisition - Purchase of property by the City or other agency at fair market value or by bargain sale. When possible, partnerships and matching funds are sought in land-acquisition.
- Conservation easement - A legal agreement between a landowner and a government agency or land trust that permanently limits use of the land. It allows the property owner continued use of the land and to sell it or pass it on to heirs.
- Transfer of development credits - The Transfer of Development Credits (TDC) program is a voluntary program created by Seattle and King County. The program intends to preserve rural areas by transferring growth to selected urban areas. Rural property owners can sell the development potential from a "sending area" and transfer that development opportunity to a "receiving area", allowing the developer to increase the height limit of a project by

[41] http://www.seattle.gov/util/About_SPU/Water_System/Habitat_Conservation_Plan--HCP/COS_001620.asp

up to 30% above the zoned height limit through the purchase of credits.

Funding

The HCP commits $5.7 million to Downstream Habitat Protection and Restoration, to be expended by the end of HCP Year 5, and is provided for in two areas of the HCP as follows:

- Habitat Restoration & Instream Flows – Restoration projects would create additional habitat by restoring the river's natural stream structure and function. Recognizing the link between flow management with land management, the city provided $3.4 million within a five-year window to protect and restore aquatic, riparian and floodplain habitat in the lower Cedar River downstream of the municipal watershed.

- Landsburg Mitigation Agreement – Secured $1.8 million for land acquisition and restoration. This is budgeted through Seattle's Capital Improvement Plans from 2001 through 2005.

The funding schedule is listed below:

HCP Year (calendar year)	Landsburg Mitigation	Instream Flows	Total Cost Commitment
1 (2001)	$ 0	$ 0	$ 0
2 (2002)	$ 107,000	$ 1,199,000	$ 1,306,000
3 (2003)	$ 162,000	$ 1,199,000	$ 1,361,000
4 (2004)	$ 1,531,000	$ 1,199,000	$ 2,730,000
5 (2005)	$ 0	$ 0	$ 0
Total	**$ 1,800,000**	**$ 3,597,000**	**$ 5,397,000**

Table 1 Downstream Habitat Program funding by HCP year (in 2001 $S)

Criteria

The HCP prioritizes funding allocation of funding within the watershed according to a number of criteria concerning water quality, feasibility, as well as other considerations. A number of these factors are consistent with King County's Cedar River Legacy Program. The criteria are:

Habitat Benefits

- Complexity/Diversity - Project would acquire habitat that is characterized by channel conditions, riparian cover, and forest cover within 200 feet from bank.

- Connectivity between the main stem channel and adjacent water bodies.

- Contiguity to adjacent protected habitats.

Feasibility

- Landowner willingness.
- Partnership opportunity
- Degree of threat.
- Other benefits:
- Mitigation for water supply - Addresses impacts of Seattl'es pipeline facilities or associated easements.
- Achieves WRIA 8 planning goals.
- Educational opportunity - provides potential educational opportunities.

Relevance

The HCP demonstrates how a public utility company, like EWEB, was able to pair several watershed management goals: water supply, water quality, and habitat protection. While no HCP was required, the plan serves to limit in the future liability to both water and wildlife. Further, the plan demonstrates effective partnering in linking land-use and water-quality by addressing federal (ESA), state (water quality requirements), county (Basin Plan), and city (water supply) needs.

Appendix I
Case Study: Vermont Rural Water Association

The purpose of this case study is to describe how the Vermont Rural Water Association's (VRWA) policies relate to drinking water protection. This case study provides a brief background of the VRWA, relevant policies and regulations, and the individuals and organizations involved in the VRWA. It also includes a discussion of the case study's relevance to the Eugene Water and Electric Board.

Background

The Vermont Rural Water Association (VRWA) serves the entire state of Vermont, which encompasses 9,250 square miles of land and 365 square miles of surface water. Forested mountains cover three quarters of the state, while Vermont's valleys support an extensive dairy industry. The state's population was over 620,000 as of 2005 (U.S. Census Bureau), with the majority of the population residing in rural areas. The vast majority of Vermont's residents depend on groundwater as their drinking water source.

VRWA was founded in 1982 as a nonprofit trade association of water and wastewater systems throughout the state. The association assists rural residents and communities with financial, managerial, or technical problems related to their water and wastewater systems. The group has been so successful at obtaining federal and state funding that they offer onsite assistance and phone consultation at minimal or no cost to members. The VRWA successfully covers its operating budget of $1.5 million through federal and state funding.

VRWA's services are targeted at rural Vermont communities who might not otherwise be able to afford specialists to assess and manage their water/wastewater systems.

Regulations

VRWA is subject to federal and state regulations. The association keeps track of state and federal legislation affecting the water-wastewater industry in Vermont and updates a list of relevant legislation on its website. The list includes bills that have been passed, been enacted into law, are under committee review, or are ordered to lie. Several current state bills relate to groundwater mapping, non-point source pollution, establishment of minimum waterfront protection standards, and stormwater management. All drinking water sources in the state are subject to the Federal Drinking Water Act, the Vermont Water Supply Rule, and Vermont statutes.

The Vermont Water Supply Rule was passed in 2005 and applies to all water systems in Vermont including public water systems, bottled water systems, non-public water systems, and privately owned water sources. The purpose of the rule is to regulate Vermont's water systems to provide safe drinking water. In implementing the rule, the state of Vermont has retained "primacy" managing the quality and safety of its drinking water. The document also includes Vermont's major regulations concerning water and wastewater systems and utility companies in a single document, which makes it easier for regulators and communities to follow.

Players

The VRWA is part of Vermont's Water Supply Division. The Water Supply Division is charged with protecting public health by assuring safe, affordable drinking water by managing drinking water resources. The Division is made up of several sections.

- The Engineering and Financial Services Section administers the construction permits program for public water systems.
- The Operations and Compliance Section assures public water system compliance with the Federal Safe Drinking Water Act, Vermont statutes, and the Vermont Water Supply Rule.
- The Support and Planning Section manages long- and short-term strategic and financial planning for the Division.
- The Water Resources Section manages public water source-related activities and groundwater protection.

VRWA is managed by a 5-member Board of Directors that are elected from VRWA-member water/wastewater systems. The program has a staff of 29, the majority of who are field technicians providing water-wastewater assessments and advice to rural Vermont communities. VRWA has 632 due-paying members, with dues ranging from $40-$330 depending on the type of system and population served. Members have voting rights in the VRWA and receive numerous benefits including:

- Onsite assistance on technical, managerial, and financial issues at no direct cost to the system.
- A 20% discount off the already low priced operator certification training and other continuing education opportunities.
- Source water protection planning assistance at no cost to the system.
- 20% or more off all other services, products, and events.
- Access to VRWA board and committees to help influence policies.

Process

Field technicians assist in a variety of tasks including finding leaks and setting new system rates. VRWA also provides training programs to system operators, charging only a modest fee for materials.

VRWA also assists in the development and implementation of source water protection plans throughout the state. Source water protection plan assistance is offered at both the single system and community level. Source water protection plans help minimize threats to public health, prevent expensive treatment upgrades, and increase public confidence in drinking water quality.

Uniqueness

The state of Vermont also has a program, the Water/Wastewater Agency Response Network (WARN), that allows water and wastewater systems in Vermont to receive/provide mutual aid assistance from/to other systems in Vermont in the event of natural or man-made incidents. Participation in the program is voluntary, costs nothing, and doesn't obligate the system to provide assistance. However, by joining, a system becomes eligible for Federal Emergency Management Agency (FEMA) disaster reimbursement.

Relevance

The VRWA provides a number of services that are similar to what EWEB already provides to homeowners in the McKenzie Basin. The VRWA offers numerous water-quality services to rural Vermont communities. These services include source water protection plan consultation, free septic tank inspection, and outreach and training. In addition, VRWA provides such technical services as leak detection, underground utilities locating, and laboratory work. VRWA also provides managerial services including wellhead protection plans and updates, vulnerability assessments, and public relations assistance. EWEB already provides several of these services and may consider adding several other services. Further analysis of VRWA may provide additional ideas for services EWEB could offer to residents of the McKenzie River Basin.

Sources

http://www.vtruralwater.org/

http://vermont.gov

http://www.allbusiness.com/membership-organizations/membership-organizations/3821615-1.html

http://www.anr.state.vt.us/DEC/watersup/Security/VTWARN_Brochure.pdf

http://www.vermontdrinkingwater.org/

http://www.epa.gov/safewater/sdwa/basicinformation.html

Appendix J
Minimum Septic System Separation Distances

Items Requiring Setback	From Subsurface Absorption Area Including Replacement Area	From Septic Tank and Other Treatment Units, Effluent Sewer and Distribution Units
1. Groundwater Supplies and Wells.	*100'	50'
2. Springs:		
• Upgradient.	50'	50'
• Downgradient.	100'	50'
**3. Surface Public Waters:		
• Year round.	100'	50'
• Seasonal.	50'	50'
4. Intermittent Streams:		
• Piped (watertight not less than 25' from any part of the on-site system).	20'	20'
• Unpiped.	50'	50'
5. Groundwater Interceptors:		
• On a slope of 3% or less.	20'	10'
• On a slope greater than 3%:		
• Upgradient.	10'	5'
• Downgradient.	50'	10'
6. Irrigation Canals:		
• Lined (watertight canal).	25'	25'
• Unlined:		
• Upgradient.	25'	25'
• Downgradient.	50'	50'
7. Cuts Manmade in Excess of 30 Inches (top of downslope cut):		
• Which Intersect Layers that Limit Effective Soil Depth Within 48 Inches of Surface.	50'	25'
• Which Do Not Intersect Layers that Limit Effective Soil Depth.	25'	10'
8. Escarpments:		
• Which Intersect Layers that Limit Effective Soil Depth.	50'	10'
• Which Do Not Intersect Layers that Limit Effective Soil Depth.	25'	10'
9. Property Lines.	10'	5'
10. Water Lines.	10'	10'
11. Foundation Lines of any Building, Including Garages and Out Buildings.	10'	5'
12. Underground Utilities.	10'	—

* 50-foot setback for wells constructed with special standards granted by WRD.
**This does not prevent stream crossings of pressure effluent sewers.

Source: Oregon DEQ - OAR 340-071-220