

Reducing Pressures on the Puget Sound Ecosystem from Runoff from the Built Environment (Draft, October 13, 2011)

The Challenge

Stormwater runoff poses a high risk to the health of Puget Sound by causing two major problems.

First, stormwater transports a mixture of pollutants such as petroleum products, heavy metals, animal waste and sediments from construction sites, roads, highways, parking lots, lawns and other developed lands, with the following results:

- Stormwater pollution has harmed virtually all urban creeks, streams and rivers in Washington State.
- Stormwater is the leading contributor to water quality pollution of urban waterways in the state.
- Two species of salmon and bull trout are threatened with extinction under the federal Endangered Species Act. Loss of habitat due to stormwater and development is one of the causes.
- Shellfish harvest at many beaches is restricted or prohibited due to pollution. Stormwater runoff is often one of the causes.
- Stormwater likely contributes to the killing of high percentages of healthy coho salmon in Seattle creeks within hours of the fish entering the creeks, before the fish are able to spawn.
- English sole are more likely to develop cancerous lesions on their livers in more urban areas. Stormwater likely plays a role.

Second, during the wet, winter months, high stormwater flows, especially long-lasting high flows, can:

- Cause flooding.
- Damage property.
- Harm and render unusable fish and wildlife habitat by eroding stream banks, widening stream channels, depositing excessive sediment and altering natural streams and wetlands.

In addition, more impervious surface area means less water soaks into the ground. As a result, drinking water supplies are not replenished and streams and wetlands are not recharged. This can lead to water shortages for people and inadequate stream flows and wetland water levels for fish and other wildlife.

A significant amount of the work completed for the 2011 Action Agenda Update was informed by the draft *Stormwater Vision and Financing Strategy for Puget Sound*. The purpose of the *Stormwater Vision* is to suggest comprehensive actions and financing strategies that will reduce polluted surface runoff from urban and rural landscapes to Puget Sound.

Relationship to Recovery Targets

The 2020 ecosystem recovery target for runoff from the built environment is insects in small streams. This target was chosen because runoff from the built environment, or urban runoff, directly affects the structure, habitat and fish and wildlife in small, wadeable streams. Insects in small streams serve as good indicators for the relative biological health of Puget Sound small lowland streams. If communities of native insects in these streams are plentiful and diverse, other biological components, including salmonids, should be healthy as well. A functioning, resilient Puget Sound requires lowland streams that support the salmonids and invertebrates native to this region, as indicated by benthic index of biotic integrity (B-IBI) scores. The target states that, “by 2020, 100 percent of Puget Sound lowland stream drainage areas monitored with baseline B-IBI scores of 42-46 or better retain these “excellent” scores and mean B-IBI scores of 30 Puget Sound lowland drainage areas improve from “fair” to “good.”

The Puget Sound Stream Benthos, a website developed by officials from the City of Seattle, King County, Pierce County, Snohomish County, and others provides a database system that allows sharing of benthic macroinvertebrate data among organizations and provides tools for calculating metrics and indices. The goal of the site is to store macroinvertebrate data in a manner that allows for reliable comparisons across sites and programs over time.

Other targets closely associated with the management of urban runoff at the site and landscape scales include: land development, land use and land cover, freshwater quality, shellfish beds, toxics in fish, and marine sediment quality.

C2. Use a comprehensive approach to manage urban stormwater runoff at the site and landscape scales.

C2.1 Manage urban runoff at the basin and watershed scale.

Urban runoff cannot be fully managed at the site and parcel level alone - it is also necessary to manage runoff at the broader basin and watershed scales. Numerous regional and national studies show that as native vegetation and soils are replaced by rooftops, roads and other hard surfaces, numerous environmental indicators decline. Local land use decisions (i.e., location and intensity of development) directly affect urban runoff within watersheds. This sub-strategy addresses protection of native vegetation, soils and high quality habitat; siting of new development; and better tying land use with stormwater management.

Native vegetation & high quality streams

In order to protect native vegetation, soils and high quality habitat, particularly in remaining stream drainages with “excellent” B-IBI scores, through actions outlined in strategies A and B, it requires mapping locations of these streams, and carrying out strategies to protect the streams. This involves using tools such as the Puget Sound Watershed Characterization Project (Watershed Characterization),

growth management planning, critical areas and other land development regulations, LID requirements in municipal NPDES permits, land conservation programs, landowner incentive programs, and other measures. (NOTE: Refer to Land Development Pressure Reduction sections for additional detail.)

Areas to protect, develop & restore

Site new development appropriately, using the watershed characterization study, GMA, SMA, SEPA, and other tools. Use Watershed Characterization, other watershed plans, and, where needed, finer scale analyses to identify areas most appropriate to protect, develop and restore through structural retrofits, legacy pollutant removal, and other means. Where development is targeted, use smart growth concepts to ensure compact, mixed-use, mass-transit supported development increases. (NOTE: Refer to Land Development Pressure Reduction sections for additional detail.)

Land use & stormwater

Support development of watershed plans based on Watershed Characterization data that integrate land use planning and stormwater management by either: a) reactivating and funding Clean Water Act 208 planning to include major land uses (urban, agricultural/rural, and forestry) and water resource elements such as stormwater, combined sewers, wastewater, water supply, reuse and non-point sources; or b) supporting and funding the development of stormwater plans, watershed plans, and/or WRIA plans that address the full spectrum of water resource elements and land use on a regional basis. Evaluate impacts of land use decisions on stormwater runoff and receiving waters. Align regulations with watershed plans, including municipal, industrial and construction NPDES permits, non-point source control programs, CAO, SMA, SEPA, and the GMA if warranted.

Performance Objectives for Ongoing Programs

The Puget Sound Watershed Characterization (Watershed Characterization), a collaborative effort between Ecology, the Partnership, and the Department of Fish and Wildlife is designed to provide local governments with better information to improve land use planning and resource protection at the watershed scale. The Watershed Characterization is a regional-scale perspective that divides the Sound geographically into three areas: Those most important to protect, those most beneficial to restore, and those most suitable for development. It is designed to:

- Describe a multi-scale framework for land-use planning.
- Provide results from assessments that can help guide the protection and restoration of watersheds and the habitats they support.
- Explain the role and proper application of these assessments.

Near Term Actions

C2.1 NTA 1: **Protect best remaining streams: King County, in cooperation with agencies populating the Puget Sound Stream Benthos database, identify and map remaining streams with “excellent” B-IBI scores and develop an overall strategy and tailored actions to protect these areas.**

Performance measures: Map of all streams with “excellent” B-IBI scores; robust strategies and actions to protect the stream drainages

C2.1 NTA 2: **Watershed characterization:** Washington State Department of Ecology, in cooperation with the Puget Sound Partnership and DNR, completes the Puget Sound Watershed Characterization Project and shares information & guidance from this & EPA-funded watershed planning projects to inform local land use planning decisions regarding where to protect, develop, or restore. Follow up with finer scale analyses to determine locations and types of restoration strategies.

Performance measures: Completed study; developed and distributed guidance or report; local governments using this in land use planning; local governments and state using this to inform restoration efforts

C2.1 NTA 3: **System mapping:** Washington State Department of Ecology, in cooperation with local governments and DNR, receives additional resources to work to better understand and manage the region's stormwater infrastructure, develop protocols, methodology and definitions, and develop geo-referenced databases that can be compiled into an overall geo-referenced database of the Sound's regulated, municipal stormwater system.

Performance measures: Protocols, methodology and definitions to guide mapping and documentation efforts; completed geo-referenced database

C2.2 Prevent problems from new development at the site & subdivision scale.

New development at the site and sub-division scale can be a significant source of stormwater related problems. Under the federal Clean Water Act, Ecology administers National Pollutant Discharge Elimination System (NPDES) stormwater permits for municipalities, industries, construction sites and the Washington State Department of Transportation (WSDOT).

Municipalities with populations over 100,000 are currently covered by NPDES "Phase I" permits. In Puget Sound, this includes King, Pierce and Snohomish counties and the cities of Seattle and Tacoma. Municipalities with populations under 100,000 located in urbanized areas are covered under "Phase II" permits. Ecology also maintains the region's stormwater technical manual, which contains minimum technical standards and best management practices for managing stormwater from all new development and redevelopment projects in the basin.

Stormwater NPDES permits

Issue, implement, oversee, enforce compliance with, and improve over time NPDES stormwater permits for western Washington according to federally established timelines. Evaluate need to bring in additional local governments under municipal permits to cover more land area of the basin. Seek funding for municipal permittees to carry out permit requirements increases. Incorporate measures in the construction general permit to protect native soils and site hydrology. Ensure permits for federal and tribal lands/facilities are consistent with state-issued NPDES standards and permits. Ensure that state-approved stormwater manuals are updated as needed.

LID

Continue to develop new and revise existing technical guidance and educational materials to help transition the region to the use of low impact development (LID) and other innovative approaches. Continue to refine how these techniques are modeled, sited, designed and maintained in state-approved runoff manuals. Continue to refine and provide incentives for LID & other innovative approaches. Seek funding for local governments for review of development proposals, inspections, enforcement and maintenance of LID facilities.

Consistent management of new development basin-wide

To protect and restore resources and beneficial uses everywhere in the basin, ensure that new development outside NPDES-permitted areas also includes flow control and treatment standards and thresholds that are technically equivalent to the Stormwater Management Manual for Western Washington. This includes using innovative approaches and techniques, such as LID, where feasible.

Performance Objectives for Ongoing Programs

Anticipated results from Ecology's efforts to control stormwater pollution include reducing contamination of streams, rivers, estuaries, lakes, and groundwater due to stormwater runoff from roads and other impervious surfaces. Expected performance measures include:

- 3,500 construction and industrial stormwater dischargers that require permits are managed.
- New permit applicants get a response within 60 days of application receipt.
- 120 municipal stormwater permits are managed.
- Permittees get Web-based information and support for low-impact development, emerging treatment technologies, and permit technical assistance.

In 2009, the state legislature directed the Department of Ecology to work with stakeholders to establish a stormwater technical resources center. The Washington Stormwater Center, jointly managed by Washington State University Extension, Puyallup and the University of Washington, Tacoma Urban Waters will provide technical assistance to municipal and industrial NPDES permittees, education and training, research and monitoring of LID practices, and review and approval of new stormwater BMPs.

Another element of effective management of urban runoff is promoting the use of innovative low impact development (LID) measures. Partnership staff, Ecology, WSU Extension, UW, WSDOT, conservation districts, local governments and others in the public and private sectors provide funding, technical assistance, education, monitoring and research on LID to improve knowledge and expertise.

Near Term Actions

C2.2 NTA 1: **Muni NPDES Permits:** Washington State Department of Ecology reissues the municipal NPDES permits and provides financial assistance to permittees for implementation, particularly for code changes, stormwater system mapping, operations and maintenance, inspections and enforcement. Ensure permits contain strong requirements for LID, and for status and trends monitoring, effectiveness studies, and source control. Provide additional resources to Ecology for permit oversight and enforcement. Provide incentives to NPDES permittees who, by interlocal agreement, lead or carry out regional or watershed scale NPDES implementation.

Performance measure: Reissued permits with LID and monitoring requirements; financial assistance provided to permittees; incentives provided to permittees for regional implementation; additional resources to Ecology

C2.2 NTA 2: **Treatment:** Washington State Department of Ecology evaluates under which circumstances (i.e., for which pollutants, from which land uses) discharges to Puget Sound should be required to provide treatment beyond sediment removal (i.e., TSS removal) to help meet 2020 recovery targets.

Performance measure: Evaluation with supporting documentation

C2.2 NTA 3: **LID:** Washington Stormwater Center and Puget Sound Partnership provide guidance on proper siting, design, review, installation & maintenance of LID practices. Provide guidance and model ordinances to help local governments add LID requirements to codes and standards. Develop and share information on LID projects, cost comparisons, performance, longevity, maintenance needs, incentives, successes and challenges.

Performance measure: Updated guidance and model ordinances; distribution of info on projects & other listed needs

C2.2 NTA 4: **Outside permitted areas:** Washington State Department of Ecology provides assistance to help non-permitted local governments reduce stormwater impacts to high priority areas, such as shellfish growing areas, salmon-bearing streams, and nearshore areas.

Performance measure: Assistance provided to non-permitted local governments; reduced impacts from stormwater discharges to high priority areas

C2.2 NTA 5: **Evaluate unpermitted areas:** Washington State Department of Ecology evaluates petitions to include unpermitted areas with documented stormwater discharges to shellfish growing areas, or discharges causing other harms, under the municipal NPDES permit.

Performance measures: Evaluation of non-permitted areas for inclusion in municipal permit

C2.2 NTA 6: **Vesting:** Washington Stormwater Center or Puget Sound Institute assess projected implications and impacts of current state vesting laws on aquatic resources and beneficial uses. Prepare report for the Science Panel, ECB and LC.

Performance measures: Report on projected implications and impacts of current vesting laws

C2.3 Fix problems caused by existing development.

[Placeholder for additional background – a statement of the challenge the strategies and NTAs are meant to address]

Structural Retrofit

Over time upgrade, as needed, existing development with stormwater management controls necessary to meet 2020 ecosystem recovery targets. Focus on areas that would benefit most, and assess whether structural upgrades or other means will achieve objectives. Assess level of effort needed (i.e., number of projects and acres retrofitted) to meet goals. Develop new, adequate funding to ensure significant progress is made.

Maintenance

Ensure that all stormwater systems are regularly inspected and maintained to function to engineering design standards. Assess need for and carry out removal of legacy loads from portions of systems. Build

on City of Tacoma’s study on removal of legacy loads. Provide technical and financial assistance to help local governments.

Redevelopment

Ensure that redevelopment policies in state-approved stormwater manuals are fully implemented and bring about improvements to runoff from existing development. Revise policies as needed as one tool to upgrade stormwater controls on existing development.

CSOs

In communities with combined sewer systems, continue to reduce the number of annual CSO events and total volume discharged according to state approved control plans to meet state goals. Encourage the use of green infrastructure techniques.

Comment [EDM1]: Overlap with WW will need to consolidate.

Performance Objectives for Ongoing Programs

[Placeholder for information on what ongoing programs are doing to protect/recovery Puget Sound]

Near Term Actions

C2.3 NTA 1: **Retrofits:** Washington State Department of Ecology and Puget Sound Partnership, in partnership with local governments, develop a regional prioritization process for structural stormwater retrofits. Assess the level of effort (i.e., projects and acreage) needed. Develop new funding for planning and construction, and begin projects. Include retrofits to transportation network.

Performance measure: New regional SW retrofit prioritization process; development of new funding source; assessment of level of effort needed

C2.3 NTA 2: **Restore degraded streams:** King County, in cooperation with agencies populating the PS Stream Benthos database, identify & map stream drainages with “fair” B-IBI scores, and develop prioritized list, strategies and actions to improve scores of 30 of these streams.

Performance measures: Map of targeted drainages; prioritized list for restoration; strategies, actions, and budgets

C2.3 NTA 3: **Legacy pollutants:** Washington State Department of Ecology, in cooperation with local governments, receives additional resources to provide guidance and financial assistance to local governments to help them remove legacy pollutant loads from their stormwater systems.

Performance measure: Shared guidance; financial assistance to permittees

C2.3 NTA 4: **Retrofit in permits:** Washington State Department of Ecology ramps up retrofit requirements in municipal NPDES permits and receives additional resources to help permittees develop and implement structural retrofit programs.

Performance measures: Clearer, increased requirements for retrofits in municipal permits with ramp-up time; technical and financial assistance to permittees

C2.4 Control sources of pollutants.

Stormwater runoff from urban and rural areas is a significant source of toxics, nutrients, and pathogens delivered to Puget Sound. (Even small concentrations of polluted runoff are bad for fish and other aquatic life.)

Proper control and treatment of this stormwater, as discussed in earlier strategies and actions, is critical to Puget Sound recovery. It also is important to reduce the amount of contamination that becomes caught up in the stormwater stream. Many pollutants, such as dissolved metals, are very expensive and difficult to remove from the stormwater stream through treatment BMPs. Other pollutants, like pathogens, are very commonly found in stormwater, and, like other pollutants, cause problems in receiving waters. It is far more cost-effective, and effective, to minimize the introduction of pollutants to stormwater than to rely only on stormwater flow control and treatment.

Local pollution & control programs

Develop and carry out local programs to identify and track sources of stormwater-related pollutants and carry out measures to control the sources. Provide guidance and ongoing financial assistance to local governments.

Inspections & enforcement

Carry out periodic inspections of businesses with high likelihood of discharging pollutants of concern, work with property owners & operators to reduce discharges, and use technical assistance, incentives and enforcement to achieve compliance. Use information from local pollution identification efforts, watershed plans, and regional monitoring activities to identify pollutant hotspots/areas to restore. Provide guidance and ongoing financial assistance to local governments.

TMDLs

Carry out stormwater-related TMDL actions through completed water quality implementation plans. (NOTE: See the toxics reduction sections for more strategies related to source control of toxics.)

Performance Objectives for Ongoing Programs

[Placeholder]

Near Term Actions

C2.4.NTA.1: **Source control:** Washington State Department of Ecology provide guidance and financial assistance to local governments to establish & carry out pollution identification & correction programs to reduce bacteria loadings to shellfish growing areas, carry out TMDL actions, and reduce toxics, nutrients and bacteria to nearshore areas.

Performance measures: Guidance and financial assistance to local governments on local pollution identification & correction programs

C2.4.NTA.2: **Inspections:** Washington State Department of Ecology provides technical and financial assistance to local governments, and with local governments, carries out broader inspection, assistance and enforcement programs for business and construction sites. Use results of toxics loading studies to target and prioritize efforts.

Comment [EDM2]: Also addressed in shellfish and ww; will need to consolidate

Performance measures: Increased number of inspections, assistance, and enforcement

C2.4 NTA 3: **Vehicle leak program:** Puget Sound Partnership, in cooperation with WSDOT and advisory committee, convene group to discuss options for developing a new program to inspect and eliminate privately-owned vehicle drips and leaks.

Performance measures: Report on options, benefits, costs, feasibility

C2.5 Provide focused stormwater-related education and training.

Cities and counties need education and training to develop effective local stormwater programs. By developing additional guidance and model ordinances, and providing technical and financial assistance stormwater can be more effectively managed throughout the region.

Education & training

Provide focused information, education and training on stormwater-specific issues for multiple audiences:

- a. Citizens (especially homeowners): Importance of problem; sources of contaminants & effects; their role in helping to solve problems.
- b. Legislators and elected officials: Issues; funding needs; results of significant studies and reports; product bans & phase-outs.
- c. Local government staff: Training on required permit activities, especially inspections and maintenance, source control, & LID implementation.
- d. Business owners: Source control training, other technical assistance.

Utilize PSSH, STORM and other regional efforts for public education & stewardship efforts. Include transportation-related topics.

Performance Objectives for Ongoing Programs

Puget Sound Starts Here (PSSH) is a partnership of regional governments dedicated to improving water quality in Puget Sound and local lakes, rivers and streams. PSSH is a consortium of 57 cities and counties that form the STORM coalition (STormwater Outreach for Regional Municipalities), a Sound-wide consortium of municipalities collaborating on a Sound-focused campaign, and effectiveness enhancement of respective local programs.

- The Washington Stormwater Center also provides NPDES education, permit technical assistance, stormwater management and new technology research, development, and evaluation.

Near Term Actions

C2.5 NTA 1: **Education:** Puget Sound Partnership, Washington State Department of Ecology, local governments and non-profit organizations develop funding for and carry out broad stormwater-focused education and behavior change campaign. Emphasize problems, sources, solutions and roles, funding needs, and stormwater management on home lots. Provide

focused information for legislators on problems, issues, funding needs, results of toxics loading studies, 2020 recovery targets, and ideas and options relating to needed product bans and phase-outs.

Performance measures: Funding and implementation of campaign; behavior changes of homeowners; information to legislators

C2.5 NTA 2:

Training: Washington Stormwater Center; Washington State Department of Ecology and Puget Sound Partnership provide focused training for local government staff on LID project review; inspections and approvals, and to local government staff and private sector on maintenance. Develop new professional certification for stormwater maintenance specialists. Provide business staff and contractors with training on source control, spill recognition, spill response, and erosion control.

Performance measures: Increased professional training with additional emphases on topics listed; new certification for maintenance specialists; new source control training for businesses

C2.6 Assess effectiveness of actions and effects on the environment.

[Placeholder for additional background on the challenge this strategy is meant to address]

Monitoring & Assessment

Ensure the region has a robust, effective program to regularly monitor and assess the effects of stormwater runoff on receiving waters and the effectiveness of BMPs, programs and permit requirements in mitigating these effects. Provide ongoing support to the Stormwater Work Group to coordinate this effort. Ensure the region has an effective process to regularly evaluate new BMPs (TAP-E) and carry out monitoring and science. Provide support to the Washington Stormwater Center for this work. Use results of significant studies, such as the toxics loadings studies, to guide future work

Performance Objectives for Ongoing Programs

In addition to the work previously mentioned about the Washington Stormwater Center, the Stormwater Work Group, an interjurisdictional team of scientists and stormwater practitioners, is collaborating to develop a regional monitoring program for Puget Sound. The group was convened at the request of the Partnership and Department of Ecology, and their work is intended to provide a coordinated approach to quantify stormwater problems in Puget Sound and to help efficiently and effectively manage stormwater.

Near Term Actions

C2.6 NTA 1:

Monitoring & assessment: Washington State Department of Ecology, in cooperation with Stormwater Work Group, carries out the recommendations of the Stormwater Work Group for status & trends monitoring; BMP and program effectiveness; and source control. Develop priorities for and expand implementation of the 2010 Stormwater Monitoring and Assessment Strategy for the Puget Sound Region beyond municipal permit requirements.

Performance measures: Recommendations of the SWG implemented; SWG develops priorities for expanded implementation (to other permits and land uses)

C2.6 NTA 2: **WA. Stormwater Center:** Washington Stormwater Center develops ongoing, stable funding for the Washington Stormwater Center to conduct research on stormwater BMPs; and provide municipalities and businesses with needed information and assistance.

Performance measures: Stable funding for the WA Stormwater Center; stormwater research projects and sharing of info; needed assistance to municipalities and businesses

C2.6 NTA 3: **CSOs:** Washington State Department of Ecology, EPA, and communities with combined sewers develop and share annual report on progress in reducing CSO events. Evaluate existing reduction plans in terms of 2020 targets.

Performance measures: Annual reports on progress. Evaluation of existing reduction plans

Emerging Issues and Future Opportunities

- Significant additional new investment in stormwater management is needed – current levels of investment by all levels of government are not sufficient to address the extent of the problems. Current investments by local governments in municipal NPDES permit programs far exceed state and federal-level investments via grant and loan programs (Stormwater Needs Assessment, add citation). Current investments in addressing problems caused by existing development through structural retrofits are not nearly sufficient – the cost to retrofit existing development for treatment alone is estimated to cost, at a minimum, \$3-16 billion (Needs Assessment, citation). Local stormwater utilities in many cases will need to be increased, and local governments need support to successfully raise local stormwater rates. Concurrently, the level of investment by the state and federal government should be increased significantly to help share the burden of costs (ECB Stormwater Subcommittee Report, add citation)

Science Needs

Preliminary list:

- Will there be any effects on groundwater (i.e., hydrology or quality) from increased infiltration of stormwater?
- Do we need better treatment than basic (80% TSS removal) for discharges to PS? (refers to pollutants not binding to sediments, like oil and grease and dissolved metals and nitrogen). If yes, for which pollutants, and under which circumstances (from which land uses)? Is it better to provide a higher level of treatment for some portion of an area, or provide basic treatment to a broader geographical area? (Tacoma is one resource for this – they’re modeling this – how dense do we need to put in BMPs to reduce impacts of effects?)
- Our region will benefit from a better understanding of the benefits and limitations of LID.
- How much retrofit is needed to meet goals? What “level” of effort is needed, in terms of number of projects and acreage retrofitted?