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OUR GREEN/DUWAMISH

Watershed-Wide Stormwater Management Strategy

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Executive Summary (under development)

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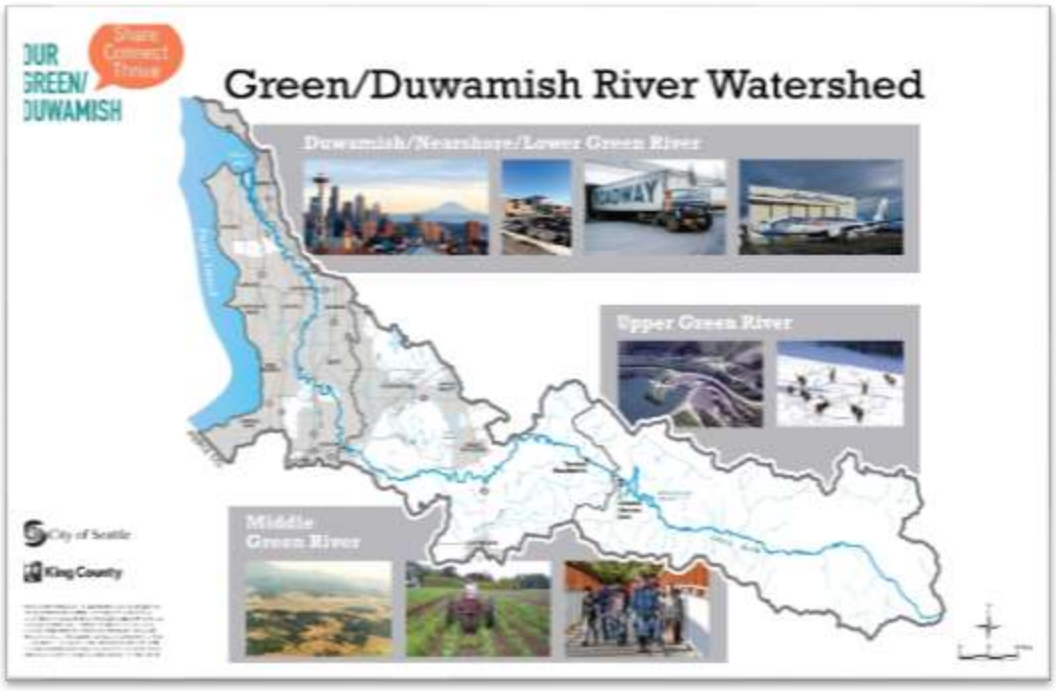
Introduction

In September 2014, King County, in partnership with the City of Seattle, launched the *Our Green/Duwamish* initiative for developing strategies to strengthen communities and improve air, land, and water conditions in the Green/Duwamish Watershed. This initiative is intended to improve coordination of work in the watershed at the local, state, and federal levels such as habitat restoration, salmon recovery, flood control, stormwater management, public health, social equity, environmental cleanups, economic development, open space preservation, water quality and more.

Figure 1 - Our Green/Duwamish Geographic Boundary



Over a year of initial background research and community meetings culminated in a Preliminary Background Report (PBR), which provides a summary of current conditions and existing plans and programs active in the Green/Duwamish Watershed. The PBR identified the need to create a more comprehensive approach to managing stormwater to improve the health of the watershed. More specifically, the PBR recommended the following:

> Create a watershed-wide stormwater management strategy to reduce priority toxic pollutants that impact human health and the environment.

Why a Stormwater Strategy?

A comprehensive, watershed-wide approach to stormwater management engages key stakeholders, to develop a shared vision, identify areas of common interest in stormwater management, and collaborate to improve watershed conditions.

A watershed-wide approach will help focus efforts on priority stormwater management needs in the watershed, so that the greatest gains in improving, conditions in the watershed can occur faster. For example, deploying current stormwater management actions on a watershed scale provides opportunities to increase efficiency and have a more widespread impact on water quality and quantity. Bundling and sequencing watershed priorities to reduce pollution from stormwater could also assist in leveraging regional funding opportunities. Finally, a watershed-wide approach can help deliver consistent programs, techniques and regulation across the watershed, which are foundational to messaging and building community understanding, behavior change and support for improved stormwater management.

How will this strategy be used?

This report reflects the first step in developing a comprehensive stormwater management plan for the Green/Duwamish Watershed. It represents an effort by Green/Duwamish Watershed stakeholders who were able to engage and work together as a single group to explore potential stormwater management activities suitable for watershed-scale implementation. It summarizes the purpose, vision, goals, actions and coalition options developed during a series of stormwater workshops and includes recommendations to move the strategy forward. The next step is to develop an implementation plan that prioritizes the actions, analyzes funding options, and provides detailed steps for implementation, including specific metrics and measurable outputs for the prioritized actions.

Definitions

Definitions are provided below for clarity and to guide understanding of the remainder of the report.

VISION: A statement of long-term results or achievement describing where we want to be in the future. It is outcome oriented, provides long-term guidance and *the grand purpose*.

MISSION: A mission statement defines what the strategy is, why it exists, and its reason for being.

GOAL: The end towards which effort and action are directed or coordinated in a specific timeframe. It helps to define how to achieve the vision.

OBJECTIVE: Measurable outcomes that represent progress towards a goal.

STRATEGY: Directs the work of achieving goals and the vision.

ACTION: Activities or interventions needed to achieve strategies, objectives and outcomes.

Background

Stormwater runoff is rain and snowmelt that runs off hard surfaces such as rooftops, paved streets, highways, and parking lots. When it rains on developed landscapes, water is unable to soak into the soil and this increased volume of stormwater runoff, and the pollutants that it carries, has a significant impact on natural hydrological and water quality conditions. Polluted stormwater runoff impacts human health through degraded water quality (and affected fish and shellfish) in streams, rivers, lakes and the Puget Sound. Water quality and altered hydrologic conditions in the natural environment impair habitat and put fish and wildlife at risk.[i]

The Puget Sound Region has been largely developed without stormwater controls. Upstream management practices have an impact downstream, crossing jurisdictional boundaries.[ii] Uncontrolled stormwater runoff can cause localized flooding and erosion, and is a major contributor to pollution and decreased water quality in streams, lakes and rivers in the Green/Duwamish Watershed. Efforts to address the impacts of stormwater runoff have been relatively new, initiated in only the past 30 to 40 years. There is a lack of understanding and awareness among the general public regarding the impacts of stormwater and causes of stormwater pollution, and local governments struggle with the cost and magnitude of the work needed to solve the stormwater problem.

In the Green/Duwamish Watershed, itself, there are two-hundred and four 303(d) listings on impaired water body segments for fish tissue and water quality that are not supporting beneficial uses (i.e.,

fishing, swimming, and aquatic habitat). There are also 46 303(d) listings for sediments not meeting sediment standards in the watershed. Polluted stormwater runoff is likely a significant contributor to many of these impaired environmental conditions. Some of the factors contributing to the stormwater problem are[iii]:

1. lands developed at a time with insufficient stormwater management practices;
2. flashier stream/river flows during storm events due to altered hydrology as a result of uncontrolled stormwater runoff from developed lands;
3. increasing density and impervious surface area within the Urban Growth Area associated with ongoing development and population increases;
4. increasing pressure to convert agriculture and forest lands outside the Urban Growth Area to low-density residential development;
5. increased temperatures and altered rainfall patterns associated with climate change;
6. legacy pollutants that reside in sediments, pipelines and drainages that have not been cleaned;
7. pollutants including nutrients, solids, metals, and bacteria that are washed off the land and materials when it rains (such as oil, fertilizers, pesticides, heavy metals, pet waste, and livestock waste).

Currently, the Clean Water Act (CWA) NPDES permit program regulates many of the stormwater discharges from the largest potential sources. For example, impacts from transportation, where vehicles and roadways discharge to the municipal separate storm sewer systems (MS4s); construction site activities; and industrial site activities. Operators of these sources are required to obtain an NPDES permit before they can discharge stormwater. This permitting mechanism is designed to establish programs to control flow volumes and prevent harmful pollutants from draining into local surface waters. These permits also provide a structure to enforce federal and state regulations, and result in programs to control the water quantity and quality impacts of local development.

Stormwater Strategy Purpose and Approach

A Green/Duwamish Watershed-Wide Stormwater Strategy has the potential to create a more unified, coordinated direction for stormwater management within the watershed to be implemented by jurisdictions, businesses, and community groups. The expectation is that a coordinated approach will better control stormwater flow and reduce priority pollutants that impact human health and the

environment. It should enhance and build upon existing "regionalized" stormwater management efforts such as STORM (Stormwater Outreach for Regional Municipalities).

In March 2016, the King County Department of Natural Resources and Parks (KCDNRP), Seattle Public Utilities and the Washington State Department of Ecology collaborated on leading the process to develop a Watershed-Wide Stormwater Strategy for the Green/Duwamish Watershed, which had five main tasks:

1. engaging the core team;
2. identifying workshop participants including subject matter experts and community representatives;
3. developing and carrying out three workshops;
4. refining actions and strategies with the core project team and a small workgroup; and
5. drafting and finalizing a stormwater strategy.

A fundamental element of this process was the identification and engagement of subject-matter experts and community representatives to participate in a series of workshops. Sixty-five representative organizations were invited to participate in the workshop series including all 15 MS4-permitted municipalities in the watershed, state and federal agencies, regulators, nonprofits, community groups, businesses and educational institutions. Of those invited, 11 local jurisdictions, 10 state, federal and regional government agencies, 12 nonprofits, five businesses, one community association and two educational entities attended one or more of the workshops. The list of organizations and distribution of attendees at each workshop can be found in Appendix A.

Over the course of five months, three, 6 1/2 hour workshops were held. More than 30 out of 65 organizations attended each workshop to collaborate on creating key components of the Green/Duwamish Watershed-Wide Stormwater Strategy. During the workshops, participants examined the current state of stormwater management in the watershed, created a vision of stormwater management for the future, identified targets and strategies to achieve the desired outcomes of regional stormwater management approaches that support and protect a cleaner, healthier watershed. Funding and coalition structure options were also investigated. Workshops #1 and #3 included presentations about current stormwater management activities and examples of coalition structures. Table 1 describes goals set for each workshop.

Table 1 - Summary of Workshop Series

Workshop # & Date	Goals of Workshop
Workshop #1 (May 2016)	• Understand current activities in stormwater management. • Explore gaps and potential opportunities in stormwater management. • Identify the collective vision for stormwater management. • Consider preliminary metrics to measure success of the stormwater strategy.

Workshop #2 (June 2016)	• Set a vision, mission and goals. • Identify measures of success/metrics. • Create a comprehensive list of actions/strategies. • Set measures of success for watershed-wide stormwater management.
Workshop #3 (September 2016)	• Identify action/strategy prioritization criteria. • Refine actions/strategies from Workshop #2. • Consider implementation costs. • Consider coalition/organizational structures.
NOTE: Workshop agendas are shown in Appendix B.	

Figure 2- Workshop #1 Results

The participants' collective vision and aspirations helped create a vision and mission statement for the stormwater strategy. Current activities were reviewed to identify existing work in watershed stormwater management, which helped participants identify gaps. Current activities and gaps were grouped categorically to create goals for the stormwater strategy. Opportunities and gaps also helped identify objectives and strategies to help achieve the goals and overall vision of the strategy.

Ultimately, more than 60 stormwater-related strategies were identified to improve the health of the Green/Duwamish Watershed. The strategies were consolidated and grouped under each goal with the help of the project team. In November 2016, a small group of volunteers from the workshops was convened to review prioritization criteria, brainstorm potential metrics, and refine the actions and recommendations to move forward. This report has been drafted to reflect input from the workshop series participants.

Stormwater Strategy Vision and Mission

A core product of the 2016 work was the development of a vision, a mission, goals, objectives and strategies. The vision serves as a description of what is desired for the future and speaks to efforts that cannot be achieved by one entity alone. For success to occur this shared vision must be carried out through a collaboration amongst stakeholders in the Green/Duwamish Watershed.

Vision Statement

> In the Green/Duwamish watershed, stormwater runoff is sustainably managed to support and enhance the environment, human health and the economy.

Mission Statement

We will improve and accelerate watershed-scale stormwater management actions in the Green/Duwamish watershed, ***collaboratively***, with community, jurisdictions, agencies, nonprofits and businesses. We will manage the quality and quantity of stormwater runoff by:

- preserving and restoring receiving waters;
- securing sustainable funding resources;
- aligning non-regulatory and regulatory interests;
- advancing equity, social justice and the economy; and
- prioritizing actions that have multiple benefits.

Goals, objectives, strategies and metrics are detailed later in this report.

Current Stormwater Management Activities

Prior to setting goals and strategies, participants were asked to identify what activities were currently underway; where gaps and weaknesses existed; and the opportunities to improve stormwater management in the Green/Duwamish Watershed.

Activities

Through small group exercises during the workshops, participants provided more than 110 current stormwater management practices. The list is a reflection of the participants input who were able to attend the workshop series and may not be comprehensive. The responses were refined to eliminate duplicate entries, and ensure that all activities were accurately written. These responses were then categorized to represent the general areas that participants emphasized as the most significant in

existing stormwater management activities. The majority of activities identified by participants fell into the following categories:

- **Collaboration/Integration/Incentives**: Efforts include building upon existing partnerships and building new ones to achieve optimal local and regional benefits, including identification of effective problem solving processes and solutions and exploring opportunities for prioritization of stormwater management projects and programs.
- **Policy**: This includes the many regulations and plans being implemented in the Green/Duwamish watershed and highlights the using policy to foster innovation, promote collaboration, and secure regional funding.
- **Research and innovation**: This includes the multitude of research currently underway to help advance the management of stormwater.

Gaps and Opportunities

Participants identified more than 120 gaps and opportunities for enhanced stormwater management actions. Once again, these were refined by the project team to eliminate duplicates and then categorized. The majority of input from the group was around improvements to, or increased implementation of, current stormwater activities. The majority of gaps and opportunities fell into the following categories:

- **Collaboration/Integration/Incentives**: Workshop attendees cited a significant number of gaps and opportunities that were focused on partnerships designed to prioritize stormwater management efforts and gain efficiencies. Partnerships are inherently where *Our Green/Duwamish* stakeholder efforts intersect and, collectively, the group identified that collaboration is fundamental to the success of regional stormwater management strategies.
- **Research and innovation**: Additionally, the participants highlighted the need to expand upon current research, and make a better attempt to share information for the purpose of prioritizing stormwater management actions and influencing policy. The workshop participants understood that most of the work currently occurring is a result of existing policies and regulations. Participants identified a desire to expand upon existing policies and regulation rather than developing new policies and regulations. However, the group also highlighted a need to address source control (e.g., product bans) at the state legislative level. Finally, many gaps also highlight the need to increase and expand research topics to better support the implementation of innovative stormwater management practices.

Relationship to Goals

The stormwater activities submitted by workshop participants within the major categories of gaps and opportunities were reviewed and helped the group shape the goals, objectives and strategies.

For example:

- Workshop participants emphasized the need for partnerships focused on prioritization of stormwater management actions. This gap is met through Goal #2: "Foster partnerships, broad participation and collaboration amongst watershed stakeholders and communities."
- Furthermore, participants identified a need to increase support for research in the stormwater management field to advance innovative stormwater actions. This gap is met through Goal #3: "Increase access to existing data, research and resources."

This approach will address identified gaps and leverage opportunities to move us closer to the *Our Green/Duwamish* vision for stormwater management.

Shaping our Vision

The goals developed for the stormwater strategy are fundamental values and present a framework to guide the advancement of the vision. In other words, goals help define how we will achieve the vision. While the goals are important, they are not sufficient to trigger action that will achieve the vision and mission of the Watershed-Wide Stormwater Strategy. In conjunction with the goals, the vision is supported by objectives and strategies that set the course of action to successfully improve conditions in the Green/Duwamish Watershed. Objectives are measurable outcomes that represent progress towards a goal. Strategies direct the work of achieving goals and the vision. The objectives and strategies are directly related to the goals and by advancing one particular strategy or objective, multiple goals may be achieved.

Measuring Success of the Strategy

While the goals, objectives and strategies are necessary to carry out the strategy, it is essential to include a system to measure the progress and success of the strategy. Measures of success or metrics are check points that help determine if the overall vision and mission are being achieved. Metrics for specific goals and objectives may reflect outputs (i.e., finalized documents or agreements) and outcomes (i.e., quantifiable hydrologic or water quality change). Overall, achieving the vision will result in the following:

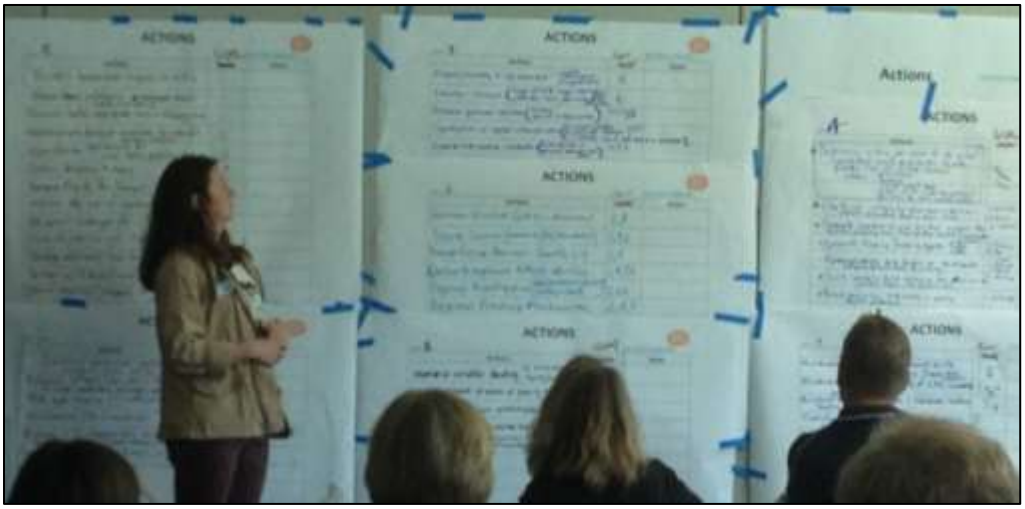
Stormwater runoff is managed to support return of receiving waters to beneficial use and reflect natural conditions.

There is equity in human health indicators in the watershed, which are on par with the region.

Course of Action

In this section, goals, objectives, and strategies are presented. Potential metrics for each objective are listed in Appendix C. Final metrics, and additional metrics specific to strategies and/or actions, should be developed in the next phase of this strategy which is implementation planning.

The goals, objectives, and strategies, developed collaboratively over the course of the workshops, reflect the participant's stormwater management priorities and provide a framework and first step to build upon for *Our Green/Duwamish*. These are crafted to direct work towards what the group thought were the most important issues in stormwater management for the Green/Duwamish Watershed.



Goal 1: Reduce priority toxics and other pollutants discharging to receiving waters.

Stormwater runoff transports priority toxics and other pollutants, degrading water quality and impairing streams, lakes, rivers and other waterbodies. Pollutants from impervious surfaces, legacy pollution in our existing stormwater infrastructure, and inadequate source control methods contribute to the loading of pollutants to local waterbodies. Currently, enhanced maintenance activities such as street sweeping, and stormwater system cleaning are known to reduce toxics in stormwater and help lessen impacts on receiving waters, wildlife and habitat. Increasing the use of maintenance and source control strategies throughout the watershed can help reduce toxics and improve water quality.

Objective 1: Improve source control across multiple sectors (commercial, industrial, agriculture, residential).

Strategies	a) Expand and prioritize business inspections to ensure stormwater best management practices (BMPs) are in use.

	b) Work with agricultural communities to support the use of stormwater BMPs in agricultural operations. c) Expand data-driven source tracing programs (e.g., City of Seattle's storm solids tracing). d) Work with the legislature to test and ban products/chemicals to address known pollution sources and materials. e) Develop a plan to address known sources in commonly used stormwater management materials (e.g., change material specifications).

Objective 2: Increase and improve maintenance practices for stormwater infrastructure.

Strategies	a) Repair and maintain stormwater facilities and conveyance systems. b) Remove legacy and ongoing pollutants through enhanced stormwater maintenance practices such as pavement sweeping and conveyance line cleaning. c) Research new maintenance methods and technologies to quantify pollutant-reduction benefits (i.e., green infrastructure maintenance).

Objective 3: Increase research on sources of priority toxics.

Strategies	a) Research pollution sources affecting stormwater, air and soil (e.g., products, CECs, and PPCPs). b) Increase research around effectiveness of stormwater treatment for both structures and activities.

Objective 4: Retrofit stormwater infrastructure to include or improve treatment.

Strategies	a) Retrofit existing development including roadway runoff systems and transportation infrastructure in order of agreed-upon priority. b) Develop watershed-wide retrofitting needs on a watershed, basin and catchment level.

Goal 2: Foster partnerships, broad participation and collaboration amongst watershed stakeholders and communities.

Within the Green/Duwamish Watershed, there are actively engaged communities, jurisdictions, government agencies, nonprofits, and businesses, which already work closely together on many stormwater issues. Addressing sources of pollutions requires strong collaboration amongst industries and government agencies. Local jurisdictions have a history of successful, outcome-oriented collaboration through programs like STORM and the Stormwater Monitoring Work Group (SWG). Continuing to build on partnerships can result in prioritized actions, improving the management of stormwater runoff and boosting outcomes for the community, people and environment.

Objective 1: Increase cross-sector and cross-jurisdictional partnerships and collaboration.

Strategies	a) Coordinate aligned programs and projects to address common actions (e.g., salmon recovery, flood-risk, and open space preservation). b) Partner with, and provide assistance to facilitate, stormwater champions within industry. c) Identify and invest in public/private partnership opportunities.

Objective 2: Develop tools to increase collaboration amongst stakeholders.

Strategies	a) Remove barriers to the public to inspire voluntary action of retrofitting and non-mandatory maintenance of existing stormwater infrastructure. b) Incentivize participation in stormwater partnerships to improve stakeholder and public engagement across the watershed. c) Develop and support resident sampling and stewardship programs.

Goal 3: Increase access to existing data, research and resources.

There is a wealth of existing stormwater management knowledge in the Green/Duwamish Watershed. The extent of this valuable knowledge is not easily accessible due to lack of a centralized location to hold this data, research and resources. Universal access to this knowledge base can help stormwater managers more effectively manage stormwater programs and projects. Creating a system, such as a clearinghouse for data and map information, can create greater efficiencies in decision-making and stormwater project lifecycle.

Objective 1: Compile and centralize access to existing, available stormwater information.

Strategies	a) Develop a map inventory of watershed assets, infrastructure specifications and resources. b) Compile and apply national and state stormwater management research. c) Utilize and leverage available information from existing organizations and programs.

Objective 2: Use existing information to prioritize actions regionally.

Strategies	a) Consider results of effectiveness studies to inform cost effectiveness. b) Ensure environmental justice communities are reflected in action prioritization in the watershed. c) Prioritize pollutant drivers. d) Prioritize other stormwater improvements (e.g., maintenance, outfall retrofits, and retrofit culverts). e) Develop pollutant reduction metrics for maintenance and other operational actions to better understand and customize approaches.

Objective 3: Develop prioritized list of capital infrastructure needs (based on agreed-upon priorities).

Strategies	a) Develop a watershed-based list of sequenced capitol retrofit needs (e.g., outfalls, culverts, and aging infrastructure). b) Gap analysis of capital needs on a recurring schedule. c) Establish a method of pooling funds to implement the most effective actions.

Goal 4: Restore natural hydrologic functions through reduction in uncontrolled stormwater runoff flows.

Over several decades in the Green/Duwamish Watershed, stormwater-runoff flow timing and quantity have been altered by land development and impervious surfaces. Much of this development occurred with inadequate or absent stormwater controls which has contributed to the degradation of receiving waters. Altered flows result in flashy streams that cause erosion of stream channels, armoring of the streambeds, degraded fish and insect populations; and impairs natural aquatic ecosystems. Strategies that retrofit areas without adequate flow controls, replace outdated infrastructure, improve infiltration, and manage stormwater flows help mitigate and restore the watershed's natural hydrologic function, ultimately, benefiting the environment and human health.

Objective 1: Increase stormwater infiltration and permeability.

Strategies	a) Improve technology related to, and increase the appropriate use of, permeable pavement, where feasible. b) Increase the use of Low Impact Development BMPs to decrease impervious surfaces in the watershed and preserve and increase permeable landscapes and parcels.

Objective 2: Ensure all properties have and maintain stormwater controls.

Strategies	a) Work to redevelop and retrofit stormwater infrastructure, and address nonconforming landscapes. b) Retrofit under-functioning stormwater flow control and conveyance facilities. c) Implement basin-level public retrofitting programs. d) Conduct riparian tree planting and restoration. e) Conduct maintenance to ensure long-term functionality of private and public infiltration BMPs (i.e., rain gardens).

Objective 3: Perform watershed-level basin planning.

Strategies	a) Assess current zoning and vested rights to determine where there are insufficient stormwater infrastructure and the most beneficial investment opportunities. b) Continue to advance understanding of the impacts of restoring hydrologic functions. c) Assess conditions and capacity of current infrastructure and operational activities to determine shortfalls in flow control and water quality treatment needs.

Goal 5: Increase innovation in stormwater management.

Investments in research and innovation support increased effectiveness of stormwater management programs. Managing stormwater runoff is complex and requires a multitude of approaches and tools to adapt to a constantly changing landscape. The regional stormwater monitoring effectiveness studies and advancements in "green chemistry" are actions supporting innovation in stormwater management. Innovation can improve stormwater management by reducing sources of stormwater pollution, encouraging flexibility, and creating cost-effective strategies that align actions with desired environmental outcomes.

Objective 1: Evaluate and implement incentive programs.

Strategies	a) Identify and advance effective private sector incentives (e.g., Salmon Safe certification programs). b) Expand government incentives (e.g. Seattle Public Utilities' RainWise and Stormwater Facility Credits programs) where action is desired not mandatory. c) Promote project-level Low Impact Development to create awareness of its value.

Objective 2: Increase research in key stormwater management areas.

Strategies	a) Partner with educational institutions to conduct research. b) Improve understanding of the effects of infiltration on groundwater quality and quantity and relation to surface water. c) Research the use of restored riparian corridors as a stormwater treatment system. d) Develop metrics for stormwater management programs such as: • Output metrics (e.g., assets mapped, studies conducted, and agreements reached) • Outcome metrics (e.g., behavior change, public reached, and water quality targets met). e) Investigate the efficacy of regional facilities (i.e., mitigation banking, CASQA, and basin treatment). f) Quantify Low Impact Development benefits. g) Pilot test innovative stormwater management technology.

Objective 3: Support stormwater NPDES permit implementation

Strategies	a) Add NPDES permit coverage for secondary MS4 permittees (e.g., schools, ports, and drainage districts). b) Continue effectiveness audits of the NPDES stormwater permit for municipal, transportation, industrial and construction sectors. c) Address barriers to compliance through technical assistance. d) Continue and increase implementation of NPDES permit activities. e) Fully implement all stormwater permit requirements (i.e., construction, industrial, secondary, and city/county).

Goal 6: Increase awareness and understanding of stormwater management.

Educating the public-at-large and other key stakeholder groups can help change behavior, improve compliance, implement programs and develop new funding sources to reduce stormwater pollution. In the Green/Duwamish Watershed and regionally, there are several stormwater education and outreach programs, coordinated through STORM, that help to increase awareness of stormwater runoff management and affect behavior change. Despite this, there is a need for additional effective education

and outreach programs that are watershed specific with unified, consistent and focused messaging geared towards a variety of audiences such as legislators, businesses, and the public.

Objective 1: Research and carry out best methods for stormwater management messaging to target audiences.

Strategies	a) Develop, test and implement effective stormwater messaging and delivery to diverse audiences. b) Localize and deliver regional stormwater best management practice education and social marketing campaigns for target audiences. c) Educate the public and legislators about the economic and health benefits of stormwater management. d) Develop an education campaign for land owners/land users about stormwater impacts of their actions and the benefits of stormwater management.

Objective 2: Expand stormwater management education, advocacy and training.

Strategies	a) Develop a public education and advocacy campaign to support legislation and funding for stormwater actions. b) Expand community and workforce stormwater management training (e.g., Dirt Corps) in part to increase innovation in stormwater management. c) Conduct regional training for jurisdictions, developers, private landowners and other stakeholders about existing data, research and resources.

Goal 7: Build a coalition or collaborative entity to carry out the vision for the Green/Duwamish watershed wide stormwater management strategy.

Successful watershed planning requires a framework, organization and collaboration amongst different groups, along with a leadership group or authority who will be responsible for guiding the region in achieving the strategy. An organizational structure is critical to collaboratively implement the strategy in an efficient, credible and cost-effective manner. Several models of watershed-scale coalitions or governance structures can provide direction for this watershed stormwater strategy such as Salmon Recovery Forums, Tualatin River Watershed – Clean Water Services and the Spokane River Regional Toxics Task Force.

Objective 1: Develop a strategy to build a Green/Duwamish stormwater management coalition or collaborative entity.

Strategies	a) Identify example models of collaboration for stormwater management. b) Work with watershed stormwater stakeholders to identify successful representation of a coalition. c) Identify roles and responsibilities of a coalition.

Funding and Cost Factors

Existing Cost of Stormwater Activities

Stormwater discharges are regulated by NPDES stormwater permits, which are administered by the Washington State Department of Ecology with authority delegated from the Environmental Protection Agency (EPA) under the Clean Water Act. This NPDES program includes municipal, industrial and construction permits.

There is not reliable data available for the cost of implementing all of the stormwater management actions taking place in the Puget Sound basin. However, there is a lot of money being invested in implementing stormwater permits under the NPDES program in the Puget Sound basin. For example, in 2009 municipal permittees in the Puget Sound basin spent between $160 and$170 million to implement the NPDES municipal stormwater permits. This investment represents a significant portion of the total amount spent on overall stormwater control in the Puget Sound basin.[iv] It is estimated that the cost of fully implementing NPDES municipal stormwater permits to be approximately $250 million per year, which does not include capital retrofit costs. A 2011 report estimated the minimum costs of retrofitting existing stormwater facilities in Puget Sound to range from $3 to $16 billion, which does not include the cost of purchasing property.[v]

Municipal Stormwater Management Program Funding

Funding for stormwater management programs comes from local, state, and federal sources. The following sections discuss these sources in greater detail.

Local Funding Sources

The primary source of funds for implementing the activities required by the Municipal NPDES stormwater permits come from stormwater management fees administered by each permitted jurisdiction. Some jurisdictions use funding from their general fund but most have a dedicated fee.

These dedicated annual stormwater utility fees are assessed per property throughout the Puget Sound region. These fees have been increasing over the years with evolving NPDES permit requirements. There is a growing understanding that this primary source of funding is insufficient as more information

is developed on the true needs for stormwater management. There is also a small portion of local funding from grants through local organizations (e.g., the King County Flood Control District and non-profit organizations).

State Funding Sources

State funding for municipal stormwater management programs comes largely from the Hazardous Substance Tax authorized by the Model Toxics Control Act (MTCA). Using the MTCA fund, the Washington State Department of Ecology provides grant funding for local stormwater management actions through the Stormwater Financial Assistance Program, Grants of Regional or Statewide Significance (GROSS), and Capacity Grants.

The Hazardous Substance Tax is dependent on petroleum prices.[vi] Oil prices have declined over the past several years, which has resulted in an MTCA shortfall impacting state grant funding for stormwater management.

Federal Funding Sources

Funding for municipal stormwater management at the federal level is provided mainly as grants or loans. Ecology manages federal funding through the State Revolving Fund (SRF), which is a federal-state partnership that provides financing for water quality infrastructure projects. The EPA also provides federal funding to support local efforts to protect and restore Puget Sound under the National Estuary Program (NEP), which is managed by the Puget Sound Partnership (PSP).

Estimating the Overall Cost of Stormwater Management

The reality is that existing annual funding generated by local jurisdictions' stormwater utility fees, and the limited funding that comes from the state and federal sources in the form of grants and loans, is far short of what is needed to fully address the stormwater problem.

Stormwater management costs to secondary, construction and industrial stormwater permittees are not currently compiled.

In aggregate, current expenditures and unfulfilled needs have been estimated by a few studies:

- Bissonnette and Parametrix (2010) estimated that an investment between $3 and $15 billion is needed to construct stormwater water quality treatment facilities to treat all stormwater in the Puget Sound region. This study did not include the cost of purchasing land for the projects because of the highly varied land costs across the Puget Sound basin. In addition, this study looked only at flow control and not the needs for water quality treatment.
- A King County study of stormwater facilities needed to improve stream flow and water quality in Juanita Creek, a seven square-mile basin, to meet water quality standards and to meet flow

requirements for salmonids estimated that $1.4 billion of investment in stormwater infrastructure in 2012 dollars is needed to fully treat stormwater.

- A study done in 2014, examining the cost of fully retrofitting the Green/Duwamish Watershed (~278 square miles) to pre-development conditions, found that there would need to be, at a minimum, a capital investment of about $45 million per year (in 2013 dollars) for 100 years.

The cost for residents and communities to fund stormwater programs is a concern. The burden of retrofitting and other stormwater programs cannot solely be placed on residents and communities.

High costs and limited available funds underscore the importance of pursuing a watershed-wide stormwater management strategy that can achieve efficiencies through economies of scale and public/private partnerships.

Equity and Social Justice Alignment

As a part of the Watershed-Wide Stormwater Strategy and the future Implementation Plan, consideration should be given to how stormwater management may influence, positively or negatively, determinants of equity and social justice in the Green/Duwamish Watershed. King County defines equity as meaning all people have full and equal access to opportunities that enable them to attain their full potential.

The Green/Duwamish Watershed in South King County, is home to nearly three-quarters of a million people, and this number is growing every year. Between 2000 and 2010, 70,000 people moved to South King County. The vast majority of the watershed's total population resides in the lower sub-watersheds, which is mostly urban and suburban in land use. The Middle- and Upper-Green River sub-watersheds are more rural in character with low population density.

Some of the most diverse communities in Washington State can be found in this watershed. Although the Green/Duwamish Watershed holds only 34 percent of the total population of the county, 42 percent of King County total population of people of color and 53 percent of King County total population of Latinos live in this watershed. Further, between 1990 and 2010 the population growth of people of color in the watershed has continued to grow while white populations decline. In many parts of the watershed, greater than a quarter of the population speaks a language other than English at home. Overall, foreign-born populations are half as likely to have a high school diploma, more likely to have no health insurance coverage, and more likely to live in poverty.

The 2010 census data shows that of the more than 700,000 people residing in the watershed, 12 percent live in poverty, 8.52 percent are unemployed, and rates of poverty and joblessness among people of color are much higher than of the remainder of the population. The average median

household income in 2010 was estimated at $63,525 in the Green/Duwamish Watershed compared to $71,811 for King County as a whole.

New stormwater policy, management or investment decisions in the watershed should consider the diversity and needs in communities in the watershed and, where possible, seek to improve conditions and create opportunities.

During the stormwater workshop series, group discussions were held amongst participants to identify the impacts of stormwater management strategies on equity and social justice determinants in the watershed. Discussions also included what else could be done to support equity and social justice. A more in-depth analysis on the strategies and actions is recommended when completing the implementation plan, as well as, when implementation takes place. Guidance from King County's Equity Impact Review (EIR) tool will be used. The tool can be found here: KC EIR.

The first step in understanding how the stormwater strategy connects to equity and social justice is a preliminary analysis showing impacts the goals of Watershed-Wide Stormwater Strategy may have on equity and social justice. From the analysis, the general conclusions that the goals appear to have a positive impact or no impact on many of the determinants of equity were made. Noticeably, the goals of the strategy suggest a positive impact on the following determinants of equity:

1. Community and public health.
2. Healthy built and natural environments.
3. Strong, vibrant neighborhoods.

Finally, the determinant of equity to potentially be influenced both positively and negatively is 'economic development.' A negative impact could be additional regulations to improve environmental and health conditions could increase costs for local business, communities and industries who are required to address pollutants. Alternately, these additional regulations or measures could create new local jobs and potentially make the area more attractive for businesses and residents. A detailed analysis is shown in Appendix C.

Prioritization Criteria Summary

The scope of work for the Watershed-Wide Stormwater Strategy involved creating a framework to evaluate and prioritize the goals, objectives and/or strategies developed by workshop participants. Draft prioritization criteria were piloted at Workshop #3. The draft criteria are in shown in Table 2. Feedback from participants indicated that these criteria were challenging because nearly every action ranked high in all categories, giving each action an almost equal ranking.

Table 2 –Piloted Draft Prioritization Criteria

#	Prioritization Criteria

1	Does this action contribute to the mission of the stormwater strategy?
2a	Is this action expected to be effective?
2b	Is this action already getting done?
3	Does this action provide multiple benefits?
4	Is this action scalable?

In November 2016, a small workgroup made up of volunteer workshop participants discussed prioritization criteria once again. The small workgroup recommended that the prioritization of the objectives and strategies should be a part of the Implementation Plan. Based on the recommendation from the small workgroup, Table 3 could be a starting point for prioritization criteria.

Table 3 - Potential Prioritization Criteria

#1	It aligns with the vision and mission of the watershed-wide stormwater strategy. (0.25)
#2	It is feasible and can be accomplished within existing needs and constraints. (0.25)
#3	It is expected to be effective. (0.5)
#4	It is scalable (has the potential to positively impact conditions in watershed as whole). (.75)

Coalition and Organizational Structure Findings

Goal #7 identified in this report is to build a durable collaborative entity or coalition to lead and carry out the *Our Green/Duwamish* Watershed-Wide Stormwater Strategy. During the third workshop, participants had the opportunity to investigate organizational structures further. Four different models of collaborative/coalition structures were presented and the presenters highlighted attributes of each structure. The four different models discussed were:

- Salmon Recovery Forum (WRIA 9),
- Spokane River Regional Toxics Task Force,
- Stormwater Monitoring Work Group, and the
- Puyallup-White Initiative.

Common themes and issues that participants noted from the four different models were:

- The capacity of organizations, communities and individuals to participate is a challenge so compensation could improve participation;
- Each coalition or organizing body had agreed-upon documentation stating the coalition's purpose and roles and responsibilities (i.e. MOAs, ILAs, guidelines for participation);
- Increased training for bringing a variety of entities together could be beneficial; and
- Decision-making processes were either consensus or majority based.

The participants then had the opportunity to discuss how successful representation on a stormwater coalition for the Green/Duwamish Watershed would look. Table 4 shows a list of entities that the workshop participants felt would create a successful coalition. While the types of representation were discussed, the number of representatives from each sector/group was not. A key point from participants was that representation on the coalition should be representative of the demographics in the watershed.

Table 4- Representation

Who should be represented as a part of the coalition?	
Government: local, state and elected officials	Balanced urban and rural representation
Tribes	Agriculture interests
Community groups	Youth/student groups
Regulatory agencies (state and federal)	Academic/education groups
Business and industry	Special purpose districts (e.g., King Conservation District)
Nonprofit organizations	

In addition, participants discussed what roles and responsibilities a stormwater coalition should have. Table 5 shows the main outcomes of this discussion.

Table 5- Roles and Responsibilities

#	Roles and Responsibilities
1	Develop the implementation plan.
2	Guide planning and implementation of the stormwater strategy.
3	Prioritize strategies.
4	Champion and communicate the stormwater strategy to others.
5	Secure funding for projects.
6	Act as the fiscal agent.
7	Work with the legislature and the community.

Fundamental issues highlighted by workshop participants included that while it is important that we encourage strategies and projects that have multiple benefits, the coalition should stay stormwater focused and that the coalition's efforts should not duplicate work done by other groups.

A Path Forward for Stormwater: Recommendations for Next Steps

This report is the first step in capturing important strategies to improve stormwater management in the Green/Duwamish Watershed. The vision, mission, and goals provide a basis on which, collectively, the Green/Duwamish Watershed can make decisions about and set a direction for watershed-wide stormwater management. Our next step is to build an organizing structure that can guide development of the implementation plan. Highlighted below are the first steps that should be taken to build upon this work. Recommendations on next steps are generally sequenced.

Recommendation 1: Build a coalition/organizing structure for watershed-wide stormwater management in the Green/Duwamish Watershed. This should include considerations for representation (who participates and the number of people engaged), a timeline for implementation, guidelines and purpose of coalition, and roles and responsibilities. The information presented in this report provides the foundation for this work.

Recommendation 2: Develop a final Watershed-Wide Stormwater Management Strategy and associated Implementation Plan. The Implementation Plan should include the following:

- Prioritized objectives and strategies to implement first; prioritized criteria with weighting for objectives and strategies;
- Detailed actions and implementation steps for strategies in order of priority;
- Measures of success appropriate for the detailed actions;
- A detailed equity impact evaluation for strategies in order of priority; and
- a funding analysis for actions.

Recommendation 3: Identify and consider implementing early actions. Early actions are those that have the potential to be implemented quickly and already have some momentum in the watershed behind them. The project team should work with the coalition/organizing structure to identify the early actions that can be accomplished. Initial ideas identified in workshops that have the potential to be early action strategies are as follows:

1. Improve source control across multiple sectors (commercial, industrial, agriculture, residential). (Goal 1, Objective 1)
    a. Conduct business inspections throughout the Green/Duwamish Watershed to ensure stormwater BMPs are in use. (Goal 1, Objective 1, Strategy a)
    b. Work with agricultural communities to support the use of stormwater BMPs in agricultural operations. (Goal 1, Objective 1, Strategy b)

c. Expand data-driven source tracing programs (e.g., City of Seattle's storm solids tracing). (Goal 1, Objective 1, Strategy c)

d. Develop a plan to address known sources in commonly used stormwater management materials (e.g., change material specifications). (Goal 1, Objective 1, Strategy e)

e. Localize and deliver regional stormwater BMPS, education and social marketing campaigns to target audiences. (Goal 6, Objective 1, Strategy b)

2. Compile and centralize access to existing, available stormwater information in the Green/Duwamish Watershed (Goal 3, Objective 1):
    a. Compile and apply national and state stormwater management research. (Goal 3, Objective 1, Strategy b).

Conclusion

This report is only the starting point for the *Our Green/Duwamish* Watershed-Wide Stormwater Strategy. It is clear that one of the keys to accomplishing this vision will be successful collaboration amongst the many stakeholders in the Green/Duwamish Watershed. In addition, evaluating and leveraging the many existing efforts such as Puget Sound Partnership, WRIA 9, Pollutant Loading Assessment, King County Water Quality Assessment, Nature Conservancy Green Initiative and other efforts to achieve the vision, mission and goals of the stormwater strategy will be necessary.

Thank you to the watershed stakeholder groups for their significant involvement throughout the process and for their interest in continuing to collaborate. This report will help the watershed confront future stormwater management challenges and improve human health and environmental conditions in the Green/Duwamish Watershed.

[i] http://www.ecy.wa.gov/water/stormwater/overview.html
[ii] Identified by University of Washington Green Futures Lab from Listening Tour
[iii] http://your.kingcounty.gov/dnrp/library/water-and-land/watersheds/green-duwamish/stormwater-retrofit-project/stormwater-retrofit-workplan.pdf
[iv] October 2010. Final Review Draft. Task 1: Urban Stormwater Runoff Preliminary Needs Assessment Technical Memorandum. The Puget Sound Partnership.
[v] April 2011. Ecosystem Coordination Board: Stormwater Policy Statements.
[vi] https://fortress.wa.gov/ecy/publications/documents/1601003.pdf