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TERTIARY DRAFT FOR WORK GROUP REVIEW

BUILDING CITIES IN THE RAIN

Watershed Prioritization Guidance for a Stormwater Control Transfer Program
*Harmonizing the NPDES Municipal Permit, Growth Management Act,
and Puget Sound Recovery*

9-16-15

Comment [BH1]: Please note that this is STILL not yet a product of the Work Group. It is a second draft based on the discussions of the Work Group for the group's review before issuance of the document for public comment.

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A. Introduction

1. Background

The Washington State Department of Ecology (Ecology) issued draft guidance for establishing a stormwater control transfer program under the Phase I and Western Washington Phase II Municipal Stormwater Permits, [Stormwater Control Transfer Program: Out of the Basin](#)¹ in May 2015. The Ecology guidance presents an opportunity for incentivizing infill development in urban centers while accelerating environmental improvement in other watersheds within a jurisdiction where they will create the most environmental benefit. Encouraging new development and redevelopment in urban centers reduces sprawl and protects habitat and air and water quality, while accommodating the growing population in Puget Sound.

2. Purpose of this Prioritization Guidance

This guidance describes a two-step process jurisdictions can use to prioritize receiving waterbodies² important to protecting salmonids and other beneficial uses and that are expected to respond to flow control and runoff treatment improvements associated with stormwater controls. It is designed for use as companion guidance to Ecology's [Stormwater Control Transfer Program: Out of the Basin](#) guidance.

This guidance provides focused recommendations for Western Washington State municipal stormwater Permittees with designated Regional growth centers³ under the Puget Sound Regional Council's VISION 2040 on how to designate high priority watersheds for stormwater retrofits. It is appropriate to use to increase infill development in urban centers while meeting stormwater requirements, Growth Management Act mandates, and goals to help restore priority watersheds. A municipality's prioritization process will be reviewed by Ecology as part of its approval process (See Appendix 1, Section 7 in the [Phase I and Western Washington Phase II Municipal Stormwater Permits](#)).

3. What is a stormwater control transfer program?

A stormwater control transfer program is one alternative approach western Washington Municipal Stormwater Permittees can implement to meet certain flow control, runoff treatment, and onsite management (or Low Impact Development/LID) permit requirements associated with new or redevelopment projects. At its core, it allows a developer to pay a fee or directly construct a facility in an alternate location designated by the local government in lieu of meeting certain stormwater requirements at a given project site.⁴ The alternate location will be in a watershed in another part of the

¹ Ecology's draft guidance was issued as a public comment draft on May 14, 2015, with a comment deadline of July 14, 2015. See Section II. Establishing a Watershed Prioritization for Stormwater Control Transfer Programs in Washington State, page 9.

² A receiving waterbody or receiving waters are the waters to which a specific geographic area (or, watershed) drain See Attachment A, Definitions.

³ The Puget Sound Regional Council has designated 29 urban centers in central Puget Sound as regional growth centers planned to accommodate housing (53 percent of residential growth) and employment (71 percent of employment growth) by 2040.

⁴ The Ecology guidance requires that any facilities in priority watersheds built to provide flow control, runoff treatment, or LID improvements in lieu of making those improvements at a project site must be online before any project may rely on the facility to help meet its stormwater requirements. See draft Ecology guidance page 3, #3.

jurisdiction where receiving waterbodies or receiving waters⁵ are evaluated to have a higher potential for increase in ecological function following implementation of specific stormwater control retrofits/improvements. Such areas are called “high priority watersheds”. The original site where new development or redevelopment is proposed to take place is located in what is called a “sending watershed”. Sending watersheds are determined to present a lesser immediate potential for environmental lift or restoration.

Per Ecology’s guidance, the goal of a stormwater control transfer program is to direct flow control or water quality improvement efforts to watersheds where they will provide more immediate environmental benefit than would be realized under the normal rate of development or redevelopment in the jurisdiction’s watershed. At the same time, the approach prevents further degradation in all watersheds – i.e. no development or redevelopment activity will be allowed to create new or additional adverse impacts to any receiving waterbodies or receiving waters. As individual priority watersheds meet waterbody improvement goals, remaining watersheds are prioritized for improvement until all of the municipality’s receiving waterbodies or receiving waters attain target levels .

4. Why consider a stormwater control transfer program?

There is a strong need to encourage redevelopment in cities and denser urban areas in order to accommodate growth, to reduce vehicle miles and trips, and to reduce sprawl and its associated stormwater impacts. Concentrating development in urban centers helps avoid the longer term costs of sprawl, such as traffic congestion, increased impervious surface and stormwater runoff, increased need for stormwater infrastructure, and increased flooding, shoreline degradation and erosion. A stormwater control transfer program provides an opportunity for local governments to provide flow and other water quality improvements in priority watersheds, and at the same time removes a potential barrier to redevelopment in urban centers.

The Puget Sound Regional Council Growth Management Policy Board has heard concerns from cities that the cost of site-by-site stormwater management, in combination with other costs of redevelopment, may cause developers to look outside compact urban centers for lower cost strategies or options for their projects, or down-size redevelopment projects. A stormwater control transfer program can provide cost effective options to developers in urban centers, and help lower infrastructure costs for managing stormwater.

A stormwater control transfer program as described above is expected to yield cost effective and better environmental outcomes in western Washington than the default approach under the permit. The mutually beneficial goals of a stormwater control transfer program are to:

- Meet or exceed municipal stormwater permit requirements;
- Improve and inform capital facilities planning requirements in GMA;
- Increase capacity to meet local or regional ecosystem/watershed recovery goals;
- Improve habitat for salmonids or shellfish, or address other sensitive beneficial uses of a waterbody sooner than following the existing default stormwater management approach; and
- Facilitate and expedite development in urban growth centers designated to receive projected population growth.

⁵ Again, it is important to note the difference between a “receiving watershed” and “receiving waterbodies or waters” per the definitions in Attachment A.

The decision to develop and implement a stormwater control transfer program is a local policy decision that will require a significant investment of time and resources to implement. Establishing a clear, defensible prioritization approach is an important early step.

Redmond's Watershed Management Plan



One example of this alternate approach is the City of Redmond's Watershed Management Plan. The Plan provides the basis for a stormwater control transfer program that allows the City to invest stormwater controls first in high priority watersheds with the most restoration potential for high quality salmon habitat. The City will not allow further impacts to streams with significant degradation, with the long term goal of rehabilitation of all water bodies within the City. The City's broader efforts include in-stream projects, buffer projects, and programmatic efforts to reduce development impacts.

The City of Redmond chose to develop a Watershed Management Plan to restore Redmond's surface waters and provide a coordinated framework for addressing regulatory drivers (Endangered Species listings and Clean Water Act violations), while supporting future development.

Redmond is taking a watershed-based approach to surface water management to be more strategic with resources, projects, and programs. When applied city-wide, this approach is expected to produce more immediate and measurable positive results relative to the current approach that relies on uncoordinated regulatory drivers to achieve incremental, site-by-site improvements in stormwater management as land is developed or redeveloped over an extended period. Redmond is implementing this approach to achieve the goal of rehabilitating all the City's surface waters over the next 50 to 100 years.¹

5. Background of the Building Cities in the Rain project

The Puget Sound Regional Council's Growth Management Policy Board at its May, June and July 2013 meetings heard presentations⁶ and discussed the challenges and high cost of meeting state stormwater requirements on a site-by-site basis, among other costs, while also accommodating growth in high-density urban centers pursuant to the Washington State Growth Management Act . The Puget Sound Partnership South Central Action Area Local Integrating Organization (LIO) also expressed an interest in working on this issue under an adopted sub-strategy of the Puget Sound Action Agenda.⁷

As a result of the Growth Management Policy Board's discussion and the South Central LIO's interest in sustainable stormwater management, the LIO requested technical assistance from the Washington State Department of Commerce (Commerce) to further understand and develop recommendations to address the issue. Commerce secured funding through a National Estuary Program (NEP) Watershed Protection and Restoration grant to work with local communities to identify land use barriers to implementing the Puget Sound Action Agenda, and policies and regulations to address those barriers, entitled *Regional Alliances*.⁸ With this funding, Commerce has researched the issue, provided technical assistance, and convened a work group of interested stakeholders for the Building Cities in the Rain project to develop this guidance.

The Building Cities in the Rain Work Group grew out of a subcommittee of the South Central LIO. It includes representatives from Western Washington Phase I and II county and city permittees; the Washington State Departments of Ecology, Fish and Wildlife, Commerce, and the Puget Sound Partnership; the U.S. Environmental Protection Agency; Puget Sound Regional Council; the South Central LIO; Water Resource Inventory Area (WRIA) 8, and the environmental community.⁹ The group agreed that a successful stormwater control transfer program could be an opportunity to both address the issue of managing stormwater in urban growth centers and to restore healthy habitat in urbanized priority watersheds. They met over a period of 12 months in 2014 and 2015 to develop this guidance for designating high priority watersheds to receive certain stormwater control improvements from designated regional growth centers in the central Puget Sound region.

Prior to convening the Work Group, Commerce staff reviewed the Growth Management Policy Board stormwater discussions and met with builders, planners, stormwater managers, and others to gain a better understanding of the issue. The product of this analysis is a background report¹⁰ that identifies key concerns and challenges. The report emphasizes the benefits to water resources of redevelopment and implementing the Puget Sound Regional Council's VISION 2040 Regional Growth Strategy. The Regional Growth Strategy includes policies to minimize new impervious surface and reduces pollution through decreased vehicle miles travelled and redevelopment of existing pollution generating

⁶ The presentations are posted on the PSRC Growth Management Policy Board's [meetings web site](#).

⁷ Puget Sound Action Agenda Sub-Strategy A 4.2, as amended in the 2014/2015 Action Agenda: "Provide infrastructure and incentives to accommodate new development and redevelopment within urban growth areas"; SC13, "Complete Regional Alliances Project and share results to increase infill development in urban centers while meeting stormwater requirements and Growth Management Act mandates".

⁸ Puget Sound Action Agenda Sub-Strategies A 1.2 and 4.1.

⁹ See Attachment B for the list of Work Group participants.

¹⁰ The Background Report is posted on the Building Cities in the Rain [project web site](#).

impervious surfaces to non-pollution generating impervious surfaces (for example, replacing a parking lot with a mixed use building and plaza).

B. Phasing of Prioritization Guidance - Focus on Regional growth centers

The Work Group agreed to take a stepwise, systematic approach to this new program. Therefore, the first iteration of the guidance will focus on regional growth centers¹¹ under the Puget Sound Regional Council's VISION 2040 to encourage growth in those areas. If this approach is successful, the group can then consider whether and how a broader application makes sense.

[Regional growth centers](#)¹² are the hallmark of VISION 2040 and it's Regional Growth Strategy. VISION 2040 is a regional strategy for accommodating the five million people expected to live in the region by 2040. In addition to a Regional Growth Strategy, it consists of an environmental framework and multi-county planning policies adopted pursuant to the Washington State Growth Management Act¹³ to guide local comprehensive land use plans and development regulations. Designated Regional growth centers have been identified for housing and employment growth, as well as for regional funding to support that growth. Regional manufacturing/industrial centers are locations for increased employment. Regional centers are expected to have subarea plans that meet planning expectations outlined in the Puget Sound Regional Council's [Regional Centers Plan Checklist](#).

In most regional growth centers, reaching population and employment targets will require substantial infill development. In addition to encouraging efficient use of urban land through infill, VISION 2040 encourages maintaining hydrological functions, and where feasible, restoring them to a more natural state.

The focus of this guidance is on jurisdictions where most of the Regional growth centers are located. However, other cities and counties may also use this guidance to plan for a stormwater control transfer program. Furthermore, a group of jurisdictions could use this guidance to prioritize watersheds in a way that justifies the transfer of stormwater control improvements across jurisdictional boundaries.¹⁴

C. Multiple Community and Regulatory Benefits and Opportunities

¹¹ Regional growth centers are the assumed sending areas for purposes of this guidance, but receiving areas can also be located in regional growth centers. While designation of regional growth centers may have taken the environment into account, stormwater issues were not necessarily considered and, in fact, parts of some regional growth centers may be prioritized for retrofit. Further, not all regional growth centers can be designated as sending areas. For example, areas within cities designated by Ecology as highly urbanized areas would not have a reason to adopt a stormwater control transfer program for flow control as these areas need only match pre-project conditions under flow control requirements. See Ecology's [Flow Control Guidance for Highly Urbanized Areas](#). It is also the case that some regional growth centers may be designated as higher priority through the process described in this guidance.

¹² See Attachment C for a map of the regional growth centers and 40/20 Basins Near Flow Control Exempt Waters.

¹³ RCW 36.70A.210 (7).

¹⁴ There may be some challenges to establishing an inter-jurisdictional program with the sending jurisdiction's ability to account for transfers, and the ability to ensure control and maintenance of a stormwater facility that it does not own and is outside its jurisdictional boundaries.

A stormwater control transfer program can be used to meet multiple regulatory and community goals. It can be used to meet the requirements of the federal Clean Water Act, while accommodating growth under the state Growth Management Act and meeting recovery goals for Puget Sound and salmon.

1. Clean Water Act, including the stormwater permit requirements

Water pollution and altered hydrology caused by development contributes pollutants and stressors such as erosion, scouring and heat to surface waters, impairing beneficial uses such as drinking, fishing, swimming, and other activities. As authorized by the federal Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Historically, industrial, municipal, and other entities obtain NPDES permits if their discharges go directly to surface waters. Separate storm sewer systems include discrete conveyances such as pipes or man-made ditches designed or used to convey or collect stormwater to receiving waterbodies. When owned and operated by a municipal or public entity (e.g., city, county, state), such storm systems (also called MS4s) may be regulated as point sources under an NPDES permit. In Washington State, the NPDES permit program is administered by the Department of Ecology. Since its introduction in 1972, the NPDES permit program is responsible for significant improvements to our Nation's water quality.¹⁵

a. NPDES Municipal Permits

In Washington State, NPDES permits have been phased in over time following EPA regulations. "Phase I" MS4 permits are issued to "large and medium sized" jurisdictions - Clark, King, Pierce, and Snohomish Counties and the cities of Seattle and Tacoma. Eighty two cities and five counties fall under the Western Washington "Phase II" MS4 permit for "small jurisdictions."¹⁶

Under both Phase I and Phase II Western Washington MS4 permits, counties and cities must adopt regulations requiring best management practices (BMPs) for new development and redevelopment projects that meet certain project size and type thresholds. The BMPs are designed to: 1) protect water quality by providing runoff treatment, and 2) provide flow controls that reduce stormwater peak flow rates and volumes to prevent channel erosion in rivers and streams.

The permits have requirements that apply to new development and redevelopment depending upon specific conditions:

- Minimum Requirement #7, Flow Control¹⁷ (MR #7 Flow Control) requires that qualifying projects control flow durations (for the range of pre-developed discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow) to match those conditions produced by the pre-developed land cover condition (generally, forested) rather than by the immediate pre-project land cover condition.

¹⁵ [EPA NPDES web site.](#)

¹⁶ See Attachment D for a list of the Western Washington Phase I and II cities and counties.

¹⁷ Municipal Permits for Western Washington, Appendix 1, Section 4.7, Minimum Requirement #7, Flow Control.

- Minimum Requirement #6, Runoff Treatment¹⁸ (MR #6) requires that various types of runoff treatment be provided to address the post-project condition for certain hard and pervious surfaces.
- Minimum Requirement #5, On-Site Stormwater Management¹⁹ (MR #5, often referred to as the Low Impact Development requirement, or LID) requires projects to infiltrate, disperse, and retain stormwater runoff at a project site.

b. Basin/Watershed Management Plan

Both Phase I and Phase II permits allow permittees to use basin or watershed planning to tailor MRs #5, #6, or #7 subject to certain conditions. The Municipal Permits for Western Washington, Appendix 1, Section 7, Basin/Watershed Planning, provide:

In order for a basin plan to serve as a means of modifying the minimum requirements the following conditions must be met:

- The plan must be formally adopted by all jurisdictions with responsibilities under the plan; and
- All ordinances or regulations called for by the plan must be in effect; and
- The basin plan must be reviewed and approved by Ecology.

A permittee may establish a stormwater control transfer program as an alternate means to provide equivalent or better stormwater control under a basin or watershed management plan, if approved by Ecology under Appendix 1, Section 7 of the MS4 permit. Doing so allows a permittee to invest in stormwater controls first in watersheds that drain to priority receiving waterbodies or receiving waters without degrading lower priority receiving waterbodies or receiving waters, while still meeting permit requirements.

2. Puget Sound Action Agenda

The Puget Sound Action Agenda is a regional road map that lays out the work needed to achieve an ambitious goal: restoring the health of Puget Sound by 2020. The [2014/2015 Action Agenda](#) identifies key ongoing programs, local priorities for different areas of the Sound and approximately 300 specific actions that must be implemented over the next two years to stay on track toward recovery targets. The Action Agenda calls for concentrated growth in urban growth areas and improved stormwater controls to implement two of the Action Agenda's three strategic initiatives: (1) Prevent pollution from urban stormwater runoff; and (2) Protect and restore salmon habitat. A stormwater control transfer program can be used to facilitate compact development in urban centers and provide opportunities for improving water quality and restoring salmon habitat.²⁰

¹⁸ Municipal Permits for Western Washington, Appendix 1, Section 4.6, Minimum Requirement #6, Runoff Treatment.

¹⁹ Municipal Permits for Western Washington, Appendix 1, Section 4.5, Minimum Requirement #5, On-site Stormwater Management.

²⁰ Several strategies in the Action Agenda speak directly to compact communities, clean water and habitat restoration, for example:

A1. Focus Land Development Away from Ecologically Important and Sensitive Areas

The third Action Agenda strategic initiative is to restore and re-open shellfish beds. Shellfish health begins on land, through reduction of pollution from rural and agricultural lands and maintenance and repair of failing septic systems. A stormwater control transfer program could be used to improve the health of shellfish beds through restoration of receiving watersheds that drain to marine waters.

3. Puget Sound Salmon Recovery Plan

The [Puget Sound Salmon Recovery Plan](#) is a regional shared strategy developed in response to listings of Puget Sound Chinook salmon and Summer chum salmon in Hood Canal under the federal Endangered Species Act (ESA). The recovery plan is mandated by the ESA listing and developed to meet the needs of fish and people. A fundamental assumption of this shared strategy approach is that local watershed efforts are the engine that will lead the region to recovery of salmon. Restoration and protection actions will take place largely at the watershed level. To that end, recovery plans have been developed by local watershed groups for each of the Water Resource Inventory Areas (WRIAs) in Puget Sound. Those plans are comprised of detailed strategies and actions designed to address the limiting factors that have caused the species to be threatened with extinction under the ESA.

Salmon recovery plans do not address the stormwater impacts from development that degrade salmon habitat in urbanized areas. A stormwater control transfer program can facilitate salmon recovery by targeting watersheds with the most potential for restoration, and building stormwater retrofits in those watersheds that leverage habitat restoration projects, making it possible for salmonids to survive in urbanized water bodies.

4. Growth Management Act – Helping Communities Plan Strategically for their Future

Since the Washington State Growth Management Act²¹ was passed by the Legislature in 1990, Washington counties and cities have utilized the Growth Management Act's planning framework to adopt comprehensive plans and development regulations to:

- Guide where urban growth areas should be located and provide these urban areas with adequate and affordable urban services;
- Protect critical areas and conserve resource lands; provide for rural living – open space – and recreational areas;
- Enhance transportation systems to reduce congestion and create healthy alternative modes of travel; and
- Revitalize downtowns with attractive compact development.

The Growth Management Act requires the fully planning counties and the cities²² within them to meet all of the requirements under the Act. Counties must, in consultation with cities, adopt countywide planning policies that govern the county and city comprehensive land use plans and development regulations. In central Puget Sound, the Puget Sound Regional Council is required to adopt multi-

A2. Protect and Restore Upland, Freshwater, and Riparian Ecosystems

A4. Encourage Compact Regional Growth Patterns and Create Dense, Attractive, and Mixed-Use and Transit-Oriented Communities

²¹ Chapter 36.70A RCW and related statutes.

²² 29 counties and the cities within them are required or opted into the requirements to fully plan under the Growth Management Act.

countywide planning policies that govern countywide planning policies for the four counties (King, Pierce, Kitsap and Snohomish).²³ VISION 2040 contains the multi-county planning policies adopted by the Puget Sound Regional Council under the Growth Management Act. A stormwater control transfer program that facilitates development in regional growth centers implements a number of the multi-countywide planning policies in VISION 2040.²⁴

a. Creating Compact Communities in Regional growth centers

A stormwater control transfer program provides an opportunity for realizing the Growth Management Act's vision of vibrant, compact communities that allow cities and counties to accommodate growth. For example, such a program can provide options for meeting flow control requirements on smaller urban lots. A stormwater control transfer program provides new options and more certainty to developers to meet stormwater requirements in Regional growth centers and encourage the growth that is planned.

b. Capital Facilities and Utilities Plans

Land use planning under the Growth Management Act requires, where applicable, the review of drainage, flooding, and stormwater runoff and provides guidance for corrective actions to mitigate or cleanse discharges that pollute waters of the state, including Puget Sound or waters entering Puget Sound.²⁵ Cities and counties must adopt a six to twenty year plan of capital projects with estimated costs and proposed methods of financing²⁶ as part of their comprehensive plan. In regard to stormwater infrastructure, planning and implementation typically occurs through a site-by-site approach, rather than a comprehensive view of the landscape and actions needed to improve or maintain water quality and habitat. Prioritization of regional stormwater facilities under a stormwater control transfer program can help a jurisdiction to strategically identify facilities in the capital facilities plan to address stormwater requirements for regional growth centers.

c. Transportation Demand Management and Infrastructure under VISION 2040

By the year 2040, projected population and job growth is expected to boost demand for travel within and through the region by about 40%. Regional growth and regional manufacturing/industrial centers, with their concentration of people and jobs, form the backbone of the transportation network for the four-county region. Facilitating growth in designated regional centers reduces the demand for vehicle trips and parking infrastructure, both of which can have significant stormwater impacts. A stormwater

²³ RCW 36.70A.210(7).

²⁴ MPP-En-3: Maintain and, where possible, improve air and water quality, soils, and natural systems to ensure the health and well-being of people, animals, and plants. Reduce the impacts of transportation on air and water quality, and climate change.

MPP-En-5: Locate development in a manner that minimizes impacts to natural features. Promote the use of innovative environmentally sensitive development practices, including design, materials, construction, and on-going maintenance.

MPP-En-13: Maintain natural hydrological functions within the region's ecosystems and watersheds and, where feasible, restore them to a more natural state.

MPP-En-14: Restore — where appropriate and possible — the region's freshwater and marine shorelines, watersheds, and estuaries to a natural condition for ecological function and value.

²⁵ RCW 36.70A.070(1).

²⁶ RCW 36.70A.070(3).

control transfer program can encourage growth in those centers where public transit and services exist or are planned by allowing transfers of stormwater requirements off site and out of the basin.

d. Economic Development and Revitalization

Vibrant downtowns and other urban centers are an essential element for any region-wide economic development strategy because they are traditionally the hubs of economic activity in any community. Market-based incentive programs such as a stormwater transfer control program can encourage economic development in these urban centers planned for housing, employment growth, transit, recreation, and services.

e. Subarea Plans and Environmental Review

“Up front” environmental review of subarea plans identifies predefined mitigation that provides certainty to developers and the community. Most of the currently designated Regional growth centers have subarea plans adopted by the city. A subarea plan is a more detailed version of the comprehensive plan for a specific area, such as a downtown or neighborhood. The Puget Sound Regional Council now requires an adopted subarea plan or “center plan” for designation of new Regional growth centers. The plan should include or reference policies and programs for innovative stormwater management.²⁷

“Up front” environmental review of subarea plans under the State Environmental Policy Act (SEPA), or predefined mitigation of development, can be used to further streamline permitting and provide incentives for developers in a regional growth center. The predefined mitigation measures could include offsite transfers of stormwater controls. Mitigation measures would be predefined in the SEPA document for the subarea plan.²⁸

²⁷ See PSRC’s [Regional Center Plans Checklist](#).

²⁸ For example, an integrated plan/SEPA document, plan-level “non project” SEPA document, planned action environmental impact statement (RCW 43.21C.031), or a subarea plan and environmental impact statement for transit-oriented development (RCW 43.21C.420).

D. Prioritizing Watersheds for Stormwater Control Improvements

Overall Planning Process

- 1: Establish prioritization goals.
- 2: Review any regional-scale information as an initial screen. See Puget Sound Characterization Project.
- 3: Assess local, watershed-specific information. See “Local Prioritization” table as a starting point.
- 4: Seek input from natural resource agencies and tribes.
- 5: Submit watershed prioritization package, including data source list and prioritization goal, along with any correspondence, to Ecology for approval under Appendix 1, Section 7.

This guidance recommends a stepwise approach to prioritizing watersheds for a stormwater control transfer program. Locally adopted policies regarding water quality and habitat can provide the basis and framework for the goals of a stormwater control transfer program. Regional-scale data, such as the Puget Sound Characterization project, and regional plans, such as WRIA plans, will support a high level analysis for local prioritization. But the final screen will be provided by local, watershed specific, information. Seeking input from natural resources agencies and tribes regarding their prioritization processes will be important. As with any planning process, public input will also be a key step. The Department of Ecology will be looking for all of these components as it considers approval of the program.

1. Policy Framework/Prioritization Goals

Policies in the local comprehensive plan or other locally adopted policies help set prioritization goals under a stormwater control transfer program. They should provide support for improved stormwater management, habitat restoration, and development that supports the Regional Growth Strategy. These policies are the basis for a stormwater control transfer program designed to facilitate growth in urban centers and provide environmental benefit.

City of Redmond’s Comprehensive Plan’s Natural Environment Element includes:

- NE-67 Maintain surface water quality necessary to support native fish and wildlife meeting state and federal standards over the long term. Restore surface waters that have become degraded to provide for fish, wildlife, plants, and environmentally conscious human use of the water body.
- NE-68 Restore, protect, and support the biological health and diversity of Water Resource Inventory Area (WRIA) 8 within the city.
- NE-69 Protect and restore natural systems that underpin watershed health and hydrological integrity.

Kitsap County's Water as a Resource Policy

Kitsap County adopted its "[Water as a Resource](#)" policy in June 2009. The County recognized that storm and surface water runoff is the leading transport medium of pollution into Puget Sound and its associated wetlands, creeks, streams and rivers in this policy. The policy applies to all County departments that report to the County Board of Commissioners. It is applied to public works projects and the comprehensive plan and development regulations. This policy is the basis for several basin planning projects, including [LID](#)



Policies in the comprehensive plan for a fee-in-lieu approach to stormwater and supporting facilities in the capital facilities element, for treatment of waters that discharge to Puget Sound in the land use element, and for identification and support for one or more compact urban centers, could also serve as the basis for a transfer program.

2. Process and Data for Prioritization of Receiving Waters

The data needed for a city or county to prioritize receiving waterbodies or receiving waters for stormwater retrofits should generally be relevant, available and easily accessible.²⁹ The Department of Ecology's watershed data from the Puget Sound Characterization Project is a recommended starting point for prioritization unless the local government has developed an equivalent watershed analysis. More specific local or regional data, including local knowledge, are also necessary to refine the watershed characterization analysis.

a. Puget Sound Watershed Characterization

The Department of Ecology's [Puget Sound Characterization Project](#) provides a regional-scale tool that highlights the most important areas to protect, and restore, and those most suitable for development. The program is a collaborative effort between Ecology, the Puget Sound Partnership, and the state Department of Fish and Wildlife. The Characterization covers the entire Puget Sound drainage area — from the Olympic Mountains on the west to the Cascades on the east, including the San Juan Islands.

²⁹ The reliability of data can be confirmed using a Quality Assurance Project Plan. See [EPA's Quality System web site](#).

The Characterization includes watershed assessments of:

- Water flow (delivery, surface storage, recharge, and discharge)
- Water quality (sediment, nutrients, pathogens, and metals)
- Landscape assessments of fish and wildlife habitat in three environments:
 - Terrestrial
 - Freshwater
 - Marine shorelines

The assessments prioritize small watersheds, or habitat areas, relative to one another for their protection and restoration value. The Characterization Process analyzes watersheds and sorts them into four different categories – “Protection”, “Restoration”, “Conservation”, and “Development”. Ecology indicates that watersheds that fall into the “Protection” and “Restoration” categories are expected to rank as higher priority under a stormwater control transfer program than watersheds in the “Conservation” or “Development” categories.

b. Using Local Data

To implement a successful stormwater control transfer program, a jurisdiction will need to further prioritize receiving waterbodies or receiving waters based on local conditions. A two-step process described below is recommended for using local data to refine prioritization of receiving waterbodies or receiving waters. Data from the first step can be used to do an initial review of receiving waterbodies or receiving waters. Step 2 data digs deeper into the connection between stormwater management and waterbody quality or value to further refine or validate the initial prioritization. The next section – Table 1 – provides information on the sources of local data.

Step 1: Fish Use and Aquatic Habitat

Review the receiving waterbodies or receiving waters for actual or potential fish use with a focus on the biological conditions and potential for environmental lift. Give higher priority to receiving waterbodies or receiving waters with low to moderate levels of impairment³⁰ as assessed using the following data:

- Percentage of tree canopy/condition of buffer for habitat and shade (This may also be considered at Step 2.)
- Benthic Index of Biotic Integrity (B-IBI) as an indicator of biological conditions.
- Known water quality impairment – 303(d) listings and Total Maximum Daily Loads (TMDLs³¹), local knowledge, or low instream flows – that impact fish mortality and use.

Step 2: Flow control/LID and runoff treatment opportunities

Review the receiving waterbodies or receiving waters for opportunities to address flow control issues or provide runoff treatment. Give higher priority to receiving waterbodies or receiving waters within which stormwater management improvements are expected to accelerate environmental improvement.³²

³⁰ Ecology Prioritization Principle #1 (page 9 of draft Ecology guidance)

³¹ TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still safely meet water quality standards.

³² Ecology Prioritization Principle #3 (page 9 of draft Ecology guidance)

- Percentage of impervious area/land cover in the watershed containing the receiving waterbodies or receiving waters
- Extent, age and condition of stormwater management treatment and flow control infrastructure – an assessment of the need for retrofits
- Ripeness to proceed (local knowledge, aligns with programs such as tree planting and stormwater capital improvement plan, etc., that will accrue water quality or stream flow benefits.)
- Watershed area data (inside vs. outside jurisdictional boundaries) – Give higher priority to receiving waterbodies or receiving waters in watersheds where the municipality can exert greater influence. However, if the municipality coordinates a priority watershed identification and rehabilitation strategy approach with a neighboring municipality, receiving waterbodies or receiving waters in a shared watershed may be scored higher.³³
- Presence of culverts or other barriers, including natural barriers, to fish passage.
- Coordination with state, regional and local plans – Give higher priority to receiving waterbodies or receiving waters in watersheds where other regional rehabilitation efforts are also focused³⁴ through:
 - Comprehensive plans and zoning – ~~understanding the potential for growth in the watershed is necessary for prioritizing and planning a retrofit appropriate for the watershed's future.~~
 - Salmon Recovery Plans (3-year work plans, Water Resource Inventory Area priorities)
 - TMDL plans (active and planned)
 - Model Toxics Control Act/Superfund cleanups
 - Regional ecosystem goals, e.g. B-IBI
 - Endangered Species Act listings and critical habitat designations

In all cases, seek input from federal (US Fish and Wildlife, NOAA Fisheries, US Environmental Protection Agency), tribal, and state (Departments of Fish and Wildlife, Ecology and Natural Resources) resource agencies to gain buy-in on the proposed plan. Those agencies may have data pertinent to establishing priorities, and informed opinions about the relative importance of watersheds.

c. Local Data for Prioritization of Receiving Waters

This section discusses recommended sources of local data to be used in the two-step prioritization analysis. The data sources are evaluated for flow control and LID separately from runoff treatment. Flow control and LID are evaluated together because Ecology’s guidance limits transfers of LID requirements to the performance standard, which is a flow duration standard.³⁵ Each jurisdiction will need to provide information on the data used and explain the prioritization process to Ecology and the public.

The data are split between highly useful and useful. Data identified as “highly useful” are important to assess potential environmental lift and suitability for retrofits. Data recommended as “useful” should be used to further inform prioritization decisions if it is available.

All of the data and prioritization decisions will be informed by local on the ground knowledge of streams and habitat conditions.

³³ Ecology Prioritization Principle #2 (page 9 of draft Ecology guidance)

³⁴ Ecology Prioritization Principle #4 (page 9 of draft Ecology guidance)

³⁵ See draft Ecology Guidance, page 6, #1.

Comment [BH(2)]: At the 8-18 meeting, there was significant discussion regarding whether it is appropriate to use future growth plans to prioritize watersheds. Some would like comp plans to be used as an information tool; others see the concern that Ecology raised – it is not appropriate to use future growth plans to prioritize watersheds, but it is appropriate to look at comp plans and zoning to anticipate where regional facilities could be built to serve existing development, redevelopment and new development. Others thought that this reference is in the wrong place, e.g., potential for growth should be considered as a “ripeness to proceed” category. All agreed that the sentence that follows the comp plan here should be deleted and that the topic needs further discussion.

Table 1: Recommended Local Prioritization Data for Flow Control, Low Impact Development and Runoff Treatment

Data Sources	Flow Control/LID		Runoff Treatment		Comments/Notes
	Highly Useful	Useful	Highly Useful	Useful	
Step 1: Fish Use and Aquatic Conditions					
Actual or Potential Fish Use and Existing Aquatic Conditions					
<p>Current Chinook, Coho and other salmonid use and potential use data:</p> <ul style="list-style-type: none"> • Water Resource Inventory Area (WRIA) Plans • Watershed Characterization habitat data – Puget Sound Characterization Project • SalmonScape web site maintained by WDFW provides a computer mapping system for salmon recovery planners. It has lifestage and barriers information for mainstems and named tributaries. It will need to be verified and refined by local data and knowledge, especially for smaller or un-named tributaries. • Salmonid Stock Inventory (SaSI) web site has reports describing and categorizing the status of 435 salmon and steelhead stocks. • County and city-specific data. • Location of physical and natural barriers – WDFW maintains a centralized database of fish passage, diversion screening, fish use, and habitat information from inventory efforts conducted throughout Washington State. WDFW’s Fish Passage and Diversion Screening Inventory (FPDSI) database is a main data source for planning fish passage projects. Local government and WSDOT also maintain the data. • Subareas of streams that drain to downstream hatcheries as well as to salmon bearing streams. 	X			X	<p>A local government needs to know that fish are present if they are prioritizing for habitat restoration.</p> <p>Potential fish use data is highly useful for salmon recovery.</p>
Step 1: Fish Use and Aquatic Conditions					

Comment [BH(3)]: The 8-18 meeting notes said local governments and WSDOT maintain this data. But there was also a meeting note about the WDFW program. I found the WDFW program on line. Are both correct?

Data Sources	Flow Control/LID		Runoff Treatment		Comments/Notes
	Highly Useful	Useful	Highly Useful	Useful	
Aquatic Habitat Condition					
<p>All available physical stream assessment data related to salmonid habitat conditions, including, but not limited to: pool/riffle ratio; type of substrate; embeddedness; and naturally occurring large woody debris/100 linear feet - weighted average of large woody debris density over walked channel length. This data can be collected by local government staff walking each creek. Standard Operating Procedures for collecting this data can be found at: http://www.ecy.wa.gov/programs/eap/quality.html</p> <p>A study assessing streams in WRIA 8 provides recommendations for salmon habitat parameters and procedures: http://www.kingcounty.gov/depts/dnrp/wlr/sections-programs/science-section/doing-science/wadeable-streams.aspx</p>		X			<p>Large woody debris is defined as wood at least 10 inches in diameter and 10 feet long, in or over bankfull channel³⁶ counted by field crews. (Unnecessary for runoff treatment.)</p>

³⁶ “Bankfull width” is defined by the Washington State Department of Natural Resources in WAC 22-16-010 for streams as “the measurement of the lateral extent of the water surface elevation perpendicular to the channel at bankfull depth. In cases where multiple channels exist, bankfull width is the sum of the individual channel widths along the cross-section (see board manual section 2).”

Tree Canopy/Condition of Buffer for Habitat					
Tree canopy percentage cover in local government regulatory stream buffers – aerial photography.	X		X		Tree canopy includes trees with a minimum 10-foot diameter canopy within regulatory buffers for open channel stream reaches within the jurisdictional limits. Tree canopy can be used as a tiebreaker between two otherwise equally ranked receiving waterbodies or receiving waters.
Percentage of intact 300-foot vegetated stream buffer – aerial photography.		X		X	
Percentage of intact 100-foot vegetated stream buffer – aerial photography.	X		X		The extent of intact buffers throughout a stream system correlate well with fish recovery/potential. Higher values equate to more vegetation. All vegetation including landscaped and mowed or plowed land is included – trees, shrubs, and unmoved grasses.
Benthic Index of Biotic Integrity					
Benthic Index of Biotic Integrity (BIBI) ³⁷ , where appropriate, to measure aquatic health. Local government can collect this data relatively inexpensively.	X		X		BIBI scores provide a quantitative method for determining and comparing the biological condition of streams using the macro-invertebrate assemblages as indicators. BIBI scores can be shown as the median value of all samples taken from the applicable stream. BIBI data is highly useful for fresh water, but is not available for salt water. As it cannot be collected in all streams, other measures of aquatic health may be needed. It is a good metric on a yearly scale for the general health of a stream and shows a good correlation with impervious surface and flow metrics.

³⁷ Fish Index of Biotic Integrity (F-IBI) is good data where it is available, but it can be hard to interpret as it is stream size dependent.

Known Water Quality Impairment					
Ecology listed water quality impairments - State Water Quality Assessment (cat 4a, 4b, 4c, or 5) at Ecology's Water Quality Assessment and 303(d) List .	X		X		Waterbodies that are identified on the Ecology 303(d) list as a category 5 or category 5B due to impairment from the indicated water quality parameter.
Known water quality concerns based on locally-collected data: High temperature, low dissolved oxygen, and high fecal coliform bacteria.			X		If a local government collects this data, it is good data to have.
Shellfish bed health - shellfish bed closure(s)- Washington State Department of Health Beach Closures		X	X		Shellfish bed closures by the Washington Department of Health are an indicator of water quality issues.
Step 2: Flow Control, LID and Runoff Treatment Opportunity Assessment					
Existing/Current Land Cover - Percentage of land in the watershed in each category: forest, pasture, landscaping and impervious surface.					
<p><u>Forest</u> - Aerial photography or satellite imagery .</p> <p><u>Pasture</u> - Aerial photography.</p> <p><u>Landscape and Impervious</u> - Developed areas (all areas not pasture or forest) are identified as impervious or landscaped based on literature values for each land use. This can be done at the parcel level, combining zoning or land use designations into commercial, industrial, low/medium/high density residential, and roads.</p> <p>Note that the Western Washington Land Cover Change Analysis project provides a look at land cover change over time and provides estimates of percent forest cover and impervious for designated catchment areas. WDFW is currently working on a high resolution land cover change product, available at: http://wdfw.wa.gov/conservation/research/projects/aerial_imagery/index.html</p> <p>Square miles of road density as a percentage of the watershed – as a metric of aquatic health.</p>	X		X		<p>Landscape is the area in developed watersheds that is not impervious. For areas with highly porous soils, effective impervious surface should be considered. Effective impervious surface is the area in developed watersheds that is impervious and directly connected to the storm drain system.³⁸ Literature values for dividing parcels into effective impervious and landscape for each land use type can be derived from hydrology literature.</p> <p>Land use and land cover data are often available in the same data set.</p>

Comment [SA(4)]: I have a note that Andy will clarify...

³⁸ Municipal Stormwater Permits for Western Washington, Appendix 1, Section 2, Definitions related to Minimum Requirements for a complete definition of “effective impervious surface”.

High vehicle traffic areas – Annual Average Daily Traffic ³⁹ >7,500.			X		(Unnecessary for flow control.)
Existing/Current Land Use Data – Percentage of land in use for commercial, industrial, roads (include the right-of-way parcel, private, and public roads), single-family and multi-family residential, and parks and undeveloped land.					
Land uses are parcel based and calculated by summing different land use types into the categories presented from a maintained city or county Land Use GIS database. Can also use Buildable Lands Analysis. ⁴⁰ Land use designations and zoning are not always indicative of what is on the ground. This exercise should be simple once the jurisdiction decides what to use for categories of existing land use.			X	X	Runoff treatment transfers should go to a like land use or to a land use with greater pollutant-generating potential. ⁴¹ <i>Land use and land cover data are often available in the same data set.</i>
Known number of culvert crossings/1,000 linear feet – city or county maps.	X			X	Mapped culvert crossings (street, driveway, or utility) per 1,000 linear feet on mapped stream channels in each watershed with jurisdictional boundaries. Does not include trail bridges, long storm pipes, pipe out piped sections of stream headwaters (e mapped in culvert layer). Multiple parallel culverts are counted as one crossing.

Comment [OE(5): Why is this restricted to Class II stream channels? Maybe the intent was to say Class II and larger stream channels?

Comment [SA(6): This is a new comment that was not discussed with the group. Recommendation for consideration: Instead of Class II (Redmond rating) Use the Typing System adopted by DNR and refer at least to Type S and F streams (WAC 222-16-030)

³⁹ Total volume of vehicle traffic of a highway or road for a year divided by 365 days.

⁴⁰ Buildable Lands Report per RCW 36.70A.215.

⁴¹ See draft Ecology guidance on page 5 regarding transfers of basic versus enhanced treatment under Specific Guidelines re: Minimum Requirement 6 Runoff Treatment.

Age and condition of stormwater management treatment and flow control infrastructure					
Outdated flow control infrastructure needing retrofit based on flow duration.	X				This data indicates the environmental lift potential from installing stormwater retrofits. While a good indicator, not all jurisdictions with have this information. (Unnecessary for runoff treatment.)
Total acres/percentage of developed watershed not equipped with basic runoff treatment. This can be done by plat and based on the age of the plat. It is important to remove forest and pasture areas from total watershed area to make sure undeveloped areas are not counted in the areas needing basic treatment.			X		The percentage can be calculated using the entire watershed minus areas that currently contribute runoff to a basic treatment facility or are currently forest or pasture.
Known number of stormwater pipe and ditch outfalls.	X		X		Mapped stormwater outfalls draining pollution generating surfaces for 1,000 linear feet on all stream classes within the jurisdiction.
Ripeness to Proceed					
Local knowledge of alignment with other programs such as tree planting, capital improvement plan, asset management plans, etc.					This wasn't in the data sets discussed, so do not know how useful it is for flow control/LID or runoff treatment.
Watershed Area Data					
Watershed area data –inside and outside jurisdictional boundaries. Local governments could be very accurate with this exercise or simply use topography to delineate areas that drain to each receiving water body/receiving waters. If nothing else, local governments could use catchments delineated in the Puget Sound Watershed Characterization Model, which are likely from a larger dataset owned by someone at the state level, likely WDNR. Data sources at DNR?	X		X		Includes stormwater conveyance and topographic based watershed.
Each stream length—total stream miles and percentage of total stream miles within jurisdictional boundaries. Local	X		X		If a stream flows into the jurisdiction from a less developed area outside the jurisdiction, then the

governments should create their own stream data, which likely occurred as part of developing the critical areas ordinance. Even with inaccuracies local critical area maps should be sufficient. Newer LiDAR data to map water bodies is by far the most accurate.					jurisdiction may want to prioritize that stream. Context will be important to understand the habitat well.
Class II (Department of Natural Resources Type F plus S ⁴²) stream length inside jurisdictional boundaries. Data sources?		X		X	

⁴² The Washington State Forest Practices Board has adopted an interim water typing system in WAC 222-16-031. Type F streams have fish use as defined in WAC 222-16-031(2) and (3). Type S streams are inventoried shorelines of the state as referenced in WAC 222-16-031(1).

Coordination with State, Regional and Local Plans					
City or county comprehensive land use and zoning maps. Zoning, right of way, critical areas, stormwater and other regulations related to land cover.					Zoning is important because future development impacts to the watershed must be considered.
<ul style="list-style-type: none"> Salmon Recovery Plans (3-year work plans, Water Resource Inventory Area priorities) TMDL plans (active and planned) Model Toxics Control Act/Superfund cleanups Regional ecosystem goals, e.g. B-IBI Endangered Species Act listings and critical habitat designations Existing prioritization efforts if available, especially those with tribal co-manager involvement.⁴³ 					<p>Function and structure code combinations can be for each land use type.</p> <p>Residential:</p> <ul style="list-style-type: none"> Single family can be further differentiated by development density. For example, four categories of single family based on parcel size. Multi family includes condominiums and apartments. Can include commercial first story with dwelling above in the commercial area calculation.
			X	X	Parks and Undeveloped Land— Undeveloped land includes areas that are forest and pasture, as well other areas that are not developed.

- Comment [SA(10): ECY proposal/suggestion:** This info could be added to the text of the document and would be helpful to determine whether there is enough redevelopment occurring in the low priority watersheds to make this program useful, as well as inform where runoff treatment facilities will need to be sited, and may help to inform or develop land use strategies that help to protect high priority watershed (e.g. where zoning changes may be needed; changes to lot coverage limits, need for additional stream buffer protections, etc). However, future land use and zoning is inappropriate criteria for determining watershed prioritization – this prioritization effort should be science-based, not based on where development is planned to occur.
- Comment [SA(11):** More discussion needed re: Comp plans and where it can be appropriate in this guidance
- Comment [BH(7):** Left all of this language in the document (with the proposed strikeout) pending the discussion of how land use fits into the prioritization process.
- Comment [SA(8): ECY recommends:** This table should be expanded to include the plans, goals, listings, and clean-up activities listed in the text on page 16.
- Comment [SA(9):** Move the 2nd bullet to Coordination with local, state plans section

⁴³ See King County example at <http://www.govlink.org/regional-water-planning/tech-committees/trib-streamflow/TribStrmflwFinalReport10-2006.pdf>.

5. Next Steps

The results of the prioritization process can be integrated into a fully developed watershed plan, which includes the basis for the prioritization process, the jurisdiction's methods for applying and tracking transfers, monitoring, and implementation strategies per Ecology's guidance.

Finally, Ecology will need to review the data and the process as part of its approval of the basin/watershed plan under the Phase I or II Municipal Permit for Western Washington, Appendix 1, Section 7.

DRAFT

ATTACHMENT A

Definitions

Receiving waterbody or receiving waters - Receiving waterbody or receiving waters means naturally and/or reconstructed naturally occurring surface water bodies, such as creeks, streams, rivers, lakes, wetlands, estuaries, and marine waters, or ground water, to which a MS4 discharges. (See Western Washington Phase I and Phase II Municipal Stormwater Permit Definitions)

High priority watershed – A high priority watershed is a watershed that has been identified for receiving rehabilitation efforts first under a stormwater control transfer program.

Sending watershed – A sending watershed is a watershed that has been identified for sending rehabilitation efforts to a receiving watershed.

Watershed – A watershed describes an area of land from which all of the water that is on or under it drains to the same place.

ATTACHMENT B

Building Cities in the Rain Work Group Participants

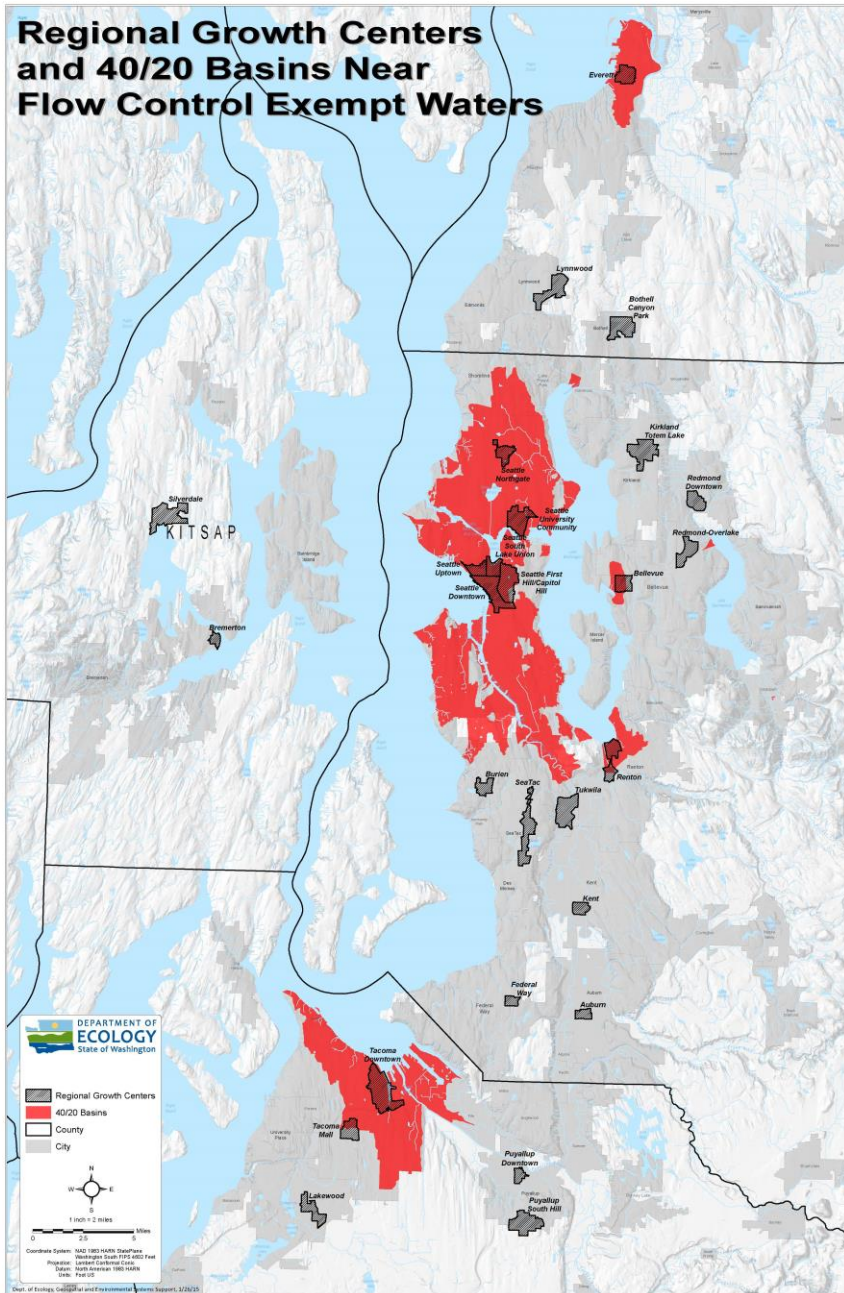
Andy Rheume, City of Redmond
Phyllis Varner, City of Bellevue
Kerry Ritland, City of Issaquah
Lorna Mauren, City of Tacoma
Dana deLeon, City of Tacoma
Don Robinett, City of SeaTac
Paul Crane, City of Everett

Doug Navetski, King County
Larry Schaffner, Thurston County

De'Sean Quinn, South Central Local Integrating Organization
Erika Harris, Puget Sound Regional Council
Heather Trim, Futurewise
Scott Stolnack, WRIA 8/King County
John Palmer, U.S. Environmental Protection Agency

Dan Gariepy, Department of Ecology
Abbey Stockwell, Department of Ecology
Anne Dettelbach, Department of Ecology
Bruce Wulkan, Puget Sound Partnership
Bob Vadas, Washington Department of Fish and Wildlife
Heather Ballash, Washington Department of Commerce
Anthony Boscolo, Washington Department of Commerce
Lynn Kohn, Washington Department of Commerce

ATTACHMENT C



ATTACHMENT D

WHO'S COVERED UNDER THE MUNICIPAL STORMWATER PERMITS?

Phase I Cities and Counties				
Seattle				Snohomish County
Tacoma				King County
				Pierce County
				Clark County
Western Washington Phase II Cities and Counties				
Aberdeen	Des Moines	Lakewood	Orting	Cowlitz County
Algona	DuPont	Longview	Pacific	Kitsap County
Anacortes	Duvall	Lynden	Port Angeles	Skagit County
Arlington	Edgewood	Lynnwood	Port Orchard	Thurston County
Auburn	Edmonds	Maple Valley	Poulsbo	Whatcom County
Bainbridge Island	Enumclaw	Marysville	Puyallup	
Battleground	Everett	Medina	Redmond	
Bellevue	Federal Way	Mercer Island	Renton	
Bellingham	Ferndale	Mill Creek	Sammamish	
Black Diamond	Fife	Milton	SeaTac	
Bonney Lake	Fircrest	Monroe	Sedro-Woolley	
Bothell	Gig Harbor	Mountlake	Shoreline	
Bremerton	Granite Falls	Terrace	Snohomish	
Brier	Issaquah	Mount Vernon	Snoqualmie	
Buckley	Kelso	Mukilteo	Steilacoom	
Burien	Kenmore	Newcastle	Sumner	
Burlington	Kent	Normandy	Tukwila	
Camas	Kirkland	Park	Tumwater	
Centralia	Lacey	Oak Harbor	University Place	
Clyde Hill	Lake Forest	Olympia	Vancouver	
Covington	Park		Washougal	
	Lake Stevens		Woodinville	

<http://www.ecy.wa.gov/programs/wq/stormwater/municipal/MuniStrmWtrPermList.html>

ATTACHMENT E

Resources

Biotic criteria associated with land cover studies:

- Horner, R.R., and C.W. May. 1999. Regional study supports natural land cover protection as the leading best management practice for maintaining stream ecological integrity. Proceedings of the Comprehensive Stormwater and Aquatic Ecosystem Conference. Auckland, New Zealand. 12 pp. <http://stormwater.cecs.ucf.edu/research/bioassessment/pugetsoundfinalreport.pdf>
- Booth, D.B., and L.E. Reinelt. 1993. Consequences of urbanization on aquatic systems — measured effects, degradation thresholds, and corrective strategies. Pages 545–550 in U.S. Environmental Protection Agency (ed.). Proceedings Watershed '93: a national conference on watershed management. Alexandria, VA (<http://www.sciencetime.org/ConstructedClimates/wp-content/uploads/2013/01/BoothReinelt1993.pdf>).

Density as a BMP Publications:

[Dense and Beautiful Stormwater Management](#), Laurence Aurbach, Ped Shed Blog, 2010.

[Watersheds, Walkability and Stormwater](#), Stormwater: The Journal for Surface Water Quality Professionals, 2011.

[Is Denser Greener? An Evaluation of Higher Density Development as an Urban Stormwater-quality Best Management Practice](#), John S. Jacob and Ricardo Lopez, Journal of the American Water Resources Association, 2009.

[Forest Cover, Impervious-Surface Area, and the Mitigation of Stormwater Impacts](#), Derek Booth, David Hartley and Rhett Jackson, Journal of the American Water Resources Association, 2007

[A Browner Shade of Green](#), Lisa Nisenson, Planetizen, 2007.

[The High Cost of Free Curb and Gutter](#), Lisa Nisenson, Planetizen, 2013.