



**Washington State
Department of Transportation**

Management Plan Stormwater Retrofit Program

Document Revision History

Version 1.0 was created in October 2013 (unfinished). Significant revisions were made in June 2017 to reflect stormwater retrofit policy positions ([Appendix 1](#)), and include flow charts and associated description documents ([Appendix 4](#) and [Appendix 5](#)) that received statewide concurrence in April 2017.

Revision Date	Revision Number	Summary of Changes	Sections	Reviser
12/27/17	1.1	Revised Standalone flow chart notes to reflect review of ownership per RCW 47.24; fixed broken links	Appendix 5; throughout document	J. Ratcliff
3/9/18	1.2	Revised Standalone flow chart notes to improve clarity	Appendix 5	A. Nguyen
2/24/21	1.3	Fixed broken links; Revised references to 2014 Permit; Updated Roles and Responsibilities; Minor wording revision for clarity throughout; Added information about fish passage retrofit	Throughout	J. Crawford S. Pietzold

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Introduction

Most of WSDOT's highways and facilities were built before the federal Clean Water Act and the Washington Water Pollution Control Act were enacted. Thus, many of the existing highways do not have facilities to control stormwater flow or treat stormwater runoff. WSDOT addresses these deficiencies through stormwater retrofits, as required by our [National Pollutant Discharge Elimination System \(NPDES\) State Waste Discharge Municipal Stormwater General Permit](#) (Permit), which is issued by the Department of Ecology (Ecology). The Permit requires WSDOT to use its [Highway Runoff Manual](#) (HRM) to provide consistent stormwater design and planning procedures statewide. The HRM has been deemed equivalent to Ecology's stormwater management manuals.

In 2010, Puget Soundkeeper Alliance appealed WSDOT's Permit. As summarized in *NPDES WSDOT Municipal Stormwater Permit Appeal Settlement* (March 2010), WSDOT agreed to require highway projects in the Puget Sound Basin to meet more stringent project-triggered retrofit requirements than in other regions of the state. WSDOT's Permit describes these requirements and the *Stormwater Management Program Plan* (SWMPP) provides additional details. WSDOT projects use the policies in the HRM to determine specific retrofit requirements.

Purpose of the Management Plan

The purpose of this Management Plan is to document how WSDOT's stormwater retrofit program is organized and managed. The primary focus includes the prioritization, scoping, and design of stand-alone and project-triggered retrofits. In addition, the plan addresses opportunity-based retrofits and outlines roles, responsibilities, and performance metrics for the program.

Revisions to the plan will occur, and be documented on Page 2, as WSDOT staff become aware of issues, learn how to improve methods and delivery of these projects, and as funding levels change.

Program Mission

WSDOT intends to manage stormwater runoff from state highways and protect the quality of receiving waters; and to efficiently and effectively plan, scope, design and construct stormwater retrofit projects in accordance with WSDOT's Mission Statement and Management Principles and to meet the terms of WSDOT's Permit.

Program Description

WSDOT retrofits existing pavement that does not have stormwater treatment or flow control, or for which treatment or flow control is not to current standards contained in the Highway Runoff Manual, using project-triggered, stand-alone, and opportunity-based stormwater retrofits.

Stormwater Retrofit Needs Prioritization

As described previously, WSDOT's Permit describes stormwater retrofit-related requirements, which includes the need to maintain a list of highway segments prioritized for stormwater retrofit. [Appendix 2](#) of this document defines WSDOT's Stormwater Retrofit Prioritization Scheme (i.e., needs prioritization process), which involves a qualitative and quantitative process for assigning a retrofit priority value to specific highway segment locations. Prioritized highway segments are used in the stand-alone and Puget Sound Basin project-triggered stormwater retrofit processes, described in the following sections.

WSDOT's Environmental Services Office (ESO) completes the first two stages of the needs prioritization process following the *Standard Operating Procedures for Stormwater Retrofit Assessment and Scoring (v. 2, 2014)* ([Appendix 3](#)). Stage 1 involves screening the entire state using Geographical Information Systems (GIS) tools. This screening identifies highway segments in the urban fringe (outside of costly urban areas before costs escalate), and having predefined conditions known to present greater than average risks for adverse stormwater impacts to receiving waters. Stage 2 of the prioritization process involves a more in-depth evaluation of high scoring candidate sites from Stage 1 to identify those with closed conveyance systems, known high habitat value, and known or observable erosion, pollution, or flooding problems. The prioritization process results in assigning scores to highway segments. Based on the scores, segments are determined to be low, medium, or high priority.

ESO will determine a schedule for updating stormwater retrofit prioritization scores to reflect new information and changing conditions brought to our attention.

The third and final prioritization stage allows WSDOT to rank stormwater retrofit needs with the highest environmental benefits relative to cost. Stage 3 is completed during project scoping and involves collecting detailed site information to determine drainage areas and estimate planning level retrofit costs.

Project-triggered Stormwater Retrofits

Statewide, project-triggered stormwater retrofits occur when a transportation project's boundaries include untreated impervious surfaces, and the project triggers requirements in Sections 3-3 and 3-4 of the HRM to add stormwater treatment and/or flow control. Project-triggered retrofits are funded by project funds.

Mechanics: Project designers follow the HRM (Figures 3-1, 3-2, and 3-3) statewide to determine if a project triggers retrofit requirements. All project triggered retrofits must meet full HRM BMP design standards.

For projects outside the Puget Sound Basin, projects triggering retrofit requirements must retrofit applicable replaced impervious surfaces and/or replaced pollutant generating impervious surfaces within the project boundaries per HRM Section 3-4.2.1.

Within the Puget Sound Basin¹, WSDOT projects have additional project-triggered stormwater retrofit requirements when projects add new impervious surface and exceed the thresholds that trigger runoff treatment or flow control requirements (i.e., Minimum Requirements 5 or 6) in any threshold discharge area, as defined in the HRM Section 3-4.2.2. (See flow chart and flow chart description document in [Appendix 4](#))

Within the Puget Sound Basin, projects triggering retrofit requirements must either:

- Retrofit, at a minimum, the amount of existing impervious surface and existing pollutant generating impervious surface within the project limits that equates to 20% of the cost to meet stormwater requirements for the new impervious surfaces and new pollutant generating impervious surface (i.e., 20% cost obligation);
- Transfer an amount of money equal to the 20% cost obligation to fund stand-alone stormwater retrofit projects within the Puget Sound Basin; however, projects with high priority retrofit areas (see stormwater retrofit prioritization section for more details) falling within their project boundaries cannot use this option; OR
- Meet the 20% cost obligation within the project site to the extent feasible² and transfer funds equivalent to the unmet balance to fund stand-alone stormwater retrofit projects within the Puget Sound Basin.

Accounting and Reporting for project-triggered retrofits: Within the Puget Sound Basin, project designers must perform a [Stormwater Retrofit Cost-Effectiveness and Feasibility](#)³ (RCEF) analysis to determine and document the extent to which retrofit obligations can be met within the project limits. Statewide (both within and outside the Puget Sound Basin) stormwater treatment and flow control BMPs constructed as part of transportation projects are documented in WSDOT's Stormwater BMP Specifications (SWABS) database. All project designers must also document the amount of stormwater retrofit done on each project along with applicable stormwater retrofit cost information in the [Stormwater Design Documentation Spreadsheet](#). Each BMP requires a Type A hydraulic report and BMP maintenance plan.

¹ Based on the March 7, 2012 NPDES Municipal Stormwater Permit (third major modification), S.5.4.b, Puget Sound Basin retrofit requirements first applied to all projects being advertised for construction contracts after July 1, 2011, except for projects that already received Design Approval as of July 1, 2010. It also applied to the following two projects: I-5/M St. to Portland Ave.; I-5 Portland Ave. to Port of Tacoma Rd.

² Feasible means there are no physical site limitations such as geographic or geologic constraints, steep slopes, soil instability, proximity to water bodies, presence of significant cultural resources, or shallow water tables (or other applicable factors contained in WSDOT's Retrofit Cost-Effectiveness and Feasibility (RCEF) Analysis document).

³ Retrofitting for stormwater treatment and flow control is cost-effective if the cost to retrofit all the existing impervious surfaces and existing pollution generating impervious surfaces does not exceed 20% of the cost to meet stormwater treatment and flow control requirements for the new impervious surfaces and new pollution generating impervious surfaces.

Stand-alone Stormwater Retrofits

Stand-alone stormwater retrofits funded through the Environmental Retrofit sub-program (I-4) occur when projects are initiated to address stormwater treatment and/or flow control at a prioritized location defined by the stormwater needs prioritization process described above. Stand-alone stormwater retrofits include Total Maximum Daily Load (TMDL) retrofit obligations assigned in Appendix 3 of WSDOT's Permit, and potentially Superfund remediation triggered retrofits⁴, as the highest priorities (i.e., these two situations result in the highest scores during the prioritization process). Statewide stand-alone stormwater retrofit funding is appropriated in I-4 by the Legislature.

Mechanics: ESO prioritizes highway segments following WSDOT's Stormwater Retrofit Prioritization Scheme ([Appendix 2](#)) and the *Standard Operating Procedures for Stormwater Retrofit Assessment and Scoring* (v. 2, 2014) ([Appendix 3](#)). Then, segments are grouped ([Appendix 6](#)) and ranked using the I-4 Stand-alone Stormwater Retrofit Scoping Matrix ([Appendix 5](#)). A list of ranked needs is provided to Capital Program Development and Management (CPDM) using the Key Ranking Factors Document (also in [Appendix 5](#)).

After scoping, CPDM selects projects for funding based on funding targets and impervious area treated and overall project cost (cost/benefit). (See flow chart and flow chart description document in [Appendix 5](#))

CPDM and Region Program Management evaluate the potential to reduce costs by identifying opportunities to combine stormwater retrofit priorities with programmed highway projects rather than advancing them as separate stand-alone retrofit projects. Those prioritized needs not falling within a programmed highway project boundary will be completed in order of their priority ranking score as stand-alone retrofits.

Stand-alone stormwater retrofits should strive to meet full HRM BMP design standards, or partial standards if full standards is infeasible. Additionally, stand-alone stormwater retrofits should evaluate existing site conditions and locations where full or partial HRM BMP design standards exist and document those as new BMPs. Guidance on the feasibility of full and partial HRM BMP design standards is included in the [stormwater retrofit assessment](#) document on [WSDOT's Hydraulics webpage](#).

Within the Puget Sound Basin: Funds transferred from project-triggered 20% cost obligations (held in PIN 099902L) will be used to fund stand-alone stormwater retrofit projects within the Puget Sound Basin, after Legislative appropriations have been dispersed by CPDM.

Accounting and Reporting: Stormwater treatment and flow control BMPs constructed to full or partial HRM BMP design standards as stand-alone retrofits are documented in WSDOT's Stormwater BMP Specifications (SWABS) database and the [Stormwater Design Documentation Spreadsheet](#).

Stand-alone stormwater retrofit projects only designating existing conditions as

⁴ A Superfund site is a contaminated location included on the National Priorities List by the EPA that has been or will be remediated (cleaned up) – more information at: [Superfund Cleanup Process | Superfund | US EPA](#).

stormwater BMPs (with no newly constructed BMPs) are required to complete a [Simplified Type A hydraulic report](#). Stand-alone stormwater retrofit projects constructing new BMPs are required to complete a Type A hydraulic report. In both cases, BMP maintenance plans are required for each BMP.

Opportunity-based Stormwater Retrofits

Opportunity-based stormwater retrofits occur when projects elect to add stormwater treatment and flow control for runoff from existing impervious surfaces and existing pollutant generating impervious surface following guidelines in the HRM.

Mechanics: Projects may construct opportunity-based retrofits statewide to provide stormwater management beyond what is required to comply with project-triggered retrofit requirements.

Opportunity-based stormwater retrofits should strive to meet full HRM BMP design standards, or partial standards if full standards is infeasible. Additionally, projects should evaluate existing site conditions and locations where full or partial HRM BMP design standards exist and document those as new BMPs. Guidance on the feasibility of full and partial HRM BMP design standards is included in the [stormwater retrofit assessment](#) document on [WSDOT's Hydraulics webpage](#).

For fish passage projects: WSDOT evaluates all fish passage projects for opportunity-based stormwater retrofit, as noted in the 2019 Hydraulics Manual Figure 1-1. As of July 2020, during the scoping phase of the project, all fish passage projects complete a [stormwater retrofit assessment](#) to determine the feasibility of providing stormwater treatment to full or partial HRM BMP design standards.

Headquarters Hydraulics, ESO, and CPDM reviews proposed BMPs based on the performance goals of the stormwater retrofit program and provide final concurrence for inclusion of BMPs to be delivered in conjunction with the fish passage project. If stormwater retrofit is infeasible, the scoping engineer shall document the rationale in the stormwater retrofit assessment.

Accounting and Reporting: Stormwater treatment and flow control BMPs constructed to full or partial HRM BMP design standards as opportunity-based retrofits are documented in WSDOT's Stormwater BMP Specifications (SWABS) database and the [Stormwater Design Documentation Spreadsheet](#). Similar to the stand-alone approach, projects only designating existing conditions as stormwater BMPs (with no newly constructed BMPs) are required to complete a [Simplified Type A hydraulic report](#). Projects constructing new BMPs are required to complete a Type A hydraulic report. In both cases, BMP maintenance plans are required for each BMP.

Performance Measures

Stormwater retrofit-related performance measures are consistent with annual reporting requirements contained in WSDOT's Permit (Completed by ESO for submittal to Ecology October 31st each year)

- Number of acres of existing impervious surface retrofitted or reverted to pervious. (Documented in the Stormwater Design Documentation Spreadsheet; Information queried by Highway Runoff Program Manager and provided to ESO)
- Amount of funds transferred by each applicable project to Puget Sound Basin bucket PIN (099902L). (Information queried by CPDM and provided to ESO)
- Number of stand-alone retrofit projects completed. (Information provided to ESO by Highway Runoff Program Manager)

Roles & Responsibilities

See the project-triggered stormwater retrofit flow chart and flow chart description document for specific roles and responsibilities in [Appendix 4](#).

See stand-alone stormwater retrofit flow chart and flow chart description document for specific roles and responsibilities in [Appendix 5](#).

Stormwater Retrofit Program Team

(One designee from each of the following Offices: Headquarters (HQ) Hydraulics, ESO and CPDM. Organized and led by the Stormwater Permit Program Manager)

- Meet quarterly to:
 - Evaluate progress of the program and make necessary adjustments, including provisions in the Permit that need revision.
 - Plan for scoping and design needs and implement any needed course corrections.
 - Clearly define scoping process and deliverables, including design deliverables, for retrofit projects.
 - Assist in development of applicable project delivery and reporting tools.
- Oversee activities of the various disciplines participating in this effort, to ensure that the most cost-effective use of resources.

HQ Hydraulics

State Hydraulic Engineer

- Identify efficiencies where Stormwater Retrofit Program may overlap with other hydraulic related programs (e.g., Major Drainage, Fish Passage, Bridge Scour, etc.).
- Oversee progress of components of the stormwater retrofit program that Hydraulics is responsible for.

- Oversee Stormwater Highway Runoff Program Manager to ensure statewide consistency for design guidance.
- Provide oversight and technical guidance to ensure the requirements of the Hydraulics Manual are adequately met.

Highway Runoff Program Manager

- Perform tasks specified in stand-alone stormwater retrofit flowchart ([Appendix 5](#)):
 - Work with ESO to ensure the ranked grouped needs (developed using the Scoping Matrix and populate Key Ranking Factors Document) is up-to-date and deliver any updates to HQ CPDM by October 1st each year.
 - Perform retrofit site visits with region staff and provide direction for scoping retrofit projects.
 - Participate in the development of alternative scopes for stormwater retrofit projects.
 - Review preferred alternative scope and provide concurrence.
 - Provide final design concurrence of stormwater BMPs and perform PS&E review and approval on schedule;
 - Review and approve stormwater and hydraulic design documents;
 - Inform ESO if it is not feasible to build to full HRM standards in a TMDL specified location.
 - Verify impervious area treated and overall project cost for cost/benefit analysis.
- Serve as the main technical/subject matter expert for the stormwater retrofit program:
 - Provide oversight and technical guidance to ensure the requirements of the Highway Runoff Manual (to the extent feasible), the Hydraulics Manual, and other federal, state and local regulations are met.
 - Provide technical assistance during construction of projects.
 - Oversee the delivery of Highway Runoff Manual training, which includes information on stormwater retrofits.
 - Support and develop technical software for stormwater modeling applications.
- Provide stormwater retrofit information to ESO for inclusion in the Annual Report (see Performance Measures section).
- Oversee on-call contracts for those projects designed by consultants.
- Participate on the Stormwater Retrofit Program Team.

HQ Stormwater Branch

Branch Manager

- Monitor new legislation, permit requirements, and policies related to stormwater retrofit.
 - Support ongoing stormwater retrofit process improvement efforts.
 - Facilitate issue resolution and identify efficiencies.
- Report any problems related to compliance with the permit's stormwater retrofit provisions to ESO Director.
- Coordinate with CPDM on I-4 Stand-alone Stormwater Retrofit funding.

- Coordinate with stakeholders on stormwater retrofit partnership opportunities.

Stormwater Permit Program Manager

- Oversee compliance with the permit's stormwater retrofit provisions; report any problems to branch manager.
- Perform overall coordination of Permit required stormwater retrofit program including:
 - Outreach and coordination with Ecology, stakeholder groups, and other agencies.
 - Organize and conduct quarterly Stormwater Retrofit Program Team meetings to assure open communication and accurate coordination of management and technical issues.
 - Oversee development and implementation of this Stormwater Retrofit Management Plan.
 - Facilitate issue resolution and identify efficiencies.
 - Implement a program schedule and coordinate update activities.
 - Work with internal stakeholders to identify program level process improvement opportunities and update program policies and priorities, as needed.
- Perform tasks specified in stand-alone stormwater retrofit flow chart ([Appendix 5](#)):
 - Complete stormwater retrofit prioritization scheme statewide (as described in SWMPP Table 6-1, Stages 1 and 2, and the Standard Operating Procedures for Stormwater Retrofit Assessment and Scoring (v. 2, 2014)).
 - Group prioritized segments based on the Grouping Retrofit Segments document.
 - Work with Highway Runoff Program Manager to rank grouped needs list using the Scoping Matrix.
 - Populate Key Ranking Factors Document and deliver any updates to HQ CPDM by October 1st each year.
 - Work with region design office and Ecology to resolve situations as quickly as possible where it is infeasible to build to full HRM standards at a TMDL specified location.
- Add and maintain a layer of statewide stormwater retrofit prioritization information to WSDOT's GIS Workbench and provide directions on the Stormwater webpage on how to access the information.
 - "Maintain" information includes: documenting segments where treatment has been provided (to include construction date and to what standards (e.g. full or partial HRM standards) based on past annual reports and/or the Stormwater BMP Specifications database, and documenting segments deemed infeasible based on site constraints (i.e., the deferred retrofit list).
- Work with Stormwater Features Inventory Coordinator to ensure the Stormwater BMP Specifications (SWABS) database is maintained and updated to reflect completed standalone stormwater retrofit projects.
- Oversee preparation and submittal of the annual report to Ecology that documents areas retrofitted.
- Serve as subject matter experts on stormwater regulations.

Capital Program Development and Management (CPDM)

- Perform tasks specified in stand-alone stormwater retrofit flow chart ([Appendix 5](#)):
 - Select ranked needs for scoping based on available funding and distribute prioritized needs lists and region scoping instructions to Region Program Management.
 - Select ranked projects for funding based on impervious area treated and overall project cost (cost/benefit analysis) and funding targets.
- Participate on the Stormwater Retrofit Program Team and provide information regarding available funds and anticipated future funds to assist program planning.
- Provide amount of funds transferred by each applicable project to Puget Sound Basin bucket PIN (099902L) to ESO for inclusion in the annual report (Capital Projects Delivery Office).
- Assist in the development and implementation of a streamlined project scoping process that results in timely scoping prior to design and provides relevant and timely scoping information for design use.
- Assist in determining likelihood of funding to facilitate orderly and efficient progress from scoping to design.

Appendices

Appendix 1

Stormwater Retrofit Program - Position Paper

April 2017

Prepared by: Environmental Services, Headquarters Hydraulics, and Capital Program Development and Management Offices

Purpose: Interim document to seek concurrence on stormwater retrofit-related topics. Content will be incorporated into WSDOT's Stormwater Management Program Plan (NPDES Municipal Stormwater Permit Appendix), Highway Runoff Manual, and Stormwater Retrofit Management Plan, as applicable.

Background

Most of WSDOT's highways and facilities were built before the federal Clean Water Act and the Washington Water Pollution Control Act were enacted. Thus, most of the existing highways do not have facilities to control stormwater flow or treat stormwater runoff. WSDOT addresses these deficiencies through stormwater retrofits, as required by our National Pollutant Discharge Elimination System (NPDES) Municipal Stormwater Permit (Permit), which is issued by the Department of Ecology (Ecology). The Permit requires WSDOT to use its Highway Runoff Manual (HRM) to provide consistent stormwater design and planning procedures statewide. The HRM has been deemed equivalent to Ecology's stormwater management manuals.

In 2010, Puget Soundkeeper Alliance appealed WSDOT's Permit. As summarized in *NPDES WSDOT Municipal Stormwater Permit Appeal Settlement* (March 2010), WSDOT agreed to require highway projects in the Puget Sound Basin to meet more stringent project-triggered retrofit requirements than in other regions of the state. Appendix 5 of WSDOT's Permit, Stormwater Management Program Plan (SWMPP) Section 6, describes these requirements. More details on WSDOT's retrofit program, including links to flow charts that describe specific roles and responsibilities, are included in Appendix A.

Where we are now

Staff from WSDOT's Environmental Services Office (ESO), Headquarters Hydraulics Office, and Capital Program Development and Management (CPDM) Office recently performed a comprehensive review of WSDOT's stormwater retrofit program. The intent of this effort is to help ensure retrofit-related permit requirements are consistently implemented statewide. Where necessary, existing policies and procedures are being revised and new documentation is being developed. The following topics need additional clarification. **Recommended positions are described below in bold text**, followed by additional background information:

- **Standalone stormwater retrofits funded through the Environmental Retrofit sub-program (I-4) will be designed and built to full HRM standards if feasible, with a minimum goal of improving baseline conditions (i.e., partial standards).**

The HRM currently doesn't specify whether retrofits must be built to full standards or partial standards. However, Ecology's Stormwater Management Manual for Western Washington (Section I-1.6.2) provides clarification. It states, "*In retrofit situations there frequently are site constraints that make the strict application of these (Best Management Practices) BMPs difficult. In these instances, the BMPs presented here can be modified using best professional judgment to provide reasonable improvements in stormwater management.*" WSDOT's stormwater retrofit program will

build to full HRM standards if feasible. If infeasible¹, a design that represents an improvement in stormwater management will be utilized.

Only stormwater retrofits prescribed by a Total Maximum Daily Load (TMDL) (listed in Appendix 3 of WSDOT's Permit) will be required to be built to full standards. If it is infeasible to build to full standards, ESO will work with Department of Ecology's TMDL Lead and Municipal Stormwater Permit Coordinator to determine an appropriate resolution.

This expectation will be documented by adding clarification to the HRM and Stormwater Retrofit Management Plan.

- **Puget Sound Basin project-triggered retrofit requirements (HRM 3-4.1) for flow control will be based on feasibility¹ and cost-effectiveness².**

Due to the high cost of land acquisition usually associated with detention facilities, there is a likelihood these types of flow control BMPs will be deemed not cost-effective. The preference will be to utilize non-retention BMPs for flow control, where feasible (i.e., Natural and Engineered Dispersion, Compost Amended Vegetated Filter Strips (CAVFS), and Bioretention Areas). If infeasible or not cost-effective, WSDOT may elect to address the retrofit using runoff treatment BMPs. This would still meet the intent of "providing reasonable improvements in stormwater management (Ecology SWMMWW Section I-1.6.2)."

- **I-4 money appropriated by the Legislature will be used to fund stand-alone stormwater retrofits statewide, but funds transferred into I-4 from projects complying with the 20% cost obligation (see Appendix A for 20% cost obligation details) can only be spent in the Puget Sound Basin.** WSDOT's Permit does not specify where stormwater retrofit funds will be spent. In order to focus stormwater retrofit investments in areas of the greatest need, CPDM will distribute funds appropriated by the Legislature based on a statewide prioritization of projects with the highest benefit/cost ratio.

Based on the intent of the 2010 settlement agreement, CPDM will only use funds transferred from projects in the Puget Sound Basin to fund stormwater retrofits within the Puget Sound Basin. CPDM created a Puget Sound Basin bucket PIN (O99902L) to hold the funds transferred from projects, which will allow accurate record keeping and help ensure funds are only spent in the Puget Sound Basin.

- **Puget Sound Basin project-triggered retrofit requirements (HRM 3-4.1) apply to all projects initiated by WSDOT in the Puget Sound Basin. These requirements do not apply to highway projects initiated by other state agencies, local agencies, Tribes, and developers³.**

¹ Feasible means there are no physical site limitations such as geographic or geologic constraints, steep slopes, soil instability, proximity to water bodies, presence of significant cultural resources, or shallow water tables (or other applicable factors contained in WSDOT's Retrofit Cost-Effectiveness and Feasibility (RCEF) document).

² Retrofitting for stormwater treatment and flow control is cost-effective if the cost to retrofit all the existing impervious surfaces and existing pollution generating impervious surfaces does not exceed 20% of the cost to meet stormwater treatment and flow control requirements for the new impervious surfaces and new pollution generating impervious surfaces.

³ Examples of highway projects initiated by others (i.e., local agency and developer projects) include adding a turning lane or intersection improvements on a state highway.

The 2010 settlement agreement and WSDOT's NPDES Municipal Permit don't make a distinction between WSDOT initiated projects and those initiated by others. Both the agreement with Puget Soundkeeper Alliance and WSDOT's NPDES Municipal Permit requirements apply to WSDOT only. However, all highway projects are required to use the HRM for stormwater design. Therefore, HRM clarification is needed to convey that projects initiated by others would not be bound by the 2010 settlement agreement or the associated Puget Sound Basin project-triggered retrofit requirement.

- **State and federal funding will be used to meet the Puget Sound Basin project-triggered retrofit requirements (HRM 3-4.1). Local funding will not be used.**

The 2010 settlement agreement and WSDOT's NPDES Municipal Permit don't make a distinction between project funding types.

Per CPDM, the fund sources will remain constant between the donor project and the new stormwater retrofit project. However, there may be an occasional need to switch the fund source due to eligibility requirements for federal funds. The type of federal funding may need to be adjusted for the new project based on location and program.

The responsibility for stormwater retrofit falls to the state, so local funds would not be used in the stormwater retrofit program.

- **If changes occur during project development, Puget Sound Basin project-triggered 20% cost obligation will be handled as follows:**
 - **Design changes affecting the original estimate for the 20% cost obligation, completed at 30% design, will be resolved when the Retrofit Cost-Effectiveness and Feasibility analysis is completed at 60% design, allowing projects to request additional funds if necessary.**
 - **Changes to contract plans (i.e., Change Orders that affects the drainage plans, drainage profiles, or drainage details) during construction that affect the cost to meet stormwater treatment and flow control requirements would not change the 20% obligation, as the funds would have been transferred at AD.**

- **Phased or corridor projects can address Puget Sound Basin project-triggered retrofit obligations as a whole, rather than each project addressing retrofit requirements individually.**

Neither WSDOT's Permit nor the HRM specify how Puget Sound Basin retrofit requirements apply to phased or corridor projects. If the phased or corridor project was permitted as one project (e.g., SEPA, NPDES, etc.) the project can address retrofit requirements for the entire footprint. Otherwise, each project must address retrofit requirements individually.

This expectation will be documented by adding clarification to the Environmental Manual and HRM.

- **Highway segments with site constraints that drop off the stand-alone stormwater retrofit scoping list or are not retrofitted as part of a project-triggered retrofit, due to infeasibility¹ and cost issues², are added to a separate list that is addressed after all high and medium retrofit priorities are met statewide.**

While these segments were removed for varying issues, the goal of WSDOT's retrofit program is to treat stormwater from all existing pavement. Therefore, these segments need to be documented, and eventually a stormwater retrofit will need to be performed.

Appendix 2

Retrofit Prioritization Scheme

Prioritization Factor	Criteria	Rationale	Point Weighting
Stage 1: GIS Screen			
Large, frequently traveled highways	Traffic level >30,000 annual average daily traffic (AADT).	For a variety of reasons, larger, frequently traveled highways are associated with greater pollutant generating potential.	1
Drinking water supply source	Mapped wellhead protection zones, sole sources aquifers, and drinking water source-protected watersheds.	Protect drinking water supplies.	2
Fish bearing streams	Waters identified by the Department of Fish and Wildlife as <i>fish bearing</i> .	Protect fish resources.	2
Summer spawning areas	Waters identified in state water quality standards as summer spawning areas.	Spawning areas and summer holding and migration areas provide critically important habitat for summer chum and summer steelhead.	2
Small streams	Waters with mean annual flows less than 20 cubic feet per second (i.e., waters that are not shorelines of the state)	Small streams are less able to assimilate runoff and more vulnerable to changes in flow.	3
High quality surface receiving waters	Waters identified in State water quality standards as <i>Char</i> and <i>Core salmon spawning and rearing</i> .	High quality streams provide important habitat	3
Urban fringe	Urban fringe areas within designated <i>Urban Growth Areas</i> .	More economical to retrofit prior to development which significantly reduces stormwater management options and increases capital and operational costs.	3
Stage 2: Reconnaissance			
Untreated closed, curbed, and/or impervious-lined conveyance systems	Untreated runoff primarily conveyed by curbs, culverts, impervious-lined conveyances, and/or pipes to a receiving water body.	Closed, curbed, and impervious-lined conveyance systems have greater pollutant discharge potential than open drainage systems which have treatment and flow attenuation properties.	2
WSDOT observed erosion, pollution, or flooding problems	Eroded channels, embankments, excess sediment buildup/loading in stormwater infrastructure, visual observation of water pollution, or flood prone areas.	Gives consideration for known problems.	2
Discharges to 303(d) listed water bodies for certain pollutants of concern	303(d) listed water bodies for: PAH, metals(zinc and copper), turbidity, and herbicides used by WSDOT.	Gives consideration to known receiving water problems that could be exacerbated by discharges of untreated highway runoff.	2
Locally identified erosion, pollution, or flooding problems	Consult local basin plans, recovery plans, and associated TMDL implementation documents for identified stormwater runoff-related problems and/or retrofit priorities.	Factors in well-informed local knowledge.	3
Habitat suitability and value	Waters identified by the WDFW area habitat and Tribal biologist as important small stream habitat as well as highway segments with fish passages identified by WSDOT as high retrofit priorities.	Factors in well-informed local knowledge.	3
Stage 3: Detail Site Assessment			
Stage 2 synthesis	Highway segments receiving a <i>Stage 2 Reconnaissance</i> score of 8 to 12.	Gives higher priority to factors evaluated in Stage 2.	1
Large highway drainage area	Draining area > 5 acres of impervious surface.	Larger drainage areas generate more runoff.	1

Appendix 3

Washington State Department of Transportation

Standard Operating Procedures for Stormwater Retrofit Assessment and Scoring

Version 2.0

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Date: July 10, 2012

(Adapted from WSDOT's *Phase 2 Stormwater Retrofit Field Reconnaissance Scoring Procedures Manual*, Tetra Tech, January 27, 2011; and based on Phase 1 scoring and mapping performed by Mark Bruskiwicz, former WSDOT Environmental Information Program, Data Administrator)

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Date: April 14, 2014



Washington State
Department of Transportation

The Washington State Department of Transportation's (WSDOT's) *Standard Operating Procedures for Stormwater Retrofit Assessment and Scoring*, an independent publication, is not affiliated with nor authorized, sponsored, or otherwise approved by a referenced product's parent company or manufacturer.

WSDOT conducts stormwater retrofit assessment and scoring work in response to requirements of Washington Administrative Code (WAC) Chapter 173-270 Puget Sound Highway Runoff Program and WSDOT's NPDES Municipal Stormwater Permit (Ecology, 2014). Instructions presented herein were developed by contracted and in-house technical staff. Their primary purpose is for internal use by WSDOT staff and/or associated contractors. Described procedures may vary from those used by other WSDOT groups.

WSDOT's stormwater retrofit assessment and scoring data collection procedures do not supplant official published definitions. Distribution of this document does not constitute an endorsement of a particular procedure or method. Any reference to specific equipment, software, manufacturers, or suppliers is for descriptive purposes only and does not constitute an endorsement of a particular product or service by the authors or WSDOT.

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Acronyms and Abbreviations

AADT	annual average daily traffic
AOI	area of interest
ArcGIS	Esri® ArcGIS® for Desktop software
ArcMap™	Esri® ArcMap™ 10.0 is an application within ArcGIS for Desktop software
ArcPad	Esri® ArcPad® 10.0 with service pack 1
ArcView®	Esri® ArcView® is one of three ArcGIS for desktop user license levels available. Each license level provides increased GIS functionality as you move from ArcView® to ArcEditor™ to ArcInfo®.
BMP	best management practice
Coordinator	Stormwater & Watersheds Program, Stormwater Features Inventory Coordinator
Crew Lead	Stormwater & Watersheds Program, Stormwater Features Inventory Field Crew Lead
Ecology	Washington State Department of Ecology
ESO	Washington State Department of Transportation, Environmental Services Office
Esri	Environmental Systems Research Institute, Inc.®
Field Lead	Stormwater and Watersheds Program, Stormwater Features Inventory Field Lead
GIS	Geographic Information System
GNSS	Global Navigation Satellite Systems
GPS	Global Positioning System
GPSCorrect	Esri® GPSCorrect™ 3.20
permit	Washington State Department of Transportation Municipal Stormwater Permit, National Pollution Discharge Elimination System and State Waste Discharge Permit for Large and Medium Municipal Separate Storm Sewer Systems
RCW	Revised Code of Washington
SFI	Stormwater Features Inventory
SOP	standard operating procedure
Stage 1 & 2	Nomenclature change in WSDOT's 2014 NPDES Municipal Stormwater Permit. Formerly referred to as Phase 1 & 2 of the stormwater retrofit process under WSDOT's 2009 NPDES Municipal Stormwater Permit.
SWMPP	Stormwater Management Program Plan
TMDL	total maximum daily load
WAC	Washington Administrative Code
WSDOT	Washington State Department of Transportation

Standard Operating Procedures for Stormwater Retrofit Assessment and Scoring

1 Background

Most of Washington State's highway infrastructure was built before federal Clean Water Act (33 U.S.C. §1251) requirements were instituted. This means that, while WSDOT builds new highways and highway features to current stormwater design standards to manage runoff for water quality and quantity, many of the older and existing highways require upgrading (retrofitting) to meet current stormwater management requirements and standards. Furthermore, the Puget Sound Highway Runoff Rule ([WAC 173-270](#)) requires the Washington State Department of Transportation (WSDOT) to rate and rank stormwater retrofit priorities within the Puget Sound basin.

The Washington State Department of Ecology (Ecology) issued WSDOT an NPDES Municipal Stormwater Permit (Permit) in 2014. [Appendix 7](#) of the permit contains WSDOT's Stormwater Management Program Plan (SWMPP), which describes details about stormwater retrofit activities. WSDOT developed the *Standard Operating Procedures for Stormwater Retrofit Assessment and Scoring* in support of and in response to the Permit and Puget Sound Highway Runoff Rule.

1-1 Scope

WSDOT's Environmental Services Office's (ESO) Environmental Information Program, with direction from the Stormwater and Watersheds Program, completed initial Stage 1 scoring and currently administers associated technical systems. WSDOT's ESO, Stormwater and Watersheds Program oversees Stage 2 of the stormwater retrofit prioritization scoring process. The Stormwater and Watersheds Program, Stormwater Features Inventory (SFI) Group administers associated field procedures. This document contains details of Stages 1 and 2 stormwater retrofit processes while omitting details for Stage 3.

1-2 Purpose

These standard operating procedures (SOPs) document WSDOT practices and apply to all personnel involved in the evaluation of highway segments or the assignment of scores to highway segments for each of the Stage 1 and 2 evaluation parameters. SOPs aim to ensure data collection and subsequent prioritization work occurs consistently and credibly.

Note: *The Standard Operating Procedures for Stormwater Retrofit Assessment and Scoring*, a version-controlled document, may receive modifications as needed.

2 Personnel Qualifications/Responsibilities

Staff must familiarize themselves with these standard operating procedures and other SOPs related to stormwater data collection. Using SOPs helps ensure the efficient, safe, and consistent collection of all relevant data. Office staff must know how to use ESRI® ArcGIS®

software (specifically ArcMap™). Field staff must receive on-the-job training in field work, Global Positioning System/Global Navigation Satellite Systems (GPS/GNSS) devices, and ESRI® ArcGIS® software (specifically ArcPad®).

Staff must complete training using this SOP, the *Stormwater Features Inventory: Standard Operating Procedures for Stormwater Discharge Point Inventory* (WSDOT, 2013), and the *Stormwater Features Inventory Database: Standard Operating Procedures for Office Data Collection* (WSDOT, 2012) to ensure your understanding of the materials presented herein. Field staff must also read and follow the equipment software manual titled *Operating the Trimble® GeoExplorer® 6000 Series GeoXT™ handheld, using ArcPad® 10.0 with service pack 1 and GPScorrect™ 3.20 software* (WSDOT, 2012).

The SFI Field Lead (Field Lead) and SFI Crew Lead (Crew Lead), directed to collect data in the field, must know all aspects of the retrofit prioritization field evaluation process to ensure credible and useable data collection. The Field Lead, Crew Lead, or SFI Coordinator (Coordinator) will brief field staff on data collection goals and objectives prior to arrival in the field.

Field staff must be knowledgeable with operating mapping-grade survey equipment and must possess the ability to:

- Understand basic survey principles, including the fundamentals of the Global Positioning System (GPS/GNSS);
- Work in adverse field conditions (weather- and site-specific) and Troubleshoot field and equipment problems; and
- Independently assess local highway conditions, determine the required level of traffic control, and apply approved traffic control plans.

Site-dependent situations encountered may require additional training.

3 Planning and Coordination

Staff must conduct planning and coordination activities for the area of interest (AOI) prior to beginning field work in a Stage 2 retrofit assessment and scoring area. These activities ensure full communication between the Field Lead, inventory crews, and WSDOT staff as well as that field work gets performed in a safe and effective manner.

The Field Lead or Crew Lead responsibilities include coordinating the following planning tasks for assessment and scoring:

3-1 Schedule and Plan

The Field Lead will develop a schedule and plan for field work to reflect Stage 1 identified priority highway segment locations. The Coordinator must review and approve the plan prior to implementation. If significant changes in assessment locations or schedules occur, the Field Lead and/or Crew Lead must update the plan and notify all parties of plan changes.

3-2 Basemap

Field Lead or Coordinator compiles a basemap to help define the highway segment(s) slated for assessment and scoring. The basemap assists the field crew in site orientation and note taking during field work. The basemap, produced in hard copy for field use, must depict the highway segments slated for assessment and scoring as well as any additional pertinent site orientation information. Examples of additional information include the presence of state and local roads, streams, wetlands or other water bodies, and other highway features such as milepost markers and previous discharge point inventories conducted in the area.

3-3 Region Contacts

Once establishing a timeline to perform the assessment of priority highway segments, field staff must contact WSDOT region Maintenance Superintendents and region Environmental Services staff for the WSDOT-specific maintenance area where assessment and scoring work will occur in order to:

- Communicate field workplans;
- Identify special safety precautions or maintenance requirements requested from the region points of contact;
- Establish open lines of communication by the Field Lead or Coordinator;
- Solicit local knowledge related to the prioritization assessment; and
- Provide a status update to Region contacts on a regular basis while work occurs in their area of responsibility.

3-4 Pre-Assessment Site Review

Prior to beginning field work within a Stage 2 retrofit assessment and scoring area, the Field Lead or Coordinator will visit and become familiar with the highway segments slated for assessment. When performing a pre-assessment site review, consider the following:

- Conveyance system characteristics
 - Primarily open, closed, or a mixture of both
- Obvious signs of erosion, pollution, pollutant sources, or maintenance concerns
- Presence or absence of existing stormwater treatment or flow control facilities
- Conveyance system discharges in a total maximum daily load (TMDL) area or to a 303(d) listed waterbody
- Field data collection logistics such as:
 - Parking and staging areas
 - Applicable safety requirements
 - Any anticipated specialty equipment or tools needed

4 Field Safety

When conducting field data collection for stormwater retrofit assessment and scoring, follow all WSDOT safety procedures and protocols outlined in the WSDOT [Safety Procedures and Guidelines Manual](#) and all other formal statewide or region-specific safety-related manuals, guidelines, memos, etc. Preplan all traffic control in adherence to the federal [Manual on Uniform Traffic Control Devices for Streets and Highways](#) and follow the WSDOT [Work Zone Traffic Control Guidelines](#).

The WSDOT *Stormwater Features Inventory: Standard Operating Procedures for Field Safety* (WSDOT, 2014) contains additional field safety procedures and protocols, as well as recommended traffic control plans.

5 Standard Data Collection Equipment

Office data collection activities use the standard WSDOT computer set up, software, applications, and connection to WSDOT's servers. WSDOT requires the use of a variety of tools, supplies, and equipment for nearly all field operations. WSDOT considers each piece of equipment an asset of the state which requires the accorded proper care. Documents specified in [Section 2](#) include additional details. Sections [5-1](#) and [5-2](#) focus on field data collection activities.

5-1 Care of Field Equipment

Staff must take proper care of the equipment used in order for it to function as intended. Leaving equipment wet and dirty at the end of the day, can corrode metal components (such as the data port or battery contacts), thus degrading performance or even ruining the device. Uncared for metal measuring equipment can rust or roughen beyond usability.

At the end of each day in the field, wipe down, dry off, or otherwise clean all equipment, and set batteries to charge overnight. For equipment used in rainy weather or in damp conditions, detach cables and leave the plug/data port covers open overnight to allow for drying. Do not leave any valuable survey equipment in the vehicle overnight. The Performance Management Program annual review for all WSDOT field personnel must include a component regarding the proper care of field equipment.

5-2 Field Data Collection Equipment List

Field staff may need additional data collection equipment depending on field conditions encountered in the Stage 2 retrofit assessment and scoring area. Following list contains the standard items required for stormwater field work. Field staff must conduct proper planning during the pre-assessment site review to tailor this list for each area targeted for assessment.

- Trimble® GeoExplorer® 6000 Series GeoXT™ handheld GPS/GNSS unit (hand-held computer, antenna, range pole, cables, stylus, and spare battery)
- Laser range finder
- Digital camera

- Chargers for camera, laptop, and GPS/GNSS unit (if traveling overnight)
- Cell phone and/or two-way radios
- Rite-in-the-Rain® field survey books
- Mechanical pencils, erasers, straight edge, and stencil
- Base maps/field maps
- Covered clipboard
- Magnetic compass
- Spotlight/powerful flashlight
- 4 lb. sledgehammer
- Shovel
- Manhole lid-opening tool(s)
- Machete or brush clippers
- Measuring tape, graduated in inches

6 Stormwater Retrofit Assessment and Scoring

Stage 1 of WSDOT’s stormwater retrofit prioritization process involves screening highway segments throughout the entire state, using Geographic Information System (GIS), to identify areas that present a greater-than-average risk for stormwater impacts. Stage 2 of the prioritization process has a more focused scope, including field assessments and additional scoring of only the highway segments receiving scores of 8 or greater in the Stage 1 screening. High-scoring Stage 2 highway segments become priority candidates for a detailed site assessment during Stage 3 in the stormwater retrofit prioritization process.

6-1 Stage 1 Assessment and Scoring

During Stage 1 of the stormwater retrofit prioritization process, highway segments were screened against GIS based criteria and assigned a score from 1 to 16. To do this, the WSDOT ESO Environmental Information Program’s Data Administrator buffered the 1:24,000 scale linear highway GIS dataset by 100 feet to generate polygon data. The Data Administrator then intersected the highway polygon dataset with seven individual criteria datasets using the “Locate Features Along Routes” tool in ArcMap™. The seven criteria datasets include:

- **Large, frequently traveled highways**
 - Created by selecting records greater than 30,000 AADT from WSDOT’s annual average daily traffic GIS data set. (Scoring weight: 1 point)
- **Drinking water supply sources**
 - Created from a union of wellhead protection zones (GIS data from the Washington State Department of Health), drinking water protection areas (GIS data from the Washington State Department of Health), and Sole Source Aquifers (GIS data from the

United States Environmental Protection Agency), then boundaries are dissolved to create large polygons. (Scoring weight: 2 points)

- **Fish bearing streams**

- Created by adding a 100-foot buffer to the fish distribution dataset (GIS data from the Washington State Department of Fish and Wildlife) to create a polygon dataset. (Scoring weight: 2 points)

- **Summer spawning areas**

- Created by selecting records with summer, summer/fall, or spring/summer runs from the salmon and steelhead inventory dataset (GIS data from the Washington State Department of Fish and Wildlife). (Scoring weight: 2 points)

- **Small streams**

- Created by selecting streams designated as shorelines of the State (records with water body type “412” and “FP_wtrty_CD” not equal to “S”) from the statewide hydro dataset (GIS data from the Washington State Department of Natural Resources). (Scoring weight: 3 points)

- **High quality receiving streams**

- Created from a subset of the water quality dataset and seasonal temperature data (GIS data from Washington State Department of Ecology). (Scoring weight: 3 points)

- **Urban fringe**

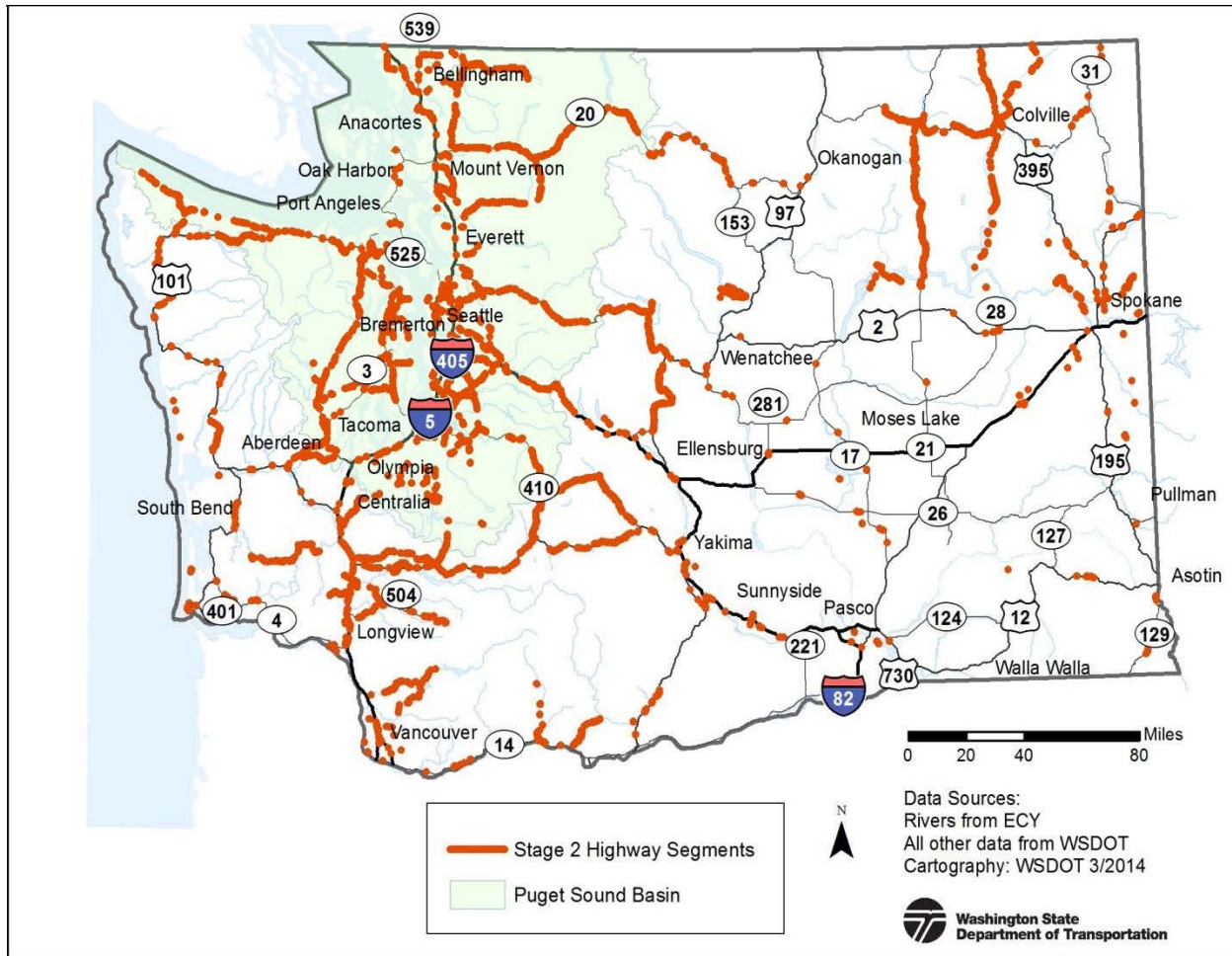
- Created by selecting urban growth areas and US Census Urban Areas records, not including city limits. (Scoring weight: 3 points)

Unless otherwise noted, all linear geospatial data was buffered by 250 feet to generate polygon data. For each of the datasets described above, a new “score” field was calculated to equal its weighted value (in parentheses above). All other fields were deleted and the datasets were dissolved based on the “score” field.

The Data Administrator overlaid each of the seven datasets with the highway polygon dataset using the “union” tool in ArcMap™ then selected all of the polygon records where a criteria score and a highway segment overlapped. The Data Administrator performed another union between the first union result and the second union result, and another between that union result and the third union result, and so forth until all seven criteria datasets were combined together into the one highway polygon dataset with fields for each criterion score. A new “total score” field was calculated to equal the sum of all seven criteria scores. The maximum achievable score is 16 if all seven criteria are present within a given area of highway.

Records from the highway polygon dataset, with total scores of 8 or greater, are selected for further assessment in Stage 2. The highway polygon dataset is then overlaid on the 1:24,000 scale linear highway GIS dataset and the “clip” tool in ArcMap™ is used to generate linear highway segments for Stage 2 assessment and scoring (see [Figure 1](#) below).

Figure 1 High scoring (8+) Stage 1 segments, selected for Stage 2 assessment and scoring.



6-2 Stage 2 Assessment and Scoring

Stage 2 stormwater retrofit assessment and scoring involves data collection activities carried out from both the field and office. This section describes assessment parameters for assigning Stage 2 scores to highway segments. [Table 1](#) shows the parameters assessed and scored during Stage 2 of the stormwater retrofit prioritization process.

Field staff assesses the first two prioritization factors listed in [Table 1](#), while office staff assesses the remaining factors. For field-assessed prioritization factors, staff use an ArcPad® shapefile. Correspondingly, office staff use an ArcMap™ shapefile to assign scores. In both cases, field and office staff assign scores to highway segments by editing a GIS-based attributes table, as shown in Appendix A, [Table A-1](#), for individual highway segments.

Table 1 Stage 2 Assessment and Scoring Summary.

Prioritization Factor	Criteria	Rationale	Point Weight
Assessed in the field:			
Untreated closed, curbed, and/or impervious-lined conveyance systems	Untreated runoff primarily conveyed by curbs, culverts, impervious-lined conveyances, and/or pipes to a receiving water body.	Closed, curbed, and impervious-lined conveyance systems have greater pollutant discharge potential than open drainage systems, which have treatment and flow attenuation properties.	2
WSDOT observed erosion, pollution, or flooding problems	Eroded channels, embankments, excess sediment buildup/loading in stormwater infrastructure, visual observations of water pollution, or flood prone areas.	Gives consideration to known problems.	2
Assessed in the office:			
Discharges to 303(d) listed water bodies for pollutants of concern	303(d) listed water bodies for: PAHs, metals (zinc and copper), turbidity, and herbicides used by WSDOT	Gives consideration to known receiving water problems that could be exacerbated by discharges of untreated highway runoff.	2
Locally identified erosion, pollution, or flooding problems	Consult local basin plans, recovery plans, and associated TMDL implementation documents for identified stormwater runoff-related problems and/or retrofit priorities.	Factors in well-informed local knowledge.	3
Habitat suitability and value	Waters identified by the Washington State Department of Fish and Wildlife (WDFW) area habitat and tribal biologist as important small stream habitat	Factors in well-informed local knowledge.	3

Note: Information in Table 1 is from Appendix 7 of [WSDOT's NPDES Municipal Stormwater Permit](#) (Ecology, 2014).

6-3 Data Collection Procedures

6-3.1 Boundaries of Responsibility

WSDOT's responsibilities include all stormwater leaving WSDOT's right of way and property boundaries, including stormwater infiltrating into the ground. This includes the boundaries of WSDOT's highways, maintenance facilities, ferry terminals, rest areas, and park and ride lots.

Depending on the specific parameters of each mapping/assessment project, use legal survey maps or general field indicators to identify and determine the right of way boundaries. Review right of way plan sheets through various WSDOT region or Headquarters data repositories where accuracy is of high importance. For further information on conducting office research using region or Headquarters data repositories, see the *Stormwater Features Inventory Database: Standard Operating Procedures for Office Data Collection* (WSDOT, 2012).

In most instances, staff should assess the approximate right of way boundary using field indicators. Use field indicators with care and in the following order of precedence:

1. Right of way fence (hog and barbed wire is most common, but private fences should also be considered),
2. Toe of slope or slope catch (the line where the roadway embankment or cut meets the natural ground surface), and
3. Vegetation line/maintenance clearing line.

When present, also use physical survey markers such as property corner or right of way boundary stakes to help verify the boundary. However, do not rely on them exclusively, since they may be out of date or incorrect. When concerns arise about using field indicators, or if they are deemed insufficient, provide documentation to justify the point data location record.

6-3.2 Assessment and Scoring of Closed Conveyance Systems

This criterion requires that field crews document the highway segment's stormwater conveyance system by:

- Determining whether a highway segment has a closed stormwater conveyance system.
- Looking at the complete system (not just the discharge point) to assess whether the runoff flows through features and structures that provide water quality treatment or through a closed system without treatment.

Closed stormwater conveyance systems are typically curbs and gutters, culverts, impervious-lined conveyances, or pipe systems that do not provide opportunities for stormwater treatment or flow control via filtration, infiltration, or evapotranspiration. Thus, closed conveyance systems have greater pollutant discharge potential than open drainage systems.

Document a conveyance system as "open" when the drainage system serving the highway segment is *primarily* open. A conveyance system is still considered open when the stormwater flows through a closed conveyance system for a portion of its flow path as long as the stormwater flows through open ditches and channels or stormwater flow control or treatment BMPs for most of its flow path.

Provides notes and supporting perspective photographs (if applicable) to document the existence of closed conveyance systems in instances where they were not previously documented.

Scoring: A field determination finding that the highway segment's stormwater conveyance system is primarily closed receives a score of 2; otherwise, it receives a score of 0.

6-3.3 Assessment and Scoring of Observed Erosion or Pollution

This criterion requires the field crew to document any observable erosion or water quality issues associated with stormwater runoff for each highway segment (see [Figure 2](#) below, for examples).

Signs of erosion include channel in-sizing; exposed and non-vegetated banks; rills in expose soil; material slumping; loss of trees and vegetation into the bank; and signs of exposed root systems. Erosion observed at a discharge point may be caused by inadequate or absent energy dissipater and/or flow control. However, in waterway erosion may result from the receiving water body's flows and channel characteristics. If signs of stormwater runoff induced erosion exist, field crews must document the potential causes in their detailed field notes along with the inclusion of illustrative photographs.

Signs of water quality issues include oil sheens, foam, suds, water discoloration, and foul smells. For oil sheens observed on the runoff or receiving water, the field crew must determine whether it is from the result of wetland vegetation biotic processes or oily pollutants from roadway runoff. Natural oil sheens secreted from plants break apart if swirled or disturbed. Oil sheens from manufactured products, like petroleum, rejoin when swirled or disturbed.

Foam and suds can also result from both natural and manufactured sources. Since determining the source of foam and suds can be difficult, unless the source is clearly determined, field crews must document the observation as a "potential" illicit discharge. For any potential illicit discharges or connections, the field crew documents the need for a follow-up investigation, identifies the location using GPS/GNSS, takes notes regarding the observations, and takes illustrative photographs.

Scoring: A field crew determination of erosion or pollution associated with a highway segment receives a score of 2; otherwise, it receives a score of 0.

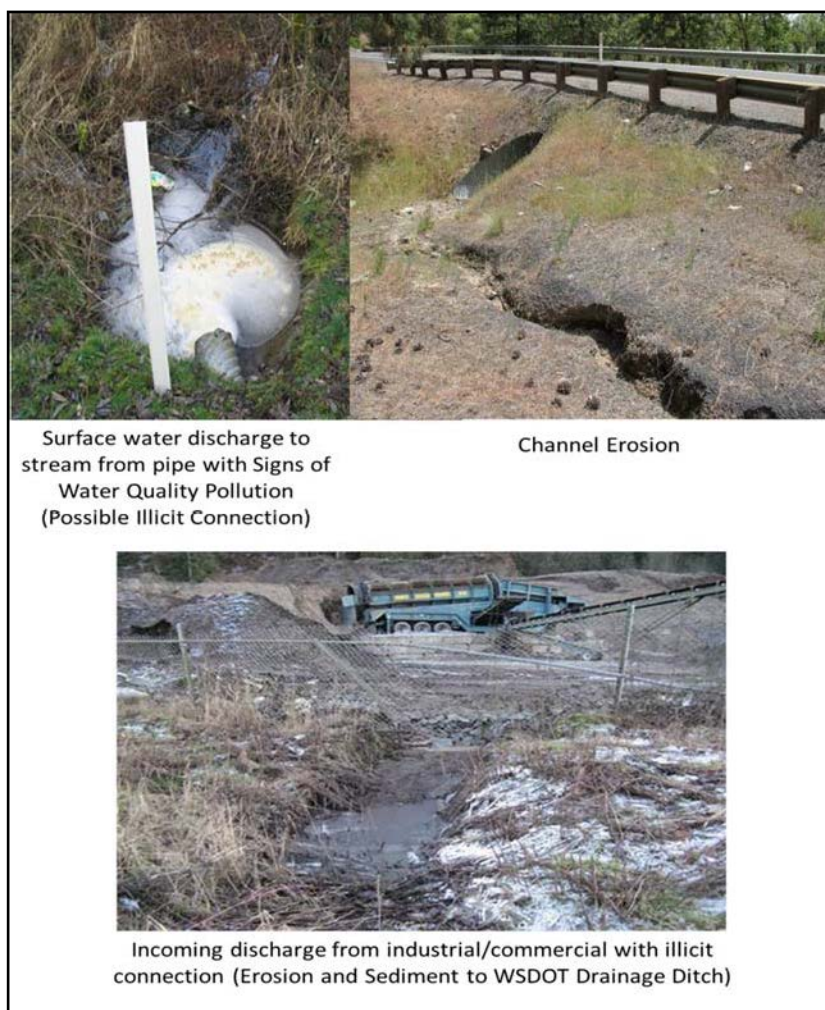
6-3.4 Assessment and Scoring of Discharges to 303(d) Listed WaterBodies

This criterion requires office staff to query WSDOT's GIS Workbench "303(d) Basin Plans and TMDLs" dataset to determine whether a highway segment discharges to a 303(d) listed water body for any of the following pollutants:

- Polycyclic aromatic hydrocarbons (PAHs)
- Metals (zinc and copper)
- Turbidity
- Herbicides used by WSDOT in the areas inventoried (for work done to comply with WSDOT's 2009 permit, only 2,4-D)

Scoring: A determination that a highway segment discharges stormwater runoff to a water body on the 303(d) list for any of the pollutants listed above receives a score of 2; otherwise, it receives a score of 0.

Figure 2 Photo examples of erosion and pollution.



6-3.5 Assessment and Scoring of Locally Identified Erosion, Flooding or Pollution

This criterion requires office staff to document any locally identified erosion, water quality pollution, or flooding for the highway segment. This involves reviewing local basin plans, recovery plans, and associated TMDL water implementation documents to gather information regarding identified problems associated with stormwater runoff as well as retrofit priorities and obligations. Consulting local plans may help identify seasonal or intermittent erosion or water quality issues not always observable in the field.

Office staff also consults with WSDOT region staff (e.g., hydraulics engineers and maintenance crews) and local jurisdictions to gain local knowledge about erosion, flooding, or water quality problems associated with stormwater runoff. These region and local jurisdiction staff may also help in identifying other applicable local plans. For assessed areas of highway, WSDOT region staff and local jurisdictions provide applicable information (as shown in [Appendix B, Table B-1](#)) on the following categories:

- Catch basins with high sediment loading,

- Stormwater culverts with high sediment loading,
- Roadways with excessive sediment build up,
- Areas with frequent slides,
- Areas with eroding soils,
- Noticeable Pollutants (Visible oil sheen, sewage concerns, etc.), and
- Other stormwater issues/concerns.

Scoring: A determination that locally identified erosion, flooding or pollution is associated with a highway segment receives a score of 3; otherwise, it receives a score of 0.

6-3.6 Assessment and Scoring of Habitat Suitability

This criterion requires office staff to determine whether the water body receiving stormwater runoff from each highway segment comprise important small stream habitat. This assessment involves interviewing Washington Department of Fish and Wildlife (WDFW) and tribal biologists to collect local knowledge of habitat suitability and the value of small streams adjacent to the highway segments.

The process involves supplying WDFW region biologists and tribal biologists with a list of small stream reaches adjacent to the highway segments of interest identified during Stage 1, GIS generated maps depicting highway segment locations in relation to the streams, and the standard questionnaire in [Appendix C](#).

6-3.6.1 Physical spawning & rearing habitat quality

Office staff ask local biologists for information on, or confirmation of, the quality of the stream's spawning and rearing habitat. High-quality spawning and rearing habitat has appropriate substrate and cover that promotes spawning, a high survival rate for eggs, and cover for early life stages of fishes (alevins and fingerlings) in upper channel reaches. It also provides adequate cover and substrate for rearing in lower channel reaches. High-quality habitat includes the following:

- **Riparian Zone** – Intact riparian corridor, including native vegetation (trees and understory); little to no evidence of riparian disturbance; no evidence of livestock grazing, stream bank armoring, or presence of invasive plant species; and buffer width is intact with a minimum width of 200 feet on both sides of the stream.
- **Fish Cover** – Fish cover (refuge) habitat such as large woody debris, boulders, overhanging vegetation, undercut banks, and pools.
- **Streambank Stability** – Stable, natural banks with lack of armoring or hardening, with no signs of incision or bed degradation, or excessive lateral erosion.
- **Spawning Habitat** – Spawning gravels for salmonids (e.g., coarse gravel and cobble) and minimal fine substrates.
- **Habitat Diversity** – Diversity of habitat units, including riffle-pool sequences or natural riffle-runs, natural sinuosity of channel forms, and lack of uniformity derived from channel manipulation and modification.

- **Lack of Stream Channel Impairments** – Lacks impairments, including channelization, dredging, bank stabilization, diversion, presence of upstream impervious areas (i.e., upstream urbanization/development), presence of infrastructure, outfalls and crossings, and fragmentation of stream system.

6-3.6.2 Water quality

Office staff ask local biologists for information on whether the stream's water quality meets or exceeds surface water quality standards. Washington State water quality standards (as outlined in [WAC 173-201A](#)) are intended to protect aquatic life and promote survivability of all life stages. High-quality surface water characteristics include low water temperature, high dissolved oxygen concentrations, moderate pH, low turbidity, and low fecal coliform bacteria concentrations.

6-3.6.3 Lack of stream impairments

Office staff ask local biologists for information on a stream's impairments (or lack of impairments). Impairments include the physical alteration of the natural riparian corridor or stream channel characteristics that reduce the availability of fish habitat necessary for completing each life stage or diminish the survivability of individual organisms. Examples of features that cause impairments include dams, channelization, hardened streambank protection, forest harvesting, mining activities, water diversions, and the effects of urbanization.

6-3.6.4 Lack of fish passage barriers

Office staff ask local biologists for information on the presence or absence of a stream's fish passage barriers. Fish passage barriers include dams, culverts, water diversions, and natural features (e.g., waterfalls, low dissolved oxygen, and high temperature barriers).

Scoring: The highway segment receives a score of 3 if the receiving water body has any one of the following:

- High-quality physical spawning & rearing habitat
- Water quality that meets or exceeds water quality standards
- Both a lack of stream impairment and a lack of fish passage barriers

In the event limited documentation or information exists for the stream, or the stream does not meet any of the above category groupings, the highway segment receives a score of 0.

6-4 Field Photograph Procedures

Photograph all stormwater discharge points, existing stormwater treatment or flow control facilities, obvious signs of erosion or maintenance concerns, and any potential pollutant sources. Assign each photo an identification number and record it in the corresponding feature's attributes. In the final deliverable, link these digitally.

Take care during photo composition. The field photograph is the most commonly overlooked or rushed stage of field data collection. A carefully composed photograph can contain an

enormous amount of useful information. Photos should independently convey the onsite stormwater scenario to support the corresponding assigned Stage 2 score.

Reference objects included in photos indicating scale and location are invaluable. These objects can aid in office-based assessment of the conditions as well as help a third party locate the point in the field at a later time. In each photo, include critical elements such as perspective on flow paths, pipe ends, drainage structures, and potential pollutant sources.

Many locations encountered may be completely covered by vegetation or otherwise obscured. In these instances, a reference photograph with a crew member at the point of interest helps to show the location of the discharge point relative to the highway shoulder, but perhaps not the exact nature and condition of the discharge. In these cases, accompany the “vicinity” photo with a “detail” photo.

Set digital camera photo resolution according to the scope of the field activity and purpose of the final dataset. For general field inventory activity, **set photo resolution at 1 mega pixel or below**. This accommodates limited data transfer rates and server storage capacity, while also improving the interface for the end user.

Field crew’s responsibilities include assigning the unique picture ID for each photo prior to data submittal. This photo number then gets recorded as an attribute in the digital data. Most commonly, the photo ID number assigned by the camera serves as the final picture ID.

6-5 Final Data Deliverable

Upon completion of the Stage 2 assessment and scoring, all individually edited attributes tables and metadata get merged into a master shapefile. The shapefile will be in Washington State Plane, south, NAD83HARN, feet and will include GPS metadata. Include these along with any photographs supporting scoring in the field, WSDOT region staff and local jurisdiction information, and WDFW and Tribal Biologist Standard Questionnaire in the final data deliverable.

7 Records Management

Data collection for Stage 2 stormwater retrofit assessment and scoring falls roughly into two categories:

1. Digital data
 - Field recorded GPS/GNSS data collector
 - Field photograph documentation
 - Office recorded information gathered from WDFW and tribal biologists, WSDOT Region staff, and local jurisdictions
2. Field book notes recorded manually

Transfer recorded data to the SFI Data Steward and/or WSDOT servers

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MS4\SWRetrofitPrioritize) for processing and storage. In addition to the transferred dataset, maintain a back-up copy (hard copy or digital copy, where applicable) of all raw and edited dataset versions. Maintain this redundant back-up to ensure all information has been properly transferred and loaded to the final destination. Backups may be deleted by the appropriate personnel only upon verification of the data transfer.

7-1 Digital Data

ESO Environmental Information Program and the GIS and Roadway Data Office conduct technical data administration. These groups' responsibilities include managing the geospatial data structure and processing and storing the geospatial data.

After coordination with the Stormwater Features Inventory field staff, the Environmental Information Program Data Steward provides a GIS shapefile, prepopulated with the attributes shown in [Table A-1](#), for editing on mobile field units. The shapefile gets stored on the above-referenced internal WSDOT server location from which field crews can transfer it to mobile GPS units and office staff can access it directly using the standard WSDOT computer hardware and software. These attributes then get edited and scored during a field review and upon completion of the WSDOT region staff and local jurisdiction information table (see [Appendix B](#)), and *WDFW Tribal Biologist Standard Questionnaire* (see [Appendix C](#)). After completion of data collection activities, staff transfers the edited dataset back onto the internal WSDOT server and the GIS technical Data Steward sequesters it for post-processing.

7-2 Field Notebooks

Photocopy and scan field books to PDF at the end of each day. This provides a hard copy back-up to be filed by the Crew Lead and a digital copy is available to office personnel. After a quality assurance review, the digital version gets permanently stored on a local WSDOT SFI server and becomes accessible to all end users upon request.

Use careful attention to detail when photocopying and scanning field book pages. The contrast settings, field book orientation in the copy machine, and page size selection all impact the record quality. The final product must be clear and legible. Do not crop the borders (e.g., by an "auto formatting" algorithm in the copy machine or by poor document placement).

Once filing a field notebook, file the original copy in a field notebook "library" for future reference. If a hard copy of field notes becomes necessary for field reviews, use the photocopy. Never remove the original copy from the office.

7-3 Field Photographs

Transfer photographs to a computer drive at the end of each day. Label the folder they are transferred to using the date and state route number where they were collected. Upon quality assurance review by Stormwater Features Inventory staff, transfer these photos to the internal [WSDOT server](#) for permanent storage.

7-4 Quality Control/Quality Assurance

Stormwater Features Inventory staff conducts in-office data review for quality control and data processing. After assessing and scoring Stage 2 stormwater retrofit areas of interest, combine the edited shapefiles containing attribute tables and GPS metadata into a master shapefile. The master shapefile gets reviewed by the Stormwater and Watersheds Program, Permit Reporting Lead for completeness to ensure it includes all attribute and metadata for each Stage 2 assessed area. Then, the assessed and scored GIS layer gets used to prioritize additional field review locations for Stage 3 of WSDOT's stormwater retrofit process.

8 Definitions

8-1 Code of Federal Regulations

The following definitions are from 40 CFR 122.2 and 40 CFR 130.2.

Point source: Any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.

Pollution: The man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of water.

8-2 Highway Runoff Manual

The following definition is from the 2014 WSDOT [Highway Runoff Manual](#), M 31-16 (as abridged for use by the Stormwater Features Inventory Group).

Basin Plan: A plan that assesses, evaluates, and proposes solutions to existing and potential future impacts on the physical, chemical, and biological properties and beneficial uses of waters of the state within a drainage basin. A plan should include but not be limited to recommendations for the following elements:

- Stormwater requirements for new development and redevelopment,
- Capital improvement projects,
- Land use management through identification and protection of critical areas, comprehensive land use and transportation plans, zoning regulations, site development standards, and conservation areas,
- Source control activities, including public education and involvement, and business programs,
- Other targeted stormwater programs and activities, such as maintenance, inspections, and enforcement,
- Monitoring, and
- An implementation schedule and funding strategy.

A basin plan that is adopted and implemented must have the following characteristics:

- Adoption by legislative or regulatory action of jurisdictions with responsibilities under the plan,
- Recommended ordinances, regulations, programs, and procedures that are in effect or scheduled to go into effect, and
- An implementation schedule and funding strategy in progress.

Best Management Practices (BMPs): The structural devices, maintenance procedures, managerial practices, prohibitions of practices, and schedules of activities that are used singly or in combination to prevent or reduce the detrimental impacts of stormwater, such as pollution of water, degradation of channels, damage to structures, and flooding.

Catch Basin: A chamber or well, usually built at the curb line of a street, for the admission of surface water to a sewer or subdrain, having at its base a sediment sump designed to retain grit and detritus below the point of overflow.

Conveyance System: The drainage facilities, both natural and constructed, that collect, contain, and provide for the flow of surface water and stormwater from the highest points on the land down to a receiving water. The natural elements of the conveyance system include swales and small drainage courses, streams, rivers, lakes, and wetlands. Constructed elements of the conveyance system include gutters, ditches, pipes, channels, and most retention/ detention facilities.

Erosion: The detachment and movement of soil/rock fragments by water, wind, ice, or gravity.

GIS Workbench: An ArcView® geographic information system tool maintained by the WSDOT HQ Geographic Services Office and the HQ Office of Information Technology to provide staff with access to comprehensive, current, and detailed environmental and natural resource management data.

pH: A measure of the alkalinity or acidity of a substance that is determined by measuring the concentration of hydrogen ions in the substance. A pH of 7.0 indicates neutral water. A 6.5 reading is slightly acidic.

Retrofit: The renovation of an existing structure or facility to meet changed conditions or to improve performance.

Sediment: Fragmented material that originates from weathering and erosion of rocks or unconsolidated deposits and is transported by, suspended in, or deposited by water.

Turbidity: Dispersion or scattering of light in a liquid, caused by suspended solids and other factors; commonly used as a measure of suspended solids in a liquid. Turbidity is a state-regulated parameter. Turbidity can be measured in the field with a hand-held meter and is recorded in nephelometric turbidity units (NTU).

8-3 WSDOT Permit

The following definitions are from the 2014 WSDOT NPDES [Permit](#) (as abridged for use by the Stormwater Features Inventory Group).

303(d) list: The federal Clean Water Act requires states to prepare a list of water bodies that fail to meet water quality standards. If a water body segment does not meet water quality standards for a specific pollutant, it gets added to the Water Quality Assessment list as a Category 5 water body segment, known as the 303(d) list. The 303(d) list consists of water bodies for which Total Maximum Daily Loads (TMDLs) must be developed to address the water quality impairment.

CWA: The federal [Clean Water Act](#) (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Pub.L. 92-500, as amended Pub. L. 95-217, Pub. L. 95-576, Pub. L. (6-483 and Pub. L. 97-117, 33 U.S.C. 1251 et.seq. (1972))

Discharge: For the purpose of this permit, unless indicated otherwise, refers to discharges from municipal separate storm sewers. (See also [40 CFR 122.2.](#))

Illicit connection: Any man-made conveyance that is connected to a municipal separate storm sewer without a permit, excluding roof drains and other similar type connections. Examples include sanitary sewer connections, floor drains, channels, pipelines, conduits, inlets, or outlets that are connected directly to the municipal separate storm sewer system.

Illicit discharge: Any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from firefighting activities.

Municipal separate storm sewer (MS3): A conveyance, or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains):

- (a) owned or operated by a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State Law) having jurisdiction over disposal of wastes, storm water, or other wastes, including special districts under State Law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States;
- (b) designed or used for collecting or conveying stormwater;
- (c) which is not a combined sewer; and
- (d) which is not part of a Publicly Owned Treatment Works (POTW) as defined at [40 CFR 122.2.](#)

Municipal separate storm sewer system (MS4): All separate storm sewers that are defined as “large” or “medium” or “small” municipal separate storm sewer systems. (See also [40 CFR 122.26\(b\)\(18\)](#)).

National Pollutant Discharge Elimination System (NPDES): means the national program for issuing, modifying, revoking, and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of the Federal Clean Water Act, for the discharge of pollutants to surface waters of the state from point sources. These permits are referred to as NPDES permits and, in Washington State, are administered by the Washington Department of Ecology.

Outfall: Point source as defined by [40 CFR 122.2](#) at the point where “a municipal separate storm sewer discharges to waters of the State and does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels, or other conveyances which connect segments of the same stream or other waters of the State and are used to convey waters of the State.”

Runoff: means water that travels across the land surface, or laterally through the soil near the land surface, and discharges to water bodies either directly or through a collection and conveyance system. Runoff includes stormwater and water from other sources that travels across the land surface.

Stormwater: Runoff during and following precipitation and snowmelt events, including surface runoff, drainage, and interflow (NPDES Permit); also, “that portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility” ([WAC 173-201A-020](#)).

Total Maximum Daily Load (TMDL): A TMDL is a calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards, and an allocation of that amount to the pollutant’s sources. A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. The calculation must include a margin of safety to ensure that the water body can be used for the purposes the state has designated. The calculation must also account for seasonable variation in water quality. Water quality standards are set by states, territories, and tribes. They identify the uses for each water body, for example, drinking water supply, contact recreation (swimming), and aquatic life support (fishing), and the scientific criteria to support that use. The Clean Water Act, section 303, establishes the water quality standards and TMDL programs.

Water Quality Standards: Surface Water Quality Standards, Chapter [WAC 173-201A](#) , Ground Water Quality Standards, Chapter [WAC 173-200](#) , and Sediment Management Standards, Chapter [WAC 173-204](#) .

Waters of the state: Includes those waters defined as "waters of the United States" in [40 CFR 122.2](#) within the geographic boundaries of Washington State and "waters of the state" as defined in [Chapter 90.48 RCW](#), which includes lakes, rivers, ponds, streams, inland waters, underground waters (see [RCW 90.44.035](#)), salt waters, and all other surface waters and water courses within the jurisdiction of the state of Washington.

8-4 Other

The following definitions are from the Environmental Systems Research Institute, Inc.® online GIS dictionary.

Geographic Information System (GIS): An integrated collection of computer software and data used to view and manage information about geographic places, analyze spatial relationships, and model spatial processes. A GIS provides a framework for gathering and organizing spatial data and related information so that it can be displayed and analyzed.

Global Positioning System (GPS): A system of radio-emitting and -receiving satellites used for determining positions on the earth. The orbiting satellites transmit signals that allow a GPS receiver anywhere on earth to calculate its own location through trilateration. Developed and operated by the U.S. Department of Defense, the system is used in navigation, mapping, surveying, and other applications in which precise positioning is necessary.

Global Navigation Satellite System (GNSS): The Russian counterpart of the United States Global Positioning System.

Shapefile: A vector data storage format for storing the location, shape, and attributes of geographic features. A shapefile is stored in a set of related files and contains one feature class. Shapefiles spatially describe geometries: points, polylines, and polygons.

9 References

[40 CFR 122.2](#)

[40 CFR 122.26\(b\)\(8\)](#)

[40 CFR 130.2](#)

[33 U.S.C. 1251 et seq.](#)

[RCW 90.44.035](#)

[Chapter 90.48 RCW](#)

[Chapter 173-200 WAC](#)

[Chapter 173-201A WAC](#)

[Chapter 173-204 WAC](#)

[Chapter 173-270 WAC](#)

ESRI. 2013. [ESRI Online GIS Dictionary](#). Environmental Systems Research Institute, Inc.® Accessed 6/14/2013.

Ecology. 2014. Washington State Department of Transportation Municipal Stormwater Permit, National Pollution Discharge Elimination System and State Waste Discharge Permit for Large and Medium Municipal Separate Storm Sewer Systems. Washington State Department of Ecology. Olympia, Washington. Permit No. WAR043000A. Issuance Date March 6, 2014.

FHWA. 2009. *Manual on Uniform Traffic Control Devices for Streets and Highways*. Federal Highway Administration. December 2009 edition. Last updated May, 2012.

WSDOT. 2011. *Phase 2 Stormwater Retrofit Field Reconnaissance Scoring Procedures Manual*. Prepared for WSDOT by Tetra Tech. January 27, 2011.

WSDOT. 2014. *Highway Runoff Manual*. Washington State Department of Transportation, Design Office. Publication Number M 31-16. April, 2014.

WSDOT. 2012. *Work Zone Traffic Control Guidelines*. Washington State Department of Transportation, Traffic Operations Division. Publication number M 54-44. February, 2012.

WSDOT. 2012. *Operating the Trimble® GeoExplorer® 6000 Series GeoXT™ handheld, using ArcPad® 10.0 with service pack 1 and GPSCorrect™ 3.20 software*. July, 2012.

WSDOT. 2012. *Safety Procedures and Guidelines Manual*. Washington State Department of Transportation, Safety and Health Services Office, Human Resources Division. Publication number M 75-01. February, 2014.

WSDOT. 2012. *Stormwater Features Inventory Database: Standard Operating Procedures for Office Data Collection*. Washington State Department of Transportation, Environmental Services Office, Stormwater and Watersheds Program. October, 2012.

WSDOT. 2013. *Stormwater Features Inventory: Standard Operating Procedures for Stormwater Discharge Point Inventory*. Washington State Department of Transportation, Environmental Services Office, Stormwater and Watersheds Program. February, 2013.

WSDOT. 2013. *Stormwater Features Inventory: Standard Operating Procedures for Field Safety*. Washington State Department of Transportation, Environmental Services Office, Stormwater and Watersheds Program. August, 2013.

Appendix A: Assessment and Scoring Attributes

Detailed descriptions of assessment and scoring criteria are presented below. Specified criteria aid in ensuring that staff collect data and consistently apply scoring to comparable conditions. [Table A-1](#) describes GIS shapefile attributes that field and office staff edit, when assigning Stage 2 Assessment scores to the highway segments.

Table A-1 Stage 2 Assessment and Scoring Procedures for GIS Shapefile Attributes.

Attribute	Definition	Editing and/or Scoring	Source
FID	Internal Feature Number	Not Applicable	ESRI
Shape	Feature Geometry	Not Applicable	ESRI
RID	Route ID Number – Combines SR, RRT, and RRQ	WSDOT’s ESO Environmental Information Program generates this information using GIS with direction from ESO’s Stormwater and Watersheds Program to complete Stage 1 of the stormwater retrofit prioritization process.	WSDOT
FMEAS	From Measure (in Accumulated Route Miles (ARM))		WSDOT
TMEAS	To Measure (in Accumulated Route Miles (ARM))		WSDOT
STARTMP	Starting Milepost – The beginning of a scoring segment		WSDOT
END MP	Ending Milepost – The end of a scoring segment		WSDOT
SR	A unique State Route identifier assigned by WSDOT’s Transportation Data Office.		WSDOT
RT_TYPEA	Route Type		WSDOT
RID2	Route ID Number		WSDOT
RRT	Related Roadway Type		WSDOT
RRQ	Related Roadway Qualifier		WSDOT
CConv	Closed Conveyance System Score	A determination that the highway segment’s stormwater conveyance system is primarily a closed conveyance system receives a score of 2; otherwise, it receives a score of 0 (see Section 6-3.2 for details).	Field Crew
CConvNote	Closed Conveyance System Notes	Field crew notes justifying why they considered the conveyance system open or closed.	Field Crew
EWQ	Observed Erosion or Water Quality Pollution Score	Observable signs of erosion or pollution associated with a highway segment receive a score of 2; otherwise, they receive a score of 0 (see Section 6-3.3 for details).	Field Crew
EWQNote	Observed Erosion or Water Quality Pollution Score Notes	Field crew notes justifying why a highway segment was considered to have erosion or pollution issues.	Field Crew
303D	Discharge to 303(D) Listed Water Bodies Score	Highway segment discharges stormwater runoff to a water body on the 303(d) list for polycyclic aromatic hydrocarbons, metals (zinc/copper), turbidity, or herbicides used by WSDOT receives a score of 2; otherwise, they receive a score of 0 (see Section 6-3.4 for details).	Office Staff/ Engineer
303DNote	Discharge to 303(D) Listed Water Bodies Score Notes	Notes regarding the office staff/engineer’s determination of whether a highway segment discharges stormwater runoff to a 303(d) Listed Water Body.	Office Staff/ Engineer
LocEP	Locally Identified Erosion or Pollution Problems Score	Locally identified erosion, flooding, or pollution associated with a highway segment exist, receive a score of 3; otherwise, they receive a score of 0 (see Section 6-3.5 and Appendix B for details).	Office Staff/ Engineer
LocEPNote	Locally Identified Erosion or Pollution Problems Score Notes	Notes about the determination of whether a highway segment was identified as having local erosion or pollution issues (see Appendix B for details).	Office Staff/ Engineer

Table A-1 Continued

Attribute	Definition	Editing and/or Scoring	Source
HabSV	Habitat Suitability and Value Score	WDFW or tribal biologist information (or documentation) showing that the receiving water body has any one of the following, the highway segment receives a score of 3. <ul style="list-style-type: none"> High-quality physical spawning & rearing habitat Water quality that meets or exceeds water quality standards Both a lack of stream impairment and a lack of fish passage barriers In absence of documentation or information for the stream or it does not meet any of the above category groupings, the highway segment receives a score of 0 (see Section 6-3.6 for details).	Office Staff/ Biologist
HabSVQ1	Answer to Question 1 of the WDFW and Tribal Biologist Standard Questionnaire	Answer to Question 1 of the WDFW and Tribal Biologist Standard Questionnaire (see Section C-1). Y= (Yes) N= (No)	Office Staff/ Biologist
HabSVQ1N	Notes for Question 1 of the WDFW and Tribal Biologist Standard Questionnaire	Notes for Question 1 of the WDFW and Tribal Biologist Standard Questionnaire (see Section C-1) documenting where information is available to support the answer to the question.	Office Staff/ Biologist
HabSVQ2	Answer to Question 2 of the WDFW and Tribal Biologist Standard Questionnaire	Answer to Question 2 of the WDFW and Tribal Biologist Standard Questionnaire (see Section C-2). Y= (Yes) N= (No)	Office Staff/ Biologist
HabSVQ2N	Notes for Question 2 of the WDFW and Tribal Biologist Standard Questionnaire	Notes for Question 2 of the WDFW and Tribal Biologist Standard Questionnaire (see Section C-2) documenting where information is available to support the answer to the question.	Office Staff/ Biologist
HabSVQ3	Answer to Question 3 of the WDFW and Tribal Biologist Standard Questionnaire	Answer to Question 3 of the WDFW and Tribal Biologist Standard Questionnaire (see Section C-3). Y= (Yes) N= (No)	Office Staff/ Biologist
HabSVQ3N	Notes for Question 3 of the WDFW and Tribal Biologist Standard Questionnaire	Notes for Question 3 of the WDFW and Tribal Biologist Standard Questionnaire (see Section C-3) documenting where information is available to support the answer to the question.	Office Staff/ Biologist
HabSVQ4	Answer to Question 4 of the WDFW and Tribal Biologist Standard Questionnaire	Answer to Question 4 of the WDFW and Tribal Biologist Standard Questionnaire (see Section C-4). Y= (Yes) N= (No)	Office Staff/ Biologist
HabSVQ4N	Notes for Question 4 of the WDFW and Tribal Biologist Standard Questionnaire	Notes for Question 4 of the WDFW and Tribal Biologist Standard Questionnaire (see Section C-4) documenting where information is available to support the answer to the question.	Office Staff/ Biologist
HabSVNote	Habitat Suitability and Value Score Notes	Habitat Suitability and Value Score Notes documenting information available to support the overall Habitat Suitability and Value Score (i.e., HabSV). Documentation includes the filename(s) containing a PDF of the completed WDFW and Tribal Biologist Standard Questionnaire.	Office Staff/ Biologist
CCPhoID	Closed conveyance photograph ID.	Photograph identification for closed conveyance system when receiving rapid assessment score (if feasible).	Field Crew
CCPhoDESC	Closed conveyance photograph description	Photograph description of field data assessment conditions for closed conveyance.	Field Crew
EWQPhoID	Erosion, water quality, or pollution photograph ID	Photograph identification of erosion, water quality, or pollution issues when receiving rapid assessment score (if feasible).	Field Crew
EWQPhoDESC	Erosion, water quality, or pollution photograph description	Photograph description of field data assessment conditions for erosion, water quality, or pollution.	Field Crew
QC_NOTES	Quality Control (QC) Review Notes	Notes and information regarding QC review of GIS shapefile submittals.	Contractor/ Project Manager

C-2 Water Quality

Water quality includes the small stream meeting or exceeding chemical and physical characteristics (e.g., low water temperature, high dissolved oxygen concentrations, and moderate pH) of surface water per the Washington State water quality standards ([WAC-173-201A](#)) that are intended to protect aquatic life and promote survivability of all life stages.

Water quality conditions meet or exceed water quality standards: Yes No

Comments:

C-3 Lack of Stream Impairments

Impairments include the physical alteration of the natural riparian corridor and/or the stream channel that reduces the availability of fish habitat necessary for completing each of the life stages and diminishes survivability, resulting from altered habitat. Examples of impairments include dams, channelization, effects from urbanization, hardened streambank protection, forest harvesting, mining activities, and water diversions.

Lacks stream impairments: Yes No (i.e., stream impairments exist)

Comments:

C-4 Lack of Fish Passage Barriers

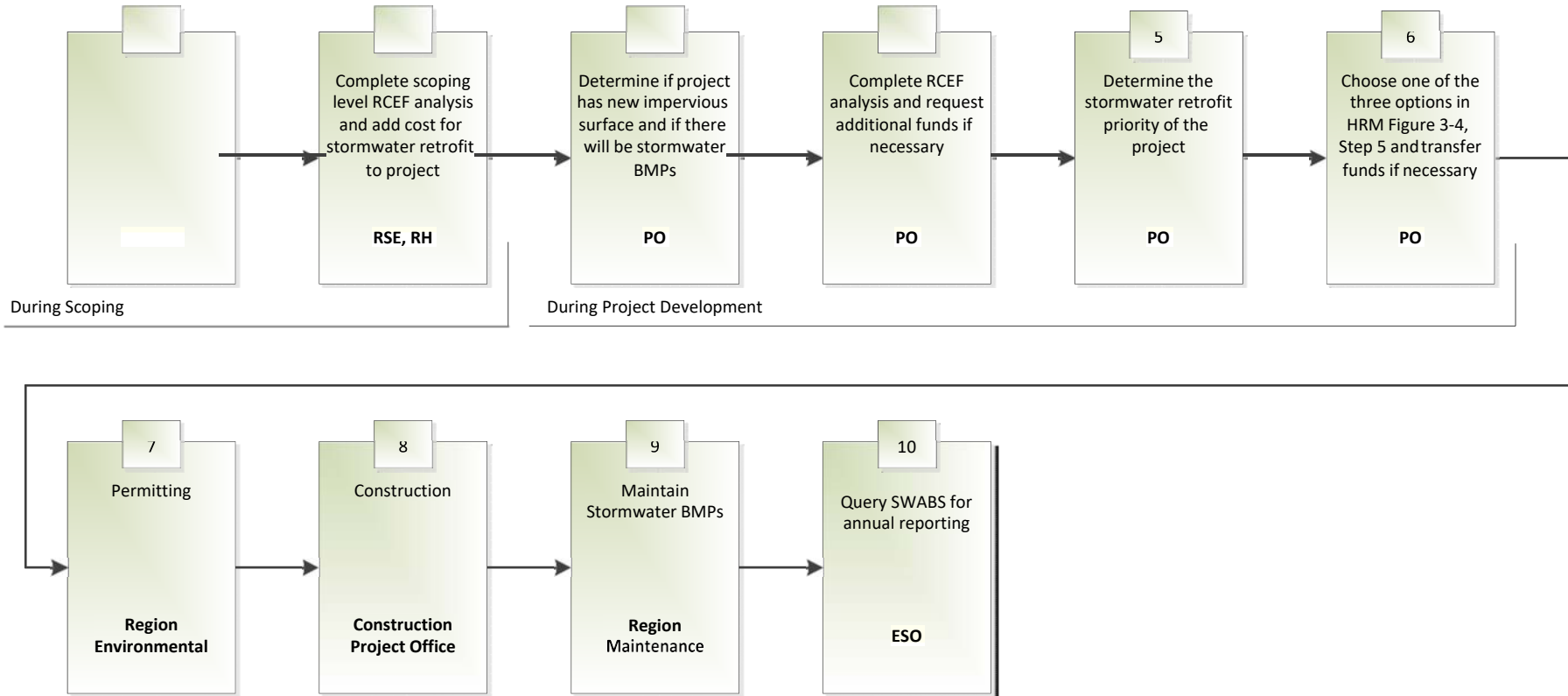
Lack of presence of fish passage barriers, including dams, culverts, water diversions, and natural passage barrier features (e.g., waterfalls, low dissolved oxygen, and high temperature barriers). The habitat suitability and value criteria is met if the regional WDFW or tribal biologist provides information that supports there is a lack of stream fish passage barriers for the small receiving stream.

Lacks fish passage barriers: Yes No (i.e., fish passage barriers exist)

Comments:

Appendix 4

Appendix 4



Project-triggered Stormwater Retrofits in the Puget Sound Basin - Flowchart Notes

During Scoping

1. **Region Scoping Engineer (RSE) and Region Hydraulics (RH)** – Determine if the Improvement Project proposes any new impervious surface and the project triggers HRM Minimum Requirement 5 (Runoff Treatment) or Minimum Requirement 6 (Flow Control).
2. **RSE and RH** – Complete the scoping level Retrofit Cost Effectiveness and Feasibility analysis to determine how much money should be added to the project estimate to pay for the project-triggered retrofit obligation.
 - a. RSE add the cost for stormwater retrofit to the project estimate

During Project Development

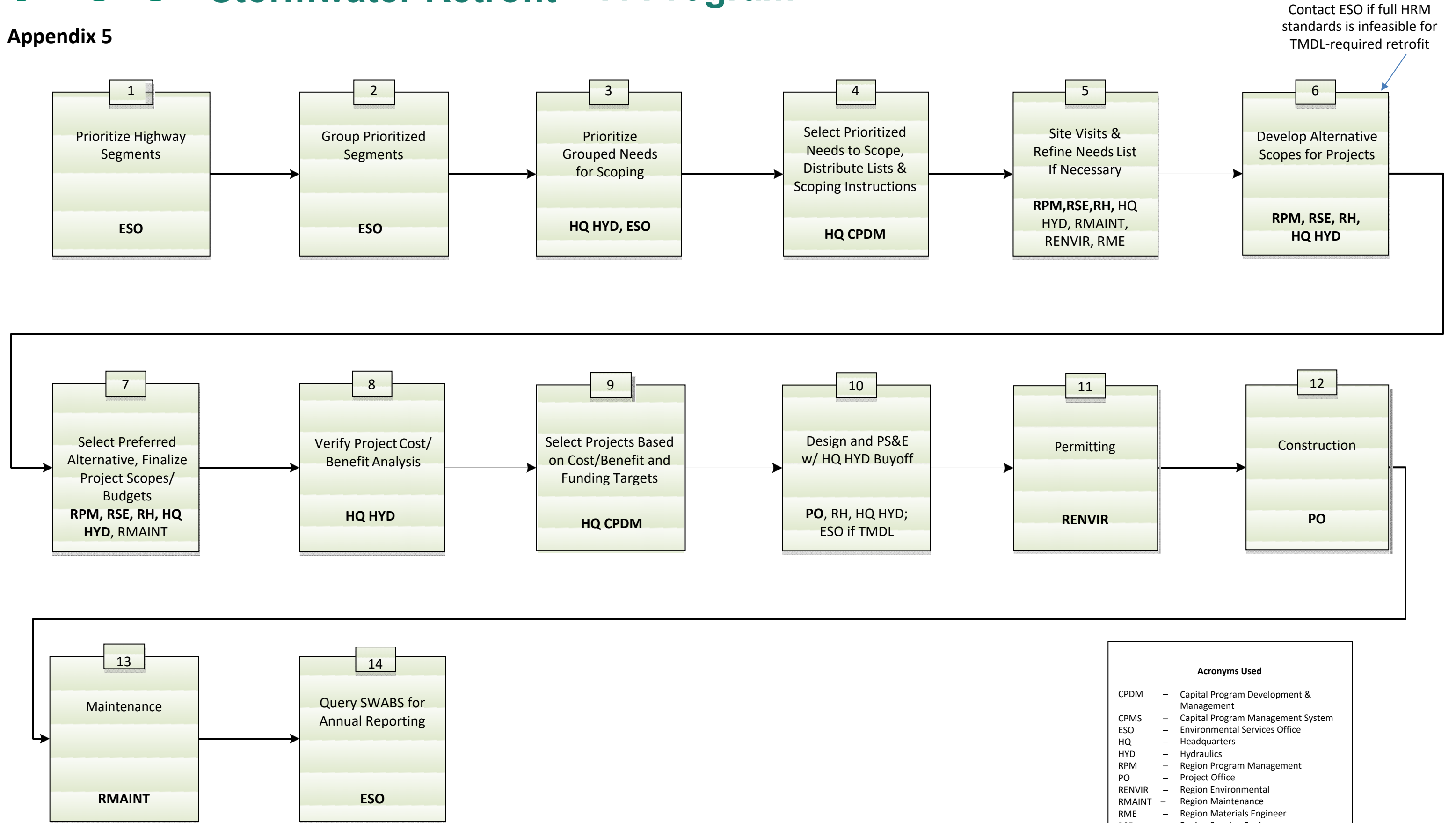
3. **Region Project Office (PO)** – Determine if the Improvement Project has any new impervious surface and if there will be any stormwater BMPs on the project.
4. **PO** – Perform the Retrofit Cost Effectiveness and Feasibility analysis for the proposed stormwater design to determine the project-triggered retrofit obligation.
 - a. Complete between 30-60% project design
 - b. Determine if it is cost effective to retrofit existing impervious and existing PGIS within project limits.
 - c. Determine if it is feasible to retrofit existing impervious and existing PGIS within project limits.
 - a. If retrofit of all existing impervious and existing PGIS is cost-effective and is feasible, then project needs to retrofit all existing impervious surfaces and PGIS within the project limits
 - d. Include cost information in Hydraulics Report
 - e. PO checks to make sure project dollars included in the budget estimated during the scoping level RCEF is adequate. If not, PO needs to initiate funds request.
 - i. PO requests additional funds, if necessary.
5. **PO** - Determine the stormwater retrofit priority of the project.
 - a. Stormwater retrofit priority information is available by contacting the Environmental Service Office (will be available on the GIS workbench by Fall 2017)
6. **PO**– Depending on retrofit priorities within the project limits, choose one of the three options in HRM Figure 3-4, Step 5.
 - a. If choosing to transfer money to the I-4 stormwater retrofit fund (PIN 099902L), initiation of the transfer shall occur just before the project goes to AD (90% design).
 - i. The project office requests a change management from Region Program Management to let them know how much and what date to transfer funds (AD date) during their monthly check-in.

- ii. Region Program Management sends change management and spreadsheet to HQ CPDM at AD.
- 7. **Region Environmental** –Permitting
 - a. Region Hydraulics to input stormwater BMPs into SWABS application
- 8. **Construction Project Office** –Construction
 - a. Construction office to update SWABS application if any BMP changes
- 9. **Region Maintenance** – Maintain stormwater BMP facilities
- 10. **ESO** - Query SWABS application for NPDES annual reporting

Appendix 5

WSDOT Stormwater Retrofit – I4 Program

Appendix 5



Acronyms Used	
CPDM	– Capital Program Development & Management
CPMS	– Capital Program Management System
ESO	– Environmental Services Office
HQ	– Headquarters
HYD	– Hydraulics
RPM	– Region Program Management
PO	– Project Office
RENVIR	– Region Environmental
RMAINT	– Region Maintenance
RME	– Region Materials Engineer
RSE	– Region Scoping Engineer
RH	– Region Hydraulics
SWMPP	– Stormwater Management Program Plan
TMDL	– Total Maximum Daily Load
SWABS	– Stormwater BMP Specifications

I-4 Stand-alone Stormwater Retrofit Flowchart Notes

1. **Environmental Services Office (ESO)** - Prioritize highway segments
 - a) Follow 2014 SWMPP Table 6-1 (Appendix 2), Stages 1 and 2, and existing Standard Operating Procedures for Stormwater Retrofit Assessment and Scoring
 - b) ESO maintains prioritized segment list
2. **ESO** - Group prioritized segments based on proximity and according to Region, if possible. If not possible, note where groups of prioritized needs cross boundaries. (following Appendix 6)
3. **Headquarters Hydraulics (HQ HYD), ESO** - Rank grouped needs list using the Scoping Matrix and populate Key Ranking Factors Document. Deliver any updates to HQ CPDM by October 1st each year (provide grouped needs but include segment details).
4. **HQ CPDM** – Select ranked needs based on available funding, and distribute prioritized needs lists and region scoping instructions to Region Program Management.
 - a) Scoping instructions include ranked needs lists defined by SRMP and a link to HQ HYD [Stand-alone Stormwater Retrofit Considerations for Scoping](#)
5. **Region Program Management (RPM), Region Scoping Engineer (RSE), Region Hydraulics (RH)** – Perform site visits for each ranked need using the [Stormwater Retrofit Site Visit Checklist](#); Include HQ HYD, Region Maintenance (RMAINT), Region Environmental (RENVIR), and Region Materials Engineer (RME).
6. **RPM, RSE, RH, HQ HYD** – Region develops alternative scopes for projects;
 - a) RPM may use a RSE in a project engineering office to:
 - i. Follow HRM and Stand-Alone Stormwater Retrofit Considerations for Scoping and CPDM scoping instructions
 - ii. Determine preliminary BMP type, size, and location and quantity in each project
 - iii. Determine preliminary PGIS area treated for water quality
 - iv. Determine preliminary cost/square foot of PGIS area treated for water quality
 - v. Enter in CPMS – establish WIN/PIN
 - b) Contact ESO as soon as possible if it is infeasible to build to full standards at a TMDL specified location. ESO staff will work with the design office and Ecology to resolve the issue as quickly as possible.
 - c) Provide feedback to ESO if:
 - i. All existing pavement in the project, or specific segments within a project, are already treated with existing runoff treatment or flow control BMPs (based on information in the Highway Activities Tracking System (HATS), SWABS, or existing hydraulic reports).
 - ii. A project, or specific segments within a project, are removed from the scoping list due to:
 - 1) City ownership of the stormwater system per RCW 47.24.020 (i.e., non-limited access city streets that form parts of state highways within the limits of incorporated cities and towns); and/or
 - 2) Constraints determined in Step 5¹.
7. **RPM, RSE, RH, HQ HYD** – Select preferred alternative, finalize scopes/budgets and update CPMS.
 - a) Include RMAINT and HQ CPDM
 - b) RPM to add impervious area (square feet) treated to CPMS notes for each scoped project

- on 10-year plan
- c) RPM to specify in the CPMS notes if the project fulfilling a TMDL requirement
8. **HQ HYD** – Verify impervious area treated and overall project cost (cost/benefit)
 9. **HQ CPDM** – Select ranked projects for funding based on cost/benefit analysis and funding targets
 - a) Projects fulfilling a TMDL requirement shall be funded first
 - b) Project delivery plan published
 10. **Project Office (PO)** – RPM assign project to Region Design office to develop detailed design and PS&E with HQ HYD buyoff
 11. **RENVIR** – Permitting
 - a) RH to input stormwater BMPs into the Stormwater BMP Specifications (SWABS) application
 12. **PO** – Construction
 - a) Construction PO to update SWABS application if any BMPs change
 13. **RMAINT** – Maintain stormwater BMP facilities
 14. **ESO** - Query SWABS application for NPDES annual reporting

¹Segments of projects (or entire projects) that have been excluded due to infeasibility criteria in Step 5 will be placed on the deferred retrofit list. When retrofit projects to address all high and medium priority segments statewide are complete, implementation of retrofits on this list will begin at Step 2.

I-4 Stand-alone Stormwater Retrofit Scoping Matrix¹

Criteria	Result
Overlay grouped needs with BMPs and drainage area mapping from the Stormwater Features Inventory database and subtract overlapping mileposts. ²	Remove sections (milepost to milepost) from the prioritized needs list where treatment is already provided.
Assign points for the number of high and medium priority segments contained within each stormwater retrofit group of prioritized needs: 1) Each high priority segment inside a project receives 2,500 points 2) Each medium priority segment inside a project receives 100 points	Assign points based on weighted number scheme.
Assign 100,000 points to each group of prioritized needs that has a TMDL obligation or a retrofit obligation to prevent superfund site recontamination (further prioritized by obligation compliance timeline if needed)	Assign points to groups of prioritized needs with stormwater retrofit obligations defined in Appendix 3 of WSDOT's permit or a retrofit obligation to prevent superfund site recontamination, which are considered the highest stand-alone retrofit priorities.
Tally points	Prioritized list of needs for scoping

¹The Scoping Matrix starts at Box 3 of the Stormwater Retrofit – I4 Program flow chart

² Won't be completed annually until WSDOT has begun mapping drainage areas. Until then, information provided during project scoping will be used to document impervious areas already treated (see I-4 Stand-alone Stormwater Retrofit Flowchart Notes, Step 7.b)ii.)

Appendix 6

Grouping Prioritized Stormwater Retrofit Segments

Background

For use after following the Stormwater Retrofit Prioritization Scheme (Appendix 2) to score low, medium, and high priority stormwater retrofit segments of highways in Washington State, this document describes the framework for combining medium and high priority stormwater retrofit highway segments that can be scoped, funded, and constructed. Note: Low priority segments may be grouped for scoping once all medium and high priority segments have been addressed.

The Headquarters Environmental Services Office is responsible for grouping priority stormwater retrofit segments. In the past, this process was not well defined and has been arbitrary. The main constraint was that stormwater retrofit segments had to be in the same WSDOT Region (NW, Olympic, SW, Eastern, NC, and SC).

Grouping many priority stormwater retrofit segments together to make one large stand-alone stormwater retrofit need resulted in less definition in the project scope since there were so many segments. This led to a request to break up the prioritized needs (segment groups) into smaller groups.

Where we are now

Smaller groups of stand-alone stormwater retrofit needs may be better since the resultant project scopes would likely have more detail and definition. Also, funding for the stormwater retrofit program is limited so funding smaller projects with smaller budgets might be easier.

Upon completion of segment prioritization in accordance with Appendix 2, segments will be reviewed for overlap with non-limited access highways within City limits (per RCW 47.24). Any prioritized segments on non-limited access highways within City limits were removed from the dataset.

New Process for Combining Stormwater Retrofit Segments

The following criteria will be used to combine stormwater retrofit highway segments:

1. Segments should be within the same Region (no segment should span two different Regions)
2. Segments should be on the same State Route
3. Segments are geographically close to each other (within 5 miles of each other)

Expected Results

Based on past stand-alone stormwater retrofit projects, the original mile post limits of the groups of prioritized needs may be expanded due to opportunities and physical road and side slope conditions. A limit of 5 miles will allow projects to expand, if needed. Also, by limiting the groups of prioritized needs to 5 mile stretches, resultant projects will be more discrete and will likely be smaller and more easily funded.

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