

Section 7: Research/Monitoring

7.1 Stormwater Research Strategy

Stormwater management is a complex task with a variety of regulatory drivers and constraints. It spans numerous technical disciplines including hydraulics, hydrology, geology, and water quality. For transportation projects, the linear nature of the highway network often poses siting constraints for conventional stormwater management approaches, in addition to considerations required for providing safe access for maintenance of stormwater treatment facilities. To help meet these challenges, the Washington State Department of Transportation (WSDOT) relies on research efforts to help identify state-of-the-art, cost-effective solutions for designing, constructing, and maintaining stormwater management systems.

The Stormwater Research Strategy is a tool for communicating WSDOT's stormwater-related research needs and priorities. The Strategy provides the framework to:

- Coordinate and build partnerships within WSDOT and at regional, state, and federal levels to leverage stormwater research resources
- Provide a clear process for soliciting, submitting, prioritizing, and implementing stormwater-related research proposals
- Find solutions that improve the design, constructability, maintainability, cost effectiveness, hydraulic performance, and treatment efficiency of stormwater facilities, as well as stormwater management operations and maintenance practices
- Improve the compilation, tracking, and dissemination of stormwater research findings

The remaining sections describe how WSDOT promotes and implements stormwater research and interacts with other research programs; lists priority stormwater-related research needs; describes how stormwater proposals are developed, evaluated, and prioritized; and how research findings are disseminated. The current list of [stormwater research proposals](#) can be viewed at WSDOT's ESO Water Quality Program web site.

7.2 Communication and Coordination

Effective internal and external communication and coordination is essential to supporting, promoting, and executing stormwater research. This section outlines the plans and processes for coordinating internal and external stormwater research-related efforts as well as for sharing and promoting research-related information.

WSDOT Research Office

WSDOT's Research Office organizes, manages, and disseminates the results of research (stormwater-related and other) conducted within the Department. The Research Office coordinates the identification, selection, and management of research projects funded through the Federal State Planning and Research Program, and helps develop and manage research funded by other agency programs or by legislative direction. This includes identifying, investigating, and providing coordination of environmental-related research efforts. A successful stormwater-specific research strategy requires ongoing communication and coordination with WSDOT's Research Office.

Stormwater Technical Review Committee

Stormwater research proposals are reviewed by the Stormwater Technical Review Committee (STRC). The STRC is an ad hoc WSDOT technical team convened and chaired by Environmental Services Office (ESO) Water Quality Program staff. In addition to the chair, the STRC consists of a core group made of representatives with best management practice (BMP) design and evaluation expertise (e.g., a regional hydraulics design engineer, a modeler from the Hydraulics Office, and ESO's Water Quality Team Leader). Additional disciplines will be called upon as needed.

The STRC reviews research proposals for applicability, potential overlap with other research proposals, and potential for partnering on a given proposal. The STRC also prioritizes the research proposals, setting the direction and focus for stormwater research. Proposals for research on new stormwater BMPs that are not included in the Highway Runoff Manual are handled in the same process as other stormwater research.

The STRC selects stormwater research projects to submit to the WSDOT Research Office and other entities for possible funding. Thus the STRC functions as one of the Research Advisory Committees as defined in the WSDOT Research Procedures Manual (page 2-2). The ranking by the STRC sets a direction and focus that advances WSDOT's stormwater research goals. However, funding sources ultimately control which STRC-recommended proposals get funded.

WSDOT New Products Committee

WSDOT's New Products Committee (NPC) evaluates new products and procedures for potential use on construction and maintenance projects. Evaluators use a wide variety of information to better understand new products or procedures, including regulatory and testing institutions such as the American Association of State Highway and Transportation Officials (AASHTO), the

Highway Innovative Technology Evaluation Center (HITEC), and others. Many products also require field-testing to fully evaluate their performance and benefits. After an evaluation, WSDOT's NPC findings and recommendations for action typically fall into one of the following categories:

- Approved
- Not Approved
- Product Meets Current Specifications
- Non-Interest Or Limited Use Item

Because the evaluation of new products and procedures may drive, influence, or complement stormwater research, it is important for ESO's Water Quality Program to communicate and coordinate with the New Products Committee. In order to ensure this, cross-committee attendance between the NPC and the STRC is encouraged.

Local, State, and National Programs Coordination

To facilitate research partnerships and information sharing, ESO's Water Quality Program will coordinate with local, state, and national programs to promote or conduct stormwater research. Maintaining communication and coordination with these and other stormwater programs ensures that WSDOT stays abreast of the latest stormwater developments and priorities, and that state and local agencies can leverage resources through shared stormwater research efforts and information sharing.

Research Program Resource Web Site

[WSDOT's stormwater research web site](#) publicizes the Stormwater Research Strategy, summarizes and communicates WSDOT's stormwater-related research activities and findings, and provides guidance on proposal development and review. The intended audience includes WSDOT staff interested in proposing research or reviewing current research priorities, affiliated research partners (e.g., universities, municipalities, state and federal agencies, etc.), and any citizens or public interest groups interested in stormwater research. The Stormwater Research Program web site includes the following elements:

- Overview of the stormwater research program including strategies and objectives
- List of current and past research efforts
- Reports and findings on stormwater-related research
- List of current research priorities
- Assistance with proposal development and submittal
- Links to research resources
- Contacts within the program

7.3 Information Management

An important goal of the Stormwater Research Program is to ensure that the information developed through research is easily available to interested parties. In addition to the website, information will be disseminated through existing libraries and databases.

WSDOT Library

The WSDOT Research Office includes the WSDOT Library, which manages a collection of books, manuals, technical reports, legal reference materials, standards, journals, and online resources on virtually every transportation-related subject. The WSDOT Research Office collaborates with the Library to catalog WSDOT research reports and to make national and state research documents available to WSDOT employees, university researchers, consultants, other government entities, and the public. Stormwater-related research results and findings will be included in the WSDOT Library in coordination with the Research Office.

Research and Monitoring Data

Monitoring data that are produced from a given research effort will be linked with the Stormwater Management Facilities Inventory database to the greatest extent feasible. This will enhance the ability to evaluate water quality and quantity monitoring data in relation to other cataloged data such as average daily traffic (ADT) and drainage area.

7.4 Research Areas and Needs

Stormwater management operates in a dynamic arena of rapidly evolving public policy and advancements in management and design methods. Although these changes and advancements tend to shift stormwater research priorities every few years, WSDOT's core research areas will likely remain the same. Currently, WSDOT's stormwater-related research needs fall into the four categories outlined below.

Characterization of the properties of highway runoff

The extensive data collected by other states and local governments, along with WSDOT's own data gathering efforts during the past NPDES permit cycle, has significantly reduced the need for additional data to characterize highway runoff. While the general characterization of highway runoff is no longer a priority, collection of highway runoff data will continue, largely as a by-product of other monitoring efforts. For example, BMP effectiveness research requires evaluating untreated highway runoff (i.e., control samples) to allow before and after treatment comparisons. Characterization data is also an integral component of policy related research efforts (i.e., defining or refining treatment thresholds, or developing waste load allocations).

Characterization of the environmental effects of highway runoff

Although the character of highway runoff is generally known, the effects of highway runoff on the water quality, ecology, hydrology, and geomorphology of downstream systems is still a

priority research area. Research on the effects of highway runoff will help further refine policy and management of highway runoff.

Methods to avoid, minimize, buffer, or mitigate highway runoff effects

WSDOT currently sees long-term benefits in pursuing and evaluating stormwater dispersion methods, infiltration systems, watershed-based mitigation approaches, and other cost-effective treatment options applicable for constrained highway right-of-way settings. However, WSDOT also recognizes the need to ensure that surface water quality protection efforts achieved through dispersion and infiltration do not come at the expense of soil or groundwater contamination.

Policy, procedures, and design tool development

Regulations or regulatory guidance may spawn the need for research to either verify appropriateness of regulatory triggers or assess its implications for department project and service delivery. The emergence of new stormwater approaches and technologies developed to comply with regulations often spurs the need for research to flush out design and maintenance questions associated with those new management options. Findings from such research are incorporated into WSDOT's business practices through its updates to department technical procedures, guidance manuals (e.g., Highway Runoff, Hydraulics, Design, Environmental Procedures, and Maintenance Manuals), design tools (e.g., hydrologic models), and standard specifications (e.g., erosion and water pollution control).

7.5 Research Proposal Development and Evaluation Process

This section outlines the development and review process for stormwater research proposals. *Figure 7-1* depicts the process that a research idea goes through from conception to a fully developed and prioritized proposal. This is a collaborative effort between the proponent generating the idea and WSDOT's technical support staff, who will assist in shepherding the concept through the process. The amount of technical staff support needed in this iterative process will depend on the level and area of expertise of the individual(s) submitting the idea.

Instructions for preparing proposals and the submittal form are available as [one downloadable file](#). Proponents may wish to consult with ESO's Water Quality Program staff for advice and assistance while preparing their proposal. To avoid expending energy in pursuing research ideas that have been adequately investigated, a literature search should be conducted very early in the process.

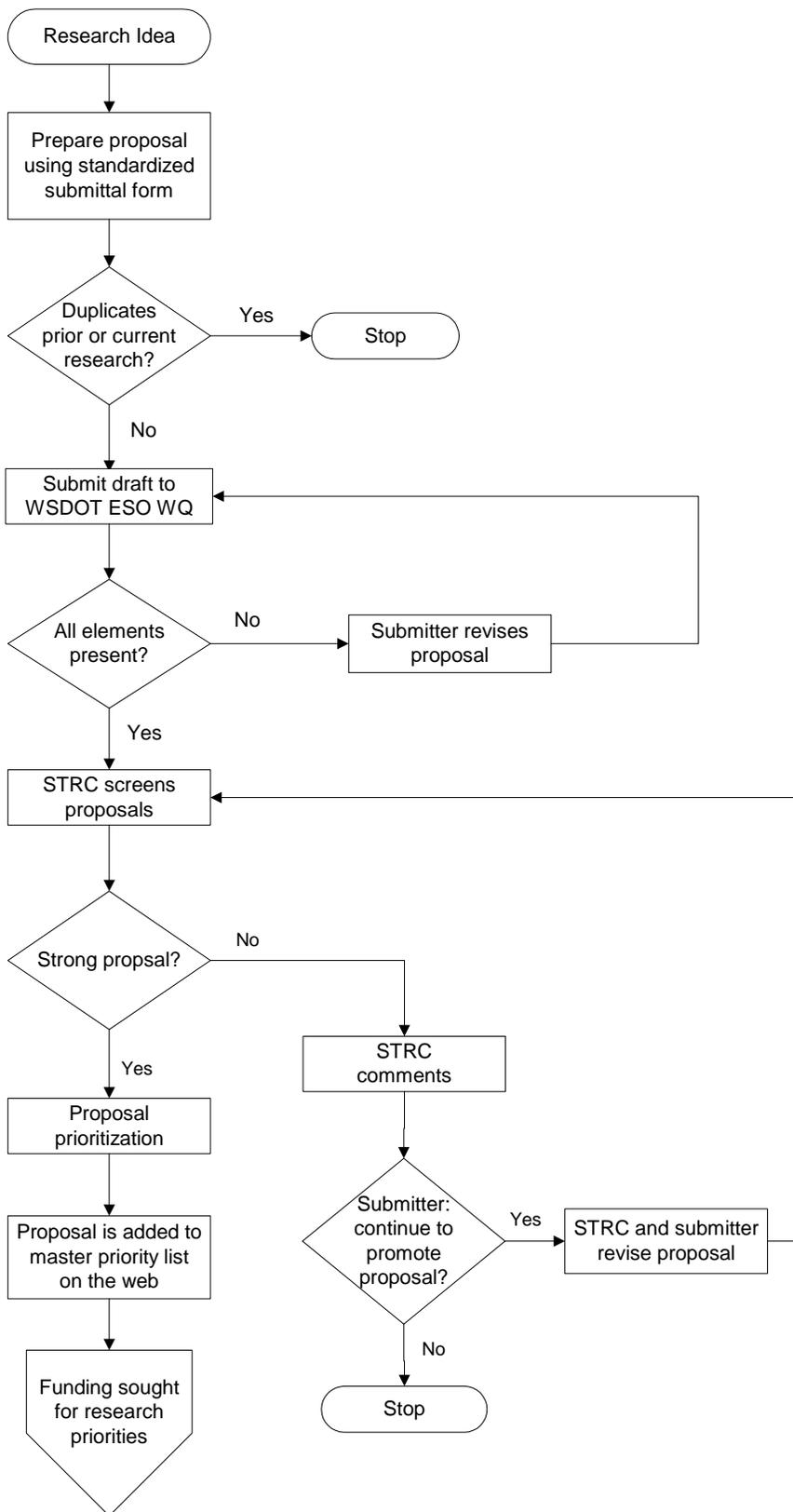


Figure 7-1 Research idea development process

Upon submittal, ESO's Water Quality Program staff checks the proposal to ensure it contains all the required information prior to sending it to the Stormwater Technical Research Committee (STRC). The STRC's initial screening evaluates whether:

- The proposal addresses key concern(s) for WSDOT operations.
- WSDOT or other researchers have already adequately investigated the topic.
- It overlaps with other existing research proposals or can be combined with other proposals.
- Potential funding partners exist.

The purpose of the preliminary screening is not to rank the research proposals, but to:

- Screen out proposals too far removed from WSDOT's interests and responsibilities, or that have already been covered in existing proposals or by previous research efforts
- Strengthen the proposal by suggesting refinements, re-directions, or additions to the proposed study
- Strengthen the proposal by integrating it with similar proposals or partnering with others interested in the same topic.

Screened proposals may be returned, with comments, to submitter; integrated with other proposals; or kept as-is. In the event that the STRC fails to embrace the proposal, a submitter may elect to either abandon the proposal or work collaboratively to refine the proposal in order to adequately respond to the STRC's feedback .

The STRC prioritizes promising proposals based on the following criteria:

- *Applicability and Practicality.* Research having practical application statewide or regionally will rank higher than those with limited applicability, or less practical applications.
- *Time-Sensitivity.* Research filling an immediate critical need will rank higher than proposals for more general or "pure" research.
- *Cost Considerations and Potential for Partnerships.* A qualitative cost-benefit evaluation will be performed for each proposal to determine whether the investment in the research effort will provide a valuable benefit to WSDOT. Proposal reviewers will also consider the availability of funds and funding partners.
- *Study Design Feasibility and Quality.* Proposal reviewers will evaluate whether the research method could be successfully deployed to yield useful results.
- *Degree of Knowledge Gap.* Research proposals may address topics that have been investigated to some degree by others. A high rank for this criterion will be applied to proposals where insufficient information exists or prior investigation has yielded inadequate knowledge.

Selected prioritized proposals will be placed on a master list of key research proposals, which will be maintained by the STRC. The list will be posted on the [WSDOT's ESO Water Quality Program web site](#).

Proposals are selected, funded, and implemented, based on WSDOT priorities and available funding opportunities. Because funding criteria and restrictions vary from source to source, proposals may not necessarily be implemented solely based on the priority ranking. Thus while the strategy sets the research priorities, it can only influence the funding and implementation of individual research efforts.