

# ***Building cities in the rain: background memo***

## **Introduction**

Consistent with the Growth Management Act, [VISION 2040](#) sets forth a vision and strategy for accommodating growth in the central Puget Sound region by concentrating housing and jobs in designated growth centers. In most areas, 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 [Puget Sound Partnership Action Agenda](#) also calls for concentrated growth in UGAs and improved stormwater controls.

However, the Puget Sound Regional Council [Growth Management Policy Board](#) (GMPB) has heard concerns from cities that the high cost of site-by-site stormwater regulations, in combination with other costs such as demolition, brownfield remediation, historic preservation, and aging infrastructure repairs, may stifle redevelopment of urban areas. If costs are too high developers may look outside concentrated growth centers for lower cost strategies or options for their projects, or down-size redevelopment projects to avoid triggering thresholds for expensive stormwater requirements to the detriment of desired density.

Some areas have found regional stormwater facilities can help address the challenges of infill development, but those approaches may not work in all cities depending on local real estate markets, or constraints of local geology or hydrology.

The South Central Action Area Caucus Group *Subcommittee on Stormwater and Infill Development* is building on Growth Management Policy Board discussions with help from Commerce (see sidebar). This memo provides background information on stormwater management challenges in infill situations based on information presented to the GMPB as well as preliminary input from interviews and meetings with builders, planners and state and local stormwater managers.<sup>1</sup>

---

**Who, What and Why:** The [South Central Action Area Caucus Group](#) is a regional “Local Integrating Organization” (LIO) designated with advancing the [Puget Sound Action Agenda](#). This project is intended to further one of the group goals: “Better alignment of land use planning with conditions for, and implementation of, municipal NPDES permits to reduce stormwater impacts.”

*This memo was prepared by Department of Commerce with a grant from the National Estuary Program directed at promoting regional collaboration efforts that advance protection of Puget Sound. For information visit the project [EZ-View website](#); or contact [Tim Gates](#), Commerce, at 360.725.3058; or [De'Sean Quinn](#), Caucus Group Coordinator, at 206.263.3420.*

---

---

<sup>1</sup> Including meetings of the American Public Works Administrators; MBA-Pierce Co; the Pierce Co Growth Management Coordinating Committee.

## Stormwater permit introduction

The regulations of concern are found in Clean Water Act “NPDES”<sup>2</sup> permits issued by Department of Ecology, under delegated authority from the EPA. The permits regulate discharges to surface waters from publicly owned [municipal separate stormwater systems](#) (MS4s) such as streets, curbs and gutters, and storm drains. Permits have been phased in over time following EPA regulations. “[Phase 1](#)” permits are issued to Clark, King, Pierce, and Snohomish Counties and the cities of Seattle and Tacoma. 82 cities and 5 counties fall under the Western Washington “[Phase 2](#)” permit.

Both permits require counties and cities to adopt regulations requiring best management practices (BMPs) for new development and redevelopment projects that meet certain thresholds.<sup>3</sup> 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. See [Ecology’s May 2013 presentation to the GMPB](#) for an introduction to the history and content of the permits.

### New permits align requirements for Phase I and II jurisdictions

New NPDES permits went into effect August 2013.<sup>4</sup> Under the previous permit Phase II jurisdictions had fewer stormwater protection obligations than Phase I jurisdictions, including an exemption for project sites and subdivisions less than 1 acre in size.<sup>5</sup> The PSRC Growth Management Policy Board heard [concerns from the City of Tacoma](#) that more restrictive Phase I regulations were a factor in projects locating in less densely developed Phase II jurisdictions. The new permits eliminate most of the regulatory differences between the two permits, including the 1-acre exemption. Once jurisdictions update their codes consistent with the new permit, the requirements that apply to development and redevelopment in both Phase I and Phase II jurisdictions will be identical.<sup>6</sup>

Both permits now require Low Impact Development (LID) wherever feasible. The purpose of LID is to more closely mimic natural processes through better site design and by getting the water into the ground rather than letting it flow horizontally as runoff. Ecology’s [2012 Stormwater Management Manual for Western Washington](#) includes two approaches. One is a prescribed “list” approach to evaluate what LID BMPs are feasible for a given site. The other allows the user to select any combination of approved BMPs to demonstrate compliance with the LID performance standard through hydrologic modeling.

Urban areas have somewhat more flexibility than do rural areas in meeting LID requirements. Parcels five acres in size and larger *outside Urban Growth Areas (UGAs)* must meet the LID performance standard and do not have the option to use the more flexible list approach. Refer to [Ecology’s flow chart](#).

---

<sup>2</sup> NPDES stands for National Pollutant Discharge Elimination System.

<sup>3</sup> Phase I permit: Section S.5.C.5; Phase II permit: Section S.5.C.4

<sup>4</sup> Both updated Phase I and Phase II permits have been appealed.

<sup>5</sup> These thresholds and differences were derived from federal rules.

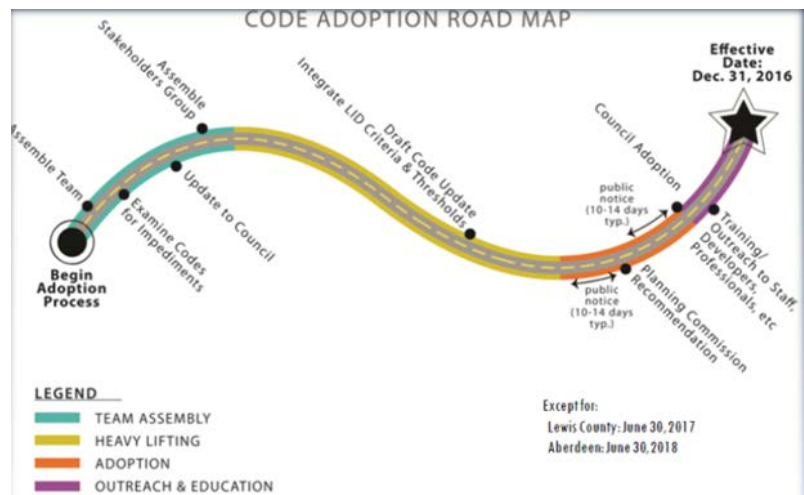
<sup>6</sup> There will still be differences in other permit requirements, such as source control, structural retrofits, inspection requirements, pilot watershed scale planning, and education/outreach.

## Addressing costs during GMA periodic update and stormwater review

The Legislature aligned the deadlines for updating local stormwater codes to meet the terms of the new permits with the required review of comprehensive plans and development regulations as part of the Growth Management Act [periodic updates](#).<sup>7</sup> In addition to requiring jurisdictions to adopt new site and subdivision stormwater codes, the new permits require review of *other land use codes* and identify opportunities to reduce impervious surface, native vegetation loss, and stormwater runoff. There are a host of existing land use regulations that intersect with stormwater requirements, such as Subdivision, Short Plat, Clearing & Grading, Landscaping, Critical Areas Ordinances, and Road, Parking and Utility Standards.

The Puget Sound Partnership prepared a [guidebook](#) for integrating LID into local codes that outlines a collaborative process to reviewing codes with staff from public works, planning, building, and fire and public safety departments. Ecology will be conducting follow-up training on how to use the manual in 2014.

At the May 2013 GMPB meeting the [Department of Commerce](#)



recommended jurisdictions use the review process outlined in the PSP manual as an opportunity to look at the development process holistically, and reduce conflicts or “pinch points” between stormwater requirements and other regulations that make infill development more challenging, to ensure the entire suite of development regulations support the direction set by comprehensive plans. For example, local governments may look for barriers to implementing public/private partnerships such as sharing costs for neighborhood or regional stormwater facilities.

The code audit may also be an opportunity to consider adopting incentives into codes, e.g., for vegetative roofs or rainwater harvesting that are not required BMPs, but can help reduce stormwater flows and have other environmental benefits.

In addition, Commerce recommended working with the development community to identify conflicting substantive requirements and also identifying improvements to procedural steps that may lead to costly delays in development review.

<sup>7</sup> The deadline for amending stormwater codes is June 30, 2015 for Phase I jurisdictions. Phase II jurisdictions in King, Pierce and Snohomish Counties have until December 31, 2016. This staggered schedule is important because many of the smaller jurisdictions follow in the path of the larger jurisdictions (e.g., cities in King County may adopt a revised County manual).

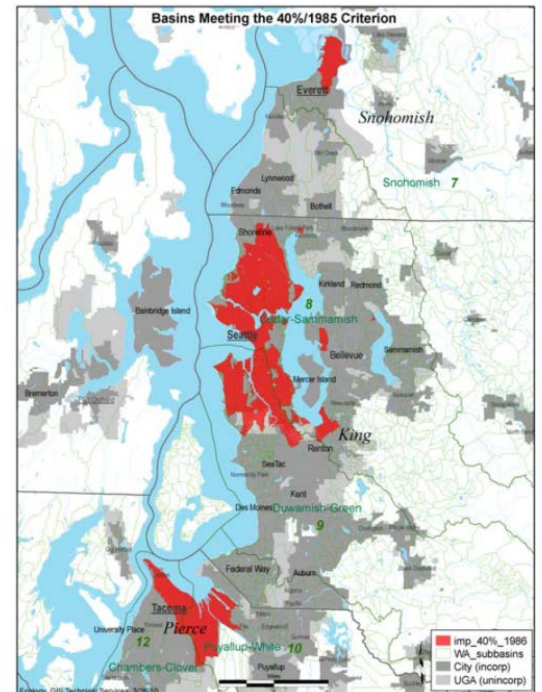
## Flow control requirements are major cost concern

The major cost concern raised at the GMPB and in meetings and interviews with builders, stormwater managers and planners relate to [flow control requirements](#). The default regulations require control facilities (e.g., ponds or vaults) designed to *match “pre-developed” discharge rates* from 50% of the 2-year peak flow to the 50-year peak flow. The standard pre-developed condition is a *forested land cover*.<sup>8</sup> The idea is that over time as individual sites are redeveloped sites they will act more like the native landscape, releasing water into streams more steadily, rather than in rapid pulses that can destroy habitat.

Flow controls are not needed for projects that involve only interior remodeling of a building or replacing a parking lot without expanding its area, but they do apply to relatively low thresholds of redevelopment.<sup>9</sup>

Some infill areas in Puget Sound have **reduced flow control standards**. In areas where drainage basins have had more than 40 percent of their land covered in impervious surfaces since 1985, developments only have to match *existing* flow conditions, rather than forested conditions.<sup>10</sup> [See Ecology’s web site](#) for a map of these areas (often called the “red zones”) and the scientific rationale for the less stringent flow control standard.

Sites that **discharge directly** to larger lakes, rivers and Puget Sound do not need to meet the flow control or LID performance standard, and the LID “list” approach has reduced requirements.<sup>11</sup>



The cost concerns seem to be most acute for jurisdictions that cannot discharge directly to exempt waters, or are not in the “red zone.” Concerns are not usually expressed as fundamental problems with the permit goals, but rather that the default requirements do not give enough “credit” for improving existing impervious areas through redevelopment, as projects will usually trigger water quality improvements.

## Regional approaches to reducing costs

Ecology’s permits allow for alternatives to the standard “site-by-site” approach to managing stormwater. Jurisdictions have the option to provide necessary flow control and/or water quality treatment at **regional stormwater facilities** constructed at a down gradient site rather than at a development site itself.

<sup>8</sup> Areas that were prairie prior to settlement need to match meadow flow conditions.

<sup>9</sup> See Minimum Requirement No. 7 in both permits.

<sup>10</sup> Appx 1-F, Ecology 2012 Stormwater Manual

<sup>11</sup> “Flow control exempt surface waters” are listed in Appendix 1-E of the 2012 Stormwater Management Manual



At the May 2013 GMPB, the [City of Redmond presented a case study](#) of how regional facilities can support dense urban redevelopment. Regional facilities use less land than individual facilities, reduce existing impacts to streams, reduce the cost of new development, make efficient use of public funds (both construction and ongoing operational costs), and reduce long-term maintenance. At redevelopment sites, developers pay into a collective fund that is used to pay for regional facility development.<sup>12</sup>

Developing regional facilities takes a tiered approach: collecting data for the area, planning for regulatory compliance tracking, and determining how to pay for the facilities. In the case of Redmond, the city requires development to contribute via ordinance, and then “payed the project forward” with public funds. The city established a surcharge area and is building regional facilities that replace the need for hundreds of individual vaults.

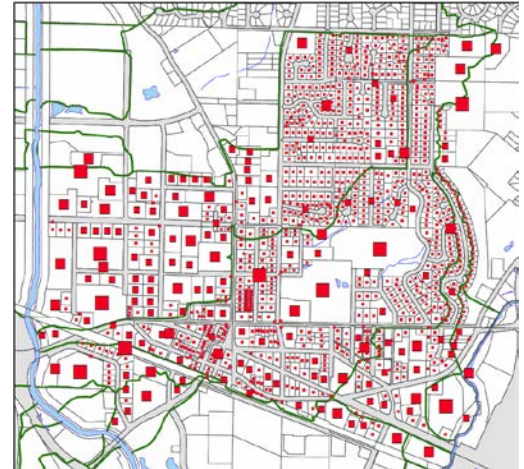
The city is paying for the facility through utility rates, connection fees, and bonds. The city also benefited from state grants. Like most utilities, the city’s base rate is based on “Impervious Unit” (2,000 square feet of impervious surface).

The city allows adjustments/incentives to reduce stormwater impacts (e.g., lots with over 30% impervious surface pay more, and discounts are offered for infiltrating, treating runoff or controlling flows). The Connection charge can be reduced if a development infiltrates clean roof runoff.

The approach Redmond is taking in their downtown area was possible because the city could build a regional trunk line to a flow control exempt water body. Many cities do not have the option to build a trunk line to eliminate flow control requirements on individual parcels. The city also noted that building regional facilities takes careful analysis of market conditions and redevelopment potential, and may not be feasible everywhere.

## Basin/watershed planning option

Another alternative to following the default “site-by-site” requirements is using **basin planning** to either establish an alternative flow control standard and/or set a flow control strategy tailored to the flow regime of a specific basin. At the [May 2013 GMPB](#) the City of Redmond also introduced their [draft](#)



Above: Red squares indicate stormwater vaults that would be required in 500 acres of downtown Redmond if the area redeveloped using a site-by-site approach.

Below: Regional facilities free up land for development.



<sup>12</sup> Note: New development cannot pay in and use the regional facilities until the regional facility is built. Redevelopment projects can pay into a fund to support a project to be completed within approximately 5 years.

[Citywide Watershed Management Plan](#) that is currently under review. The city's goal with basin planning is to address multiple regulations with one effort (TMDL, NPDES, ESA), prevent new stormwater impacts everywhere in the basin, focus improvements to existing stormwater impacts where it makes sense; and create a citywide plan that addresses stormwater and environmental asset needs.

The city's comprehensive watershed planning effort involved extensive collaboration with many partners over many years. The basic elements are: characterizing the watersheds; setting goals for future desired conditions; developing an implementation plan, identifying methods for measuring performance and adaptively managing over time. The city would approve a detailed plan for specific improvements by watershed that would identify specific areas where new stormwater impacts would be addressed. New impacts would typically be addressed at or close to the site. City projects such as road projects could benefit from the up-front analysis.

Comprehensive planning has historically focused mostly on land use and transportation, and stormwater is not always well integrated. Stormwater infrastructure is too expensive and land-consuming to not plan.”  
- John Spangler, Redmond

Although basin planning is recommended by US EPA, Ecology, and the Puget Sound Partnership, there are not many examples to date, and the level of effort required may be daunting for many jurisdictions.<sup>13</sup>

## Existing analysis of cost impacts of stormwater regulations

While the planning literature is replete with analysis and documents addressing [the many challenges of infill development](#), there is no information directly addressing cost implications of Ecology's latest stormwater permit in dense areas. Existing sources all cite the challenge of getting a handle on costs.

- At the [July 2013 PSRC Growth Management Policy Board meeting](#) speakers from the consulting firm OTAK outlined general cost-effective strategies for infill areas at the site scale, such as integrating stormwater and LID into development plans early as environmental/multi-use amenities; and emphasizing the importance of public/private partnerships. The presentation also emphasized the cost benefits of comprehensive basin planning approaches for dense urban areas. OTAK included citations to information about relative costs for LID BMPs and O&M costs, but warned that innovation is advancing rapidly, so determining costs is a fast-moving target.<sup>14</sup>
- The June 2013 [Cost Analysis for Western Washington LID requirements and Best Management Practices](#) found that in various modeled scenarios LID BMPs could reduce costs by reducing the size of centralized runoff treatment and flow control facilities. However, the scenarios did not include redevelopment in dense urban areas, and the report acknowledged that “Stormwater management approaches at ultra-urban redevelopment sites may vary significantly from the

---

<sup>13</sup> See Section 7 of Appendix 1 in both permits. The City of Kirkland is currently using a \$250,000 NEP grant from Ecology for Totem Lake basin planning.

<sup>14</sup> [Rapid Assessment of the Cost-Effectiveness of Low Impact Development for CSO Control, Landscape and Urban Planning Volume 82, Issue 3 \(Monalto, et al, 2007\)](#)

approaches included in this analysis. Different BMPs... would be a significant cost element in scenarios where the building footprint occupies a large percentage of the parcel.”




- King County’s [Stormwater Retrofit Analysis and Recommendations for Juanita Creek Basin](#) was frequently cited in interviews with stormwater managers as context for the magnitude of costs that may be involved in recovering urban watersheds. The basin is nearly 70% developed with stormwater facilities that are critically lacking or undersized relative to current stormwater standards. The report includes an evaluation of the cost to retrofit the basin to meet Ecology’s new standard by applying LID BMPs to most impervious surfaces, as well as conventional end-of-pipe flow control and treatment facilities. The modeling results indicate estimated cost in current dollars to retrofit the basin would be \$200 million per square mile. This estimate lumps together costs for all private and public installations as well as operations and maintenance.
- A June 2011 report by ECONorthwest [Managing Stormwater in Redevelopment and Greenfield Development Projects Using Green Infrastructure](#) focused on economic factors that influence developers’ decisions. A literature review that found “no broad-scale studies that systematically investigated the impacts that stronger stormwater regulations may have on different types of development, specifically greenfield projects and redevelopment projects.” As for research describing the locational behavior of firms, they found “no studies that used statistical or quantitative methods to determine how developers have responded to changes in stormwater regulations.”
- [Stormwater Design for High Intensity Redevelopment Projects in the Chesapeake Bay Watershed](#) includes some cost analysis demonstrating the challenges in infill areas specific to the Chesapeake region, with recommendations for offset/in-lieu fee programs. However, the costs and analysis may not be relevant to the Puget Sound region.

## National discussion on stormwater control requirements

Puget Sound jurisdictions are not alone in raising concerns over the impacts of stormwater requirements in dense areas. EPA’s Smart Growth Office and others have been asking whether the benefits of density are adequately accounted for in stormwater regulations. For example:

- EPA’s [Protecting Water Resources with High Density Development](#) presents analysis that concludes higher-density development produces less runoff and less impervious cover than low-density development; and for a given amount of growth, lower-density development impacts more of a watershed.
- Another EPA manual includes guidance on [Using Smart Growth Techniques as](#)

EXHIBIT 5: 10,000-Acre Watershed Accommodating 10,000 Houses

Scenario A	Scenario B	Scenario C
		
10,000 houses built on 10,000 acres produce: 10,000 acres x 1 house x 18,700 ft <sup>3</sup> /yr of runoff = 187 million ft <sup>3</sup> /yr of stormwater runoff Site: 20% Impervious cover Watershed: 20% Impervious cover	10,000 houses built on 2,500 acres produce: 2,500 acres x 4 houses x 6,200 ft <sup>3</sup> /yr of runoff = 62 million ft <sup>3</sup> /yr of stormwater runoff Site: 38% Impervious cover Watershed: 9.5% Impervious cover	10,000 houses built on 1,250 acres produce: 1,250 acres x 8 houses x 4,950 ft <sup>3</sup> /yr of runoff = 49.5 million ft <sup>3</sup> /yr of stormwater runoff Site: 65% Impervious cover Watershed: 8.1% Impervious cover

[Stormwater Best Management Practices](#), including acknowledging benefits of infill development.

- The Journal of the American Water Resources Association article [Is Denser Greener?](#) presents an evaluation of higher density development as an urban stormwater best management practice.
- The Congress for New Urbanism's [Rainwater-in-Context Initiative](#) includes principles and examples of stormwater management practices that support dense, walkable urban communities.
- The StormH2O article "[Watersheds, Walkability and Stormwater](#)" summarizes the benefit of incorporating per-capita approaches to regulating stormwater.
- The Planetizen article "A [Browner Shade of Green](#)" was an early call for context-sensitive stormwater solutions that acknowledge the benefits of density.

The US EPA has [initiated rulemaking to update national stormwater regulations](#), and is considering incorporating [the benefits of redevelopment](#)<sup>15</sup> into the next generation of rules. Even without new direction from EPA, there may be opportunities for Ecology to incorporate the benefits of infill as it implements the municipal stormwater permits to ensure local infill goals can be achieved.<sup>16</sup>

## What's next for "Building cities in the rain"

**Gather more good examples:** At the GMPB, the City of Redmond provides an example of regional stormwater treatment for a subarea, as well as a comprehensive multipurpose city-wide basin planning approach; and OTAK provided good general principles and practices to reduce costs. Commerce will contract with [SvR Design](#) to build on these examples with a portfolio of other innovative approaches adopted to address the challenge of managing stormwater in a variety of infill areas. The examples will highlight strategies that can inform updated GMA and stormwater policies, regulation and incentives.

**Gather more cost information?** Concerns about stormwater regulations have been characterized as "NPDES v GMA." The Pollution Control Hearings Board has affirmed that the GMA requires local governments to mitigate the effects of stormwater and the permits are the means to do that.<sup>17</sup> However, the questions about cost do not seem to be about the *authority* of Ecology conflicting with local authority under GMA; they are about potential adverse consequences of applying certain technical standards. To assess the impact of stormwater regulations on infill development, policy-makers would benefit from accurate, recent information on relative costs in various geographies and real estate markets. Several ideas emerged from interviews:

- At the individual project scale, an evaluation of development pro formas to determine the relative hard and soft costs of meeting stormwater regulations in a variety of contexts. MBA-Pierce County is considering conducting such a study.
- At a broader scale, evaluation of subarea plans where jurisdictions have prepared detailed cost analysis of regional facilities to support redevelopment.

---

<sup>15</sup> July 2013 presentation, see slide 11 of 17: "Considering relaxed standard for redevelopment: Recognizes site constraints and benefits to reusing already developed site; Encourages redevelopment to revitalize urban communities; Considering additional incentives for smart growth and brownfields development"

<sup>16</sup> [WAC 365-196-530](#)

<sup>17</sup> PCHB 2008 Phase I decision, reiterated in PCHB 12-093c, 10/2013 Order on Summary Judgment