

King County Stormwater Management Action Plan



December 31, 2022

For Internal Use Only -

https://kc1.sharepoint.com/teams/phase1permit/S5C6ComprehensiveStormwaterPlanning/SMAP/2022_0915_SMAP_FINAL.docx

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ACRONYMS

AKART	All Known, Available Reasonable methods of Treatment
AADT	Average Annual Daily Traffic
B-IBI	Benthic Index of Biotic Integrity
BMP	Best management practice
CBIMP	Catch Basin Inspection and Maintenance Program
CBP3	Community-Based Public-Private Partnership
CCTV	Closed-Circuit Television
CESCL	Certified Erosion and Sediment Control Lead
CIP	Capital Improvement Project
CSO	Combined Sewer Overflow
CSP	Conveyance Screening Program
CWHH	Clean Water Healthy Habitats
CWP	Clean Water Plan
DES	Department of Executive Services
DLS Permits	King County, Division of Local Services – Permits
DNRP	Department of Natural Resources and Parks
DOC	Department of Commerce
Ecology / ECY	Washington State Department of Ecology
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
ESJ	Equity and Social Justice
FMD	Facilities Management Division
GPS	Geographic Positioning System
GIS	Geographic Information System
GSI	Green Stormwater Infrastructure
HOA	Homeowners Association
HSPF	Hydrologic Simulation Program- Fortran
HU	Hydrologic Unit
HUC	Hydrologic Unit Code
IC	Illicit connection
IC/IDDE	Illicit Connection / Illicit Discharges Detection and Elimination
ID	Illicit discharges

KCC	King County Code
KCD	King Conservation District
KCIA	King County International Airport
KCIW	King County Industrial Waste
LCI	Land Conservation Initiative
LID	Low impact development
MEP	Maximum Extent Practicable
MIS	Maintenance Information System
MS4	Municipal separate storm sewer system
MWBE	Minority- and Women-Owned Business Enterprises
NCEES	National Council of Examiners for Engineering and Surveying
NHD	National Hydrography Dataset
NPDES	National Pollutant Discharge Elimination System
O&M	Operation & Maintenance
OGD	Our Green Duwamish
PAH	Polycyclic Aromatic Hydrocarbon
Parks	Parks and Recreation Division
PBDE	Polybrominated Diphenyl Ethers
PCB	Polychlorinated Biphenyl
Permit	NPDES Phase I Municipal Stormwater Permit
PGIS	Pollution Generating Impervious Surface
PGPS	Pollution Generating Pervious Surface
PHSKC	Public Health - Seattle & King County
PPP	Public Private Partnership
PRISM	Puget Sound Regional Synthesis Model
PSP	Puget Sound Partnership
PSSH	Puget Sound Starts Here
PSWCP	Puget Sound Watershed Characterization Project
ROADMAP	Regional Operations and Maintenance Program
Roads	Road Services Division
ROW	Right-of-Way
RSMP	Regional Stormwater Monitoring Program
SAM	Stormwater Action Monitoring

SIMPLA	Site Management Plan
SIP	Stormwater Investment Plan
SMAP	Stormwater Management Action Plan
SPPM	Stormwater Pollution Prevention Manual
SPP	Stormwater Planning Program
SPPU	Strategy Policy and Performance Unit
SSOP	Stormwater Services Strategic Operations Plan (SSOP)
SWD	Solid Waste Division
SWDM	Surface Water Design Manual
SWG	Stormwater Work Group
SWMP	Stormwater Management Program
SWMP Plan	The documentation of the SWMP
SWPPP	Stormwater Pollution Prevention Plan
SWSS	Stormwater Services Section
TMDL	Total Maximum Daily Load
Transit	Metro Transit Department.
UGA	Urban Growth Area
USGS	United States Geological Survey
WBD	Watershed Boundary Delineation
WLRD	Water and Land Resources Division
WQ	Water Quality
WQBE	Water Quality Benefits Evaluation
WRIA	Water Resource Inventory Area
WAC	Washington Administrative Code
WQCU	Water Quality Compliance Unit
WRIA	Water Resource Inventory Area
WTD	Wastewater Treatment Division

GLOSSARY

Action: Individual structural and non-structural best management practices (BMPs), activities, or programs to improve water quality (e.g., rain gardens, wetponds, street sweeping).

Action Bundles: A group of Actions that could be implemented together to improve water quality over a broad geographic area. Bundling of Actions can, in some cases, improve outcomes with increased efficiency, reduced cost, and reduced risk to the community, King County, and program partners.

Best Management Practice: The schedules of activities, prohibitions of practices, maintenance procedures, and structural and/or managerial practices, that when used singly or in combination, prevent or reduce the release of pollutants and other adverse impacts to receiving waters.

Community Benefit: A benefit created in conjunction with an Action such as, but not limited to improved flood management, flood conveyance, or flood risk mitigation; creation, enhancement or restoration of parks, habitat or wetlands; improved and more equitable public access to waterways, recreational opportunities, and green spaces; improved public health by reducing heat island effect; increased shade or planting of trees and/or other vegetation that increase carbon reduction/sequestration; and improved air quality.

Heatmap: A data visualization technique that shows magnitude of a phenomenon as a color in two dimensions.

Partner: An interested party that has a direct or indirect stake in the King County Stormwater Retrofit Program.

Program: Non-structural BMP or activity that could be implemented, such as a Green Stormwater Infrastructure incentive program within the Lake Washington drainage area or a roadway stormwater treatment program on County-owned roads within the Ship Canal drainage area.

Project: The development, operation, and maintenance (including monitoring) of a physical structure or facility that increases flow control or improves water quality.

Protection Action: Actions that seek to maintain intact conditions in areas (or subbasins) with important aquatic health functions and low degradation. These Actions could include, for example, land conservation Actions, native vegetation protection policies and programs, source control activities and programs, and educational programs.

RainWise: RainWise helps private property owners install rain gardens and cisterns to help manage the rain that falls on their roofs. In addition to stopping water pollution, these installations can add attractive landscaping, provide water for summer irrigation, and may reduce flooding.

<https://kingcounty.gov/services/environment/wastewater/cso/rainwise.aspx>

Restoration (or Retrofit) Action: Actions that seek to restore aquatic health in areas (or subbasins) that have experienced the greatest degradation. Restoration Actions could include, for example, stormwater retrofits in roadway Rights-of-Way (ROWs), regional water quality treatment facilities, and floodplain restoration projects. Examples of programmatic-type Restoration Actions could include establishing a stormwater fee-in-lieu program or stormwater control transfer program.

Retrofit: Improvements, either structural or programmatic, that reduce stormwater runoff impacts from existing developed land to help restore water quality and aquatic health. Retrofits may include a balance of

land use improvements, stormwater management, and stream restoration techniques to treat stormwater runoff, provide flow control, or contribute to the restoration or conservation of a watershed.

Retrofit Framework: The process by which subbasins and Actions are prioritized and implemented in consideration of community needs, system needs, and County goals.

Source Control Action: An Action or operation intended to prevent pollutants from coming into contact with stormwater through physical separation of areas or careful management of activities that are sources of pollutants.

Stormwater Benefit: A structure, facility, or program that improves stormwater management via increasing flow control or improving water quality through the reduction in runoff pollution.

Stormwater Investment Plan: A 30-year plan for stormwater investments that is being co-designed and co-implemented by a group of partners from across the region, including King County, who are coming together to develop a region-wide plan to rethink how we address polluted runoff, prioritizing the needs of the residents impacted the most. The SIP will identify Actions that will produce the greatest return on investment and will provide associated time-based budgetary planning information.

Stormwater Retrofit Program: The King County Stormwater Retrofit Program is primarily responsible for planning, designing, constructing, installing, and maintaining improvements, either structural or programmatic, that reduce stormwater runoff impacts to help restore water quality and aquatic health.

Subbasin: The regional hydrologic boundaries as delineated by the highest resolution available (e.g., 12-, 14-, or 16- digit) hydrologic unit codes from the National Hydrography Dataset.

Water Quality: A term used to describe the chemical, physical, and biological characteristics of water, usually in respect to its suitability for a particular purpose.

Executive Summary

Introduction

King County is required to operate its stormwater system in compliance with the National Pollutant Discharge Elimination System 2019-2024 Phase I Municipal Stormwater Permit (the Permit). The Permit is administered by the Washington State Department of Ecology (Ecology). The 2019-2024 Permit expanded the previous requirements in Section S5, Special Conditions for Stormwater Management Program for Cities, Towns, and Counties; the expanded provisions require comprehensive stormwater planning (Section S5.C.6 Stormwater Planning). King County prepared this Stormwater Management Action Plan (SMAP) to address these expanded requirements. This SMAP is geographically focused on the Bear Creek Basin in unincorporated King County. The Basin also lies in Snohomish County and the City of Redmond.

Ecology's vision for Stormwater Planning

From Ecology's Stormwater Management Action Planning Guidance, publication 19-10-010, pages 1-2:

There are many ways to successfully approach comprehensive stormwater planning in general, and many ways to approach the specific steps required by the Permit and in this document in particular. Ecology recognizes that many jurisdictions are already actively planning stormwater investments and actions to accommodate future growth in a way that minimizes impacts to receiving waters and designated uses. Jurisdiction staff responsible for developing a SMAP may, and should, coordinate with other local planning efforts and use and leverage those efforts to produce the permit-required deliverables. Some jurisdictions may simply need to add a subset of the steps required by the permit and described below to an existing planning effort. Others may have a plan or process underway that completely meets Ecology's goals and guidance for meeting the Permit requirements.

The Permit requires a planning approach that emphasizes protection of designated uses and improvements to receiving water quality and habitat under both existing and anticipated future developed conditions. SMAP is focused on addressing impacts from the cumulative development in a watershed rather than on single site or subdivision impacts. SMAP helps to answer these two important questions:

- 1) How can we most strategically address existing stormwater problems?
- 2) How can we meet our future population and density targets while also protecting and improving conditions in receiving waters?

A successful SMAP strategically identifies approaches – in addition to current requirements of the Permit – to accommodate future growth and development while preventing water quality degradation and/or improving conditions in receiving waters harmed by past development.

Ecology included the following explanation about stormwater planning in the Permit.

Permit Language:

On or before March 31, 2021, the Permittee shall respond to the series of Stormwater Planning Annual Report questions that describe how anticipated stormwater impacts on water quality were addressed, if at all, during the 2013-2019 permit term in updates to the Comprehensive Plan (or equivalent) and in other locally initiated or state-mandated long-range land use plans that are used to accommodate growth or transportation. (p. 14, section S5.C.6, Permit)

King County has responded to this requirement in its Annual Report. See [Appendix A - King County's Answers to the 2021 Annual Report Questions](#) for the information provided to these questions.

Specific 2019 – 2024 Phase I Permit Language for S.5.C.6 **Stormwater Planning**

Each Permittee shall implement a Stormwater Planning program to inform and assist in the development of policies and strategies as water quality management tools to protect receiving waters.

Minimum performance measures:

d. Stormwater Management Action Planning

- i. Each county Permittee shall describe in their SWMP how the watershed-scale stormwater plans developed during the 2013 Permit term are being used to inform their S5.C.7 project prioritization and selection.*
- ii. No later than December 31, 2022, each county Permittee shall develop a Stormwater Management Action Plan (SMAP) for a single sub-basin or catchment area located within the geographic areas for which watershed-scale stormwater plans were developed in the 2013 Permit. The required SMAP content is described in the Stormwater Management Action Planning Guidance (Ecology, 2019. Publication 19-10-010). The SMAP shall identify:
 - (a) Specific short-term actions (i.e., actions or projects to be accomplished within six years).*
 - (b) Specific long-term actions (i.e., actions or projects to be accomplished within seven to 20 years).*
 - (c) Land management/development strategies and/or actions needed for water quality management, if these were not articulated in the watershed-scale stormwater plans. Include these in (a) and (b).*
 - (d) Targeted, enhanced, or customized implementation of stormwater management actions related to permit sections within S5, including:
 - IDDE field screening,*
 - Prioritization of Source Control inspections,*
 - O&M inspections or enhanced maintenance, or*
 - Public Education and Outreach behavior change programs**Identified actions shall support other specifically identified stormwater management strategies and actions for the basin overall, or for the catchment area in particular.***

e. A revised and updated implementation schedule and budget sources.

Section S.5.C.6 (d) above was used as an outline for King County’s SMAP.

King County's Approach to Stormwater Planning

How King County plans

King County's Comprehensive Plan and its associated development plans are not driven by stormwater management considerations. However, King County's externally focused Stormwater Investment Plan and its internally focused Strategic Operations Plan, as well as King County's Stormwater Retrofit Prioritization Framework, all serve to meet Permit requirements to "*... implement a Stormwater Planning program to inform and assist in the development of policies and strategies as water quality management tools to protect receiving waters.*" – The Permit, S5.C.6, Stormwater Planning.

As stated in King County's Stormwater Management Plan ([Link to current SWMP](#)):

"King County's Strategy Policy and Performance Unit (SPPU) coordinates with long-range plan updates including how stormwater management needs and protection/improvement of receiving water health are (or are not) informing the planning update processes and influencing policies and implementation strategies in King County. This set of plans describe the water quality and watershed protection policies, strategies, codes, and other measures intended to protect and improve local receiving water health through planning or considering stormwater management needs or limitations.

KC is creating an overall stormwater strategy that integrates long range plans with the goal of protect aquatic resources across the county. This involves designing the Stormwater Investment Plan (SIP) to include representatives from the jurisdiction's stormwater program, long-term planning, transportation, parks and recreation, and scientific and technical experts.

SPPU hosted and lead a regional stormwater summit (<https://www.stormwatersummit.com>) with a call to partners to collaborate and coordinate more closely on stormwater issues. Over 350 partners participated in that event. King County's Stormwater Investment Plan will address policy barriers and include new projects, collaboration, research, and funding ideas for further development."

[King County's Stormwater Investment Plan and Strategic Operations Plan](#)

As stated in the SWMP, the Stormwater Investment Plan (SIP) will focus on community and external partners. The internal Stormwater Services Strategic Operations Plan (SSOP) will focus on internal planning and combine with the SIP to form the foundation of King County's stormwater planning efforts.

[Other King County Voluntary Initiatives supported by Executive Directives that Support Stormwater Planning](#)

In addition to the SIP and SSOP, there are many additional King County initiatives focused on clean water that also support or call for stormwater management. These complementary initiatives impact stormwater planning for all of King County and its partners. These include:

1. [King County Equity and Social Justice Strategic Plan](#)
2. [King County Clean Water Healthy Habitat Executive Order](#)
3. [King County Small Basin Retrofit Program](#)
4. [King County 2020 Strategic Climate Action Plan](#)
5. [King County Water Quality Benefits Evaluation – Program Development](#)
6. [King County Clean Water Plan 2020](#)
7. [Land Conservation Initiative - Open Space Equity Cabinet Report](#)
8. [King County Combined Sewer Overflow \(CSO\) Long-term Control Plan](#)
9. [Building Cities in the Rain: Watershed Prioritization for Stormwater Retrofits](#)

10. [Structural Stormwater Controls \(SSC\) Science Review and Synthesis Project](#)

[The Bear Creek Watershed Management Study](#)

King County's Bear Creek Watershed Management Study was developed per the requirements in the 2013 Permit. The Permit-defined objective of watershed-scale stormwater planning is to identify a stormwater management strategy or strategies that would result in hydrologic and water quality conditions that fully support "existing uses," and "designated uses" throughout the stream system. While the Permit requires the development of watershed strategies, it does not require implementation of the strategies.

King County will use the Bear Creek Watershed Management Study efforts to inform the implementation of *"a Stormwater Planning program to inform and assist in the development of policies and strategies as water quality management tools to protect receiving waters"*.

A community engagement and planning effort culminating in 2018 that reviewed existing conditions of Bear Creek and provided [recommendations](https://your.kingcounty.gov/dnrp/library/2018/kcr2955.pdf) (<https://your.kingcounty.gov/dnrp/library/2018/kcr2955.pdf>) for prioritizing subbasins within Bear Creek for stormwater management to maximize multi-benefit outcomes.

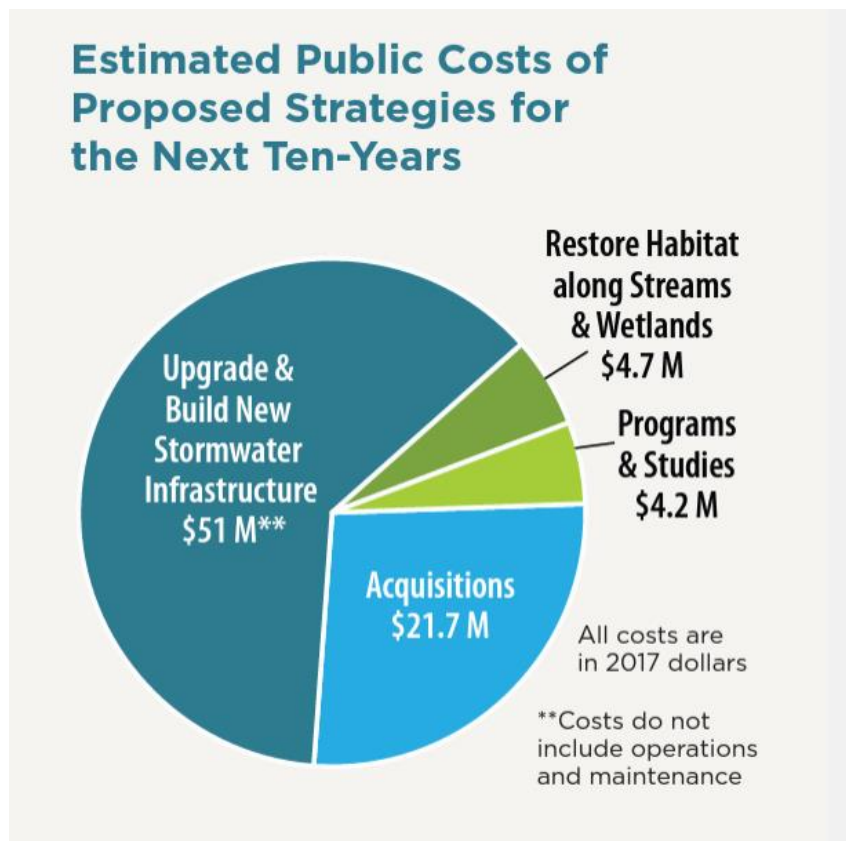


Figure 1 Estimated Public Costs of Proposed Strategies - Bear Creek Watershed

Bear Creek Project Siting and Prioritization:

A consultant study conducted by King County's consultant, HDR, Inc., for the Water Quality Capital Program to identify and prioritize potential Stormwater Infrastructure Project sites within subbasins prioritized by the Bear Creek Watershed Management Study. This effort identified Sunrise Elementary School as a potential Project site.

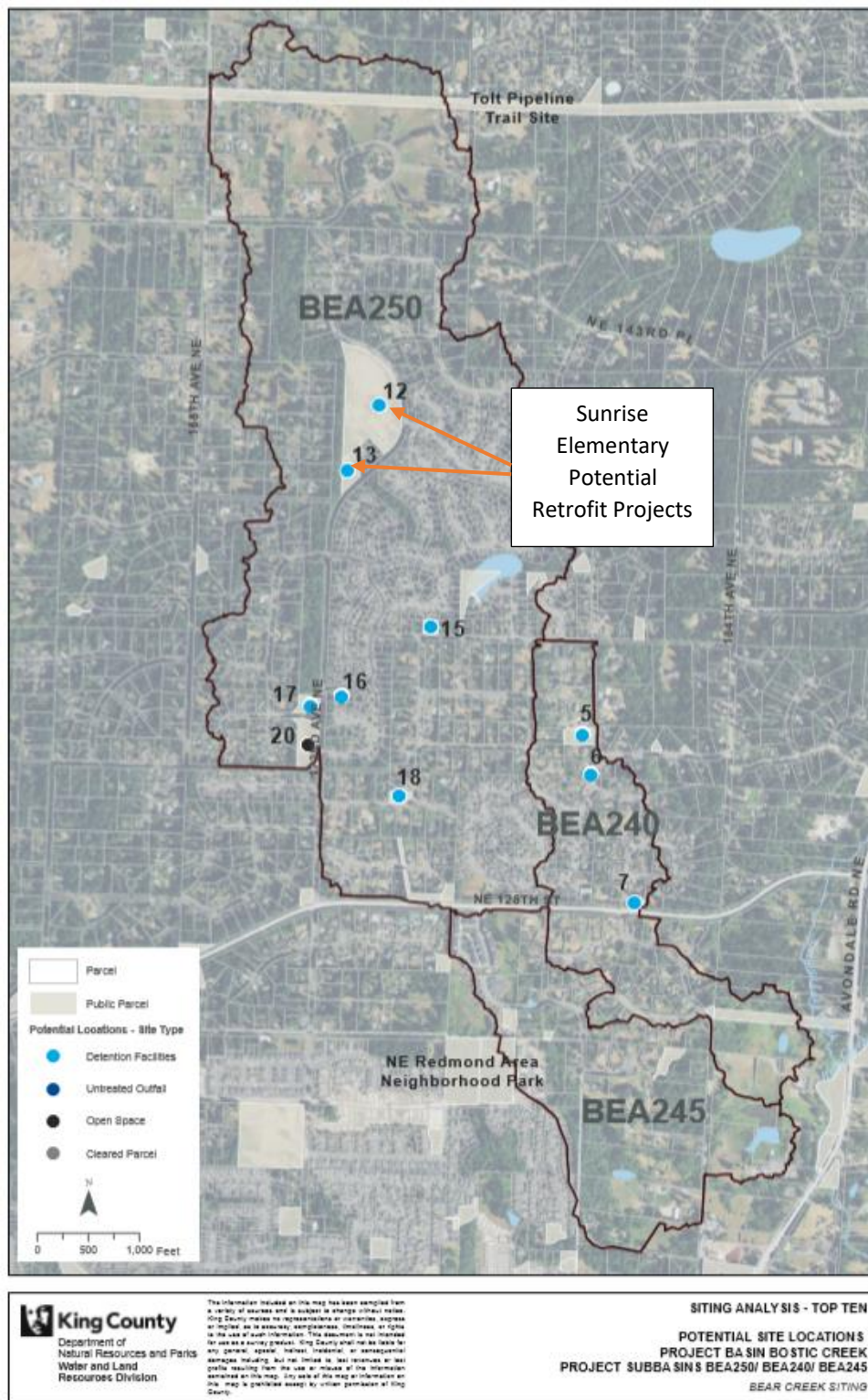


Figure 2 Potential Short-term and Long-term Project Locations - Bostic Creek / Bear Creek Watershed

Capital Services Unit (CSU) – Seattle University Sponsorship Project: This project earned the 2022 National Council of Examiners for Engineering and Surveying (NCEES) Engineering Education Award. County Staff

worked with Seattle University Engineering Students to engage the Sunrise Elementary School Community to learn about Green Stormwater Infrastructure (GSI) and develop a conceptual design of potential projects for the Elementary School. The project developed an ‘a la carte menu’ of potential GSI retrofits for the school, ranging from relatively small projects such as cisterns, medium scale projects like a community sized rain garden & outdoor classroom, to projects as large in scope as a regional stormwater detention vault beneath the school’s play field.



Figure 3 Callout map for proposed location of educational option - Sunrise Elementary

Sunrise Elementary School Green Stormwater Infrastructure Retrofit: This retrofit project was first conceptualized by the CSU-Seattle University Sponsorship Project mentioned above. It is supported by the King County RainWise program, which helps property owners install rain gardens and cisterns to help manage the rain that falls on roofs. This project is supported by RainWise to continue to work with the Sunrise Elementary School to Co-Design and implement modular Stormwater Best Management Practices (BMPs) such as Cisterns and downspout planters. This project was awarded \$100,000 in [2022 Subregional Opportunity Funds](#) by King County’s Flood Control District in November 2021 and is preparing to design during the 2022 – 23 school year with the intent of summer 2023 implementation.

Overview of King County’s Required Stormwater Management Action Plan (SMAP)

As required by the 2019 – 2024 Phase I Permit, King County is submitting this document to meet Phase I permit requirement S5.C6.d. Stormwater Management Action Planning with this SMAP. [SMAP Summary Table - Implementation schedule and budget sources](#) outlines the efforts, due dates and budgets needed if implementation of the SMAP is required in the 2024 – 2029 Phase I Permit.

This project supports King County in meeting its Phase I Municipal Stormwater NPDES Permit obligations for S5.C6.d. Stormwater Planning / Stormwater Management Action Planning. This Project builds on decades of Strategic Planning and investment in Bear Creek as well as stormwater plans were developed for requirements in the 2013 Phase I Permit.

Table 1 SMAP Summary Table - Implementation schedule and budget sources

SMAP Summary Table - Implementation schedule and budget sources

Permit Element	Compliance action - Stormwater Management Action Planning	Permit due date	King County SMAP Response / Permit Required Actions	Budget / Funding Source	Costs / Funding Sources
S5.C.6.a.	<i>.. inter-disciplinary team to inform and assist in the development, progress, and influence of this program.</i>	Completed by August 1, 2020	<ol style="list-style-type: none"> Stormwater Services Manager Strategic Planning Manager, Stormwater Services Section NPDES Coordinator - Environmental Programs Managing Supervisor / Assistant NPDES Coordinator King County Basin Steward - Bear Creek Water Quality Program Manager (Capital) Source Control Program Manager Water Quality Planner/Program Manager III – IDDE/TMDL Water Quality Planner/Program Manager III – SSC Communications Specialist III 	SWMP preparation included in 2021-2022 Budget	Included
S5.C.6.d.i.	Describe in their SWMP how the watershed-scale stormwater plans developed during the 2013 Permit term are being used to inform their S5.C.7 project prioritization and selection.	3/31/2022	Included in KC May 2022 SWMP	SWMP preparation included in 2021-2022 Budget	Included
S5.C.6.d.ii.	Develop a Stormwater Management Action Plan (SMAP) for a single sub-basin or catchment area located within the geographic areas for which watershed-scale stormwater plans were developed in the 2013 Permit.	12/31/2022	Included in KC 12/31/2022 SMAP	SMAP preparation included in 2021-2022 Budget	Included
S5.C.6.d.ii.(a)	The SMAP shall identify: (a) Specific short-term actions (<i>i.e.</i> , actions or projects to be accomplished within six years).	Potential Project Completion by 8/2029	Specific short-term actions <ol style="list-style-type: none"> Sunrise Creek Elementary - modernize stormwater management at Sunrise Elementary through implementation of green stormwater infrastructure (GSI) - Cisterns & Downspout Planters or a similar retrofit project in the Bear Creek Watershed. Land management / Land Acquisitions - Eight Land Acquisitions in the Bostic Creek (SMAP) Subbasin or Bear Creek Watershed in 2022-2029 permit cycle. King County’s Stormwater Retrofit Prioritization Framework Project – Subbasin prioritization process and pilot web tool to support decision making and collaboration on retrofit projects. 	<ol style="list-style-type: none"> Sunrise Creek Elementary will need to be staffed and funded in the 2023 budget and beyond to be completed by 2029. These land acquisitions will be grant funded. Stormwater Retrofit Prioritization Framework Project will need to be funded in the 2023-2024 budget. 	<ol style="list-style-type: none"> \$ 950 K *** Grant Funded Grant Funded
S5.C.6.d.ii.(b)	The SMAP shall identify: (b) Specific long-term actions (<i>i.e.</i> , actions or projects to be accomplished within seven to 20 years).	Potential Project Completion by 8/2044	Specific long-term actions: <ol style="list-style-type: none"> Sunrise Elementary bioretention/industrial rain garden and/or regional detention vault beneath the school playfield or a similar retrofit project in the Bear Creek Watershed. Land management / Land Acquisitions - Eight Land Acquisitions in the Bostic Creek (SMAP) Subbasin or Bear Creek Watershed in 2022-2029 permit cycle. 	<ol style="list-style-type: none"> Sunrise Creek Elementary Cistern Retrofit or a similar retrofit project in the Bear Creek Watershed will need to be staffed and funded in the 2023 budget and beyond to be completed by 2044. These acquisitions will be grant funded. 	<ol style="list-style-type: none"> \$ To Be Determined; Grant Funded \$ To Be Determined; Grant Funded
S5.C.6.d.ii.(c)	(c) Land management/development strategies and/or actions needed for water quality management. Include these in (a) and (b).	See (a) and (b) above	See (a) and (b) above	See (a) and (b) above	

Note: Phase I Permit requirements are in *italics with gray highlighting*. Ecology Guidance are in *gray highlighting*.

C.6.d.ii.(d) IDDE Field Screening	(d) Targeted, enhanced, or customized implementation of stormwater management actions related to permit sections within S5.	2024-2029 Permit cycle	IDDE field screening: 1. Comply with Appendix 2 of the 2024-2029 permit. 2. Complete the evaluation of King County’s methods used to gather and analyze data and information during implementation of the 2019-2024 Bear-Evans Basin Fecal Coliform Total Maximum Daily Load Work Plan. 3. Formulate <i>targeted, enhanced and customized</i> additional IDDE field screening, if needed, as well as identify other actions that would improve water quality based on this work.	This work will need to be staffed and funded in the 2023 budget and beyond to be completed by 2029.	1. \$ TBD – depending on 2024 permit requirements 2. \$ TBD – depending on 2024 permit requirements 3. \$ TBD – depending on 2024 permit requirements
C.6.d.ii.(d) Source Control inspections	(d) Targeted, enhanced, or customized implementation of stormwater management actions related to permit sections within S5.	2024-2029 Permit cycle	Prioritization of Source Control inspections 1. Business Inspection at the SMAP Subbasin or Watershed Level 2. Implement Mobile Business source control and education / outreach behavior change pilot implementation	This work will need to be staffed and funded in the 2023 budget and beyond to be completed by 2029.	1. \$ TBD – depending on 2024 permit requirements 2. \$ TBD – dependent on completions of pilot
C.6.d.ii.(d) Public Education and Outreach behavior change programs.	(d) Targeted, enhanced, or customized implementation of stormwater management actions related to permit sections within S5.	2024-2029 Permit cycle	Public Education and Outreach behavior change programs 1. Implement Mobile Business source control and education / outreach behavior change pilot implementation 2. Short Term Action - Sunrise Elementary Bostic Creek Retrofit - Public Education and Outreach project support and behavior change programs	Targeted, enhanced, or customized implementation of stormwater management actions will need to be staffed and funded in the 2023 budget and beyond to be completed by 2029.	1. \$ TBD – dependent on completions of pilot 2. \$ 25 K

*** See Table 2 GREEN STORMWATER INFRASTRUCTURE AT SUNRISE ELEMENTARY

Table D - 5: 30% Design Cost for the Bioretention.

Item	Units	Est. Quantity	Unit Price	Total Cost
SITE PREPARATION				
Clearing and Grubbing	ACRE	0.1	\$70,778	\$7,078
SITE FORMATION				
Common Borrow Incl. Haul	C.Y.	279	\$27	\$7,547
Ditch Excavation Incl. Haul	C.Y.	27	\$47	\$1,263
EROSION CONTROL				
Temporary Erosion and Sedimentation Control Plan	L.S.	1	\$15,000	\$15,000
OTHER				
Materials	L.S.	1		\$443,400
Materials Contingency	0.25			\$110,850
Overhead	0.25			\$118,572
Estimate Contingency	0.25			\$118,572
Soft Costs	0.25			\$118,572
Washington State Tax	0.101			\$ 44,784
TOTAL				\$940,856

*Table 2 GREEN STORMWATER INFRASTRUCTURE AT SUNRISE ELEMENTARY***

** Engineering Design Team CEE 21.2 - Page D-5

King County's Stormwater Management Action Plan (SMAP) *s5.c6.d.ii.*

The Permit requires that the County develop a SMAP for a single sub-basin or catchment area located within the geographic areas for which watershed-scale stormwater plans were developed in the 2013 Permit no later than December 31, 2022.

This section is King County's response to this requirement.

Background - From the Bear Creek Watershed Management Study

The Bear Creek Watershed Management Study (the Study) was developed in accordance with Special Condition S5.C.5.c of the 2013-2018 National Pollutant Discharge Elimination System (NPDES) Phase I Municipal Stormwater Permit (the Permit).

King County selected the Bear Creek watershed for this Study because the majority of the watershed is in unincorporated King County and it was identified by the Washington Department of Ecology (Ecology), the agency that issued the Permit, as a targeted watershed for stormwater retrofit planning due to its high ecological integrity. While there are restoration needs and concerns, the watershed contains important habitat for salmon recovery, and has generally good water quality.

The Study area covers about 26 square miles of the Bear Creek watershed. The majority of the study area is within unincorporated King County, with smaller portions in the City of Woodinville, the City of Redmond, and unincorporated Snohomish County. Bear Creek currently supports a wide range of salmonids including Chinook, sockeye, coho, kokanee, steelhead, and coastal cutthroat. Moreover, Bear Creek has been identified as one of two high priority habitats to restore for Chinook salmon recovery (known as "Tier 1" habitat) by the Water Resource Inventory Area 8 (WRIA 8) Salmon Conservation Plan, covering the Greater Lake Washington Watershed.

Bear Creek's water quality, while generally good, is challenged with high levels of fecal coliform bacteria, elevated water temperatures, and low dissolved oxygen levels. Ecology has developed Total Maximum Daily Loads for temperature and bacteria in Bear Creek. Native vegetation along the stream corridor has been degraded over time and historic wetlands have been altered or filled in for other uses. Instream habitat, critical for salmon and other aquatic life, is lacking in quantity, quality and variety. Bear Creek's overall aquatic health based on observed Benthic Index of Biotic Integrity (B-IBI) scores is categorized as "Fair."

A significant amount of land in the watershed is privately owned and has already been developed to some extent. Most areas not developed are within the City of Redmond Watershed (protected for water supply purposes) or are defined as critical areas by King County code.

Most of the development in the watershed occurred prior to current requirements for modern stormwater controls. Some stormwater facilities to manage runoff (such as ponds) have been built in the past, but most were based on older design standards that do not adequately protect aquatic resources. Land use projections based on population trends and current zoning suggest increasingly dense developments within the urban areas of the watershed in the future, with incremental increases in development levels in rural areas.

Investments in the watershed include, but are not limited to, King County land conservation and acquisition efforts, WRIA 8 salmon habitat recovery projects, road drainage improvements, stormwater retrofits, pollution source control, and Redmond's Watershed Restoration Plan. The Study reviewed

several of the major planned actions over the next 10 years and over \$40 million may be expected to be invested in the Bear Creek watershed that will improve water and habitat quality.

The study identified temperature, dissolved oxygen, and fecal coliform as water quality concerns due to exceedances of the state water quality standards consistent with historic data for Bear Creek. Adding to these concerns, this study identified exceedance of the state criteria for dissolved copper in Mackey and Cold creeks during wet weather.

Key findings from this study effort include:

- More than half of the existing inventory of stormwater control facilities was built to pre-1990 standards, and about three-quarters of the existing inventory was built to the 1990 or earlier standards.
- Approximately 179 acre-feet of detention storage is provided within the basin's existing detention ponds and vaults. The current detention storage amount is roughly 10 percent of the estimated 1,598 acre-feet that would be needed to meet King County's current default flow control standard for all developed surfaces in the basin.
- 52 percent of the existing pond facilities and vaults inventoried were developed prior to 1990 SWDM standards when formal water quality treatment was first required. This suggests a significant deficit in water quality treatment of developed surfaces in the basin.
- There are very few flow control BMPs in the basin. Only 3.5 percent of the inventoried facilities were built to 2009 SWDM standards under which flow control BMPs were first designed to protect the hydrologic function of small streams. Flow control BMPs are likely critically important to address flashiness in Bear Creek and its tributaries, to cool receiving waters via infiltration of stormwater from developed surfaces, and to recharge groundwater.

2.0 WATERSHED GOALS, OBJECTIVES, METRICS, AND TARGETS

The goals and management objectives developed by the technical team and Partners are aimed at restoration of the stream to designated and existing uses (Table 6). The objectives include those with associated indicators specifically required to be assessed by the Permit (B-IBI, flow, and water quality) and others considered discretionary that nonetheless directly support the aim of restored uses and successful implementation.

Table 6

Goal	Management Objective(s)	Potential Indicator(s)	Permit Required Assessment
Improve and maintain watershed functions in Bear Creek, including water quality, habitat, and hydrology	Minimize impacts of stormwater runoff on stream hydrology to promote stable stream morphology, protect habitat, and support biota	B-IBI Flow metrics	Yes
	Minimize impacts to stream water quality from stormwater runoff.	Meet state freshwater quality standards (Temperature, dissolved metals, Turbidity/ Total suspended solids)	Yes
Protect human health, safety, and property	Minimize human gastrointestinal health risk associated with recreational exposure	Meet state fecal coliform standard	Yes

Catchment Prioritization

The Bear Creek study area was divided into 87 drainage catchments for modeling and prioritization purposes. Most catchments were about 100 to 400 acres. The largest catchment modeled was 650 acres and the smallest catchment modeled was 10 acres.

Appendix A: Prioritization: Water Quality and Quantity Strategies provides further detail on the prioritization and scoring metric and details the priority catchments within each partner jurisdiction:

- Four catchments (BEA120, BEA200, BEA300, and BEA740) and one group of catchments (BEA230/240/245/250) are prioritized for King County

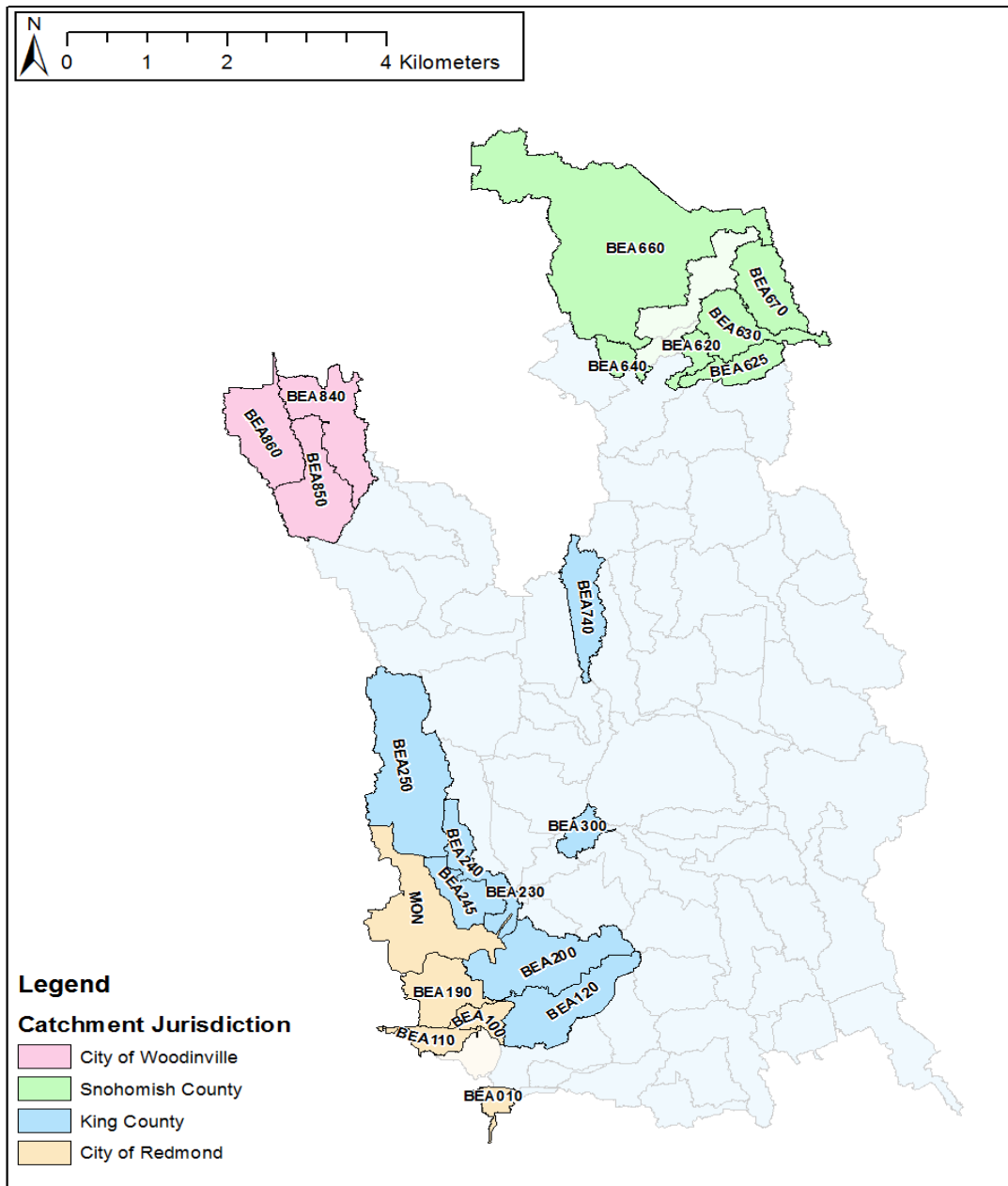


Figure 4 BCMS – Figure 9. Prioritized catchments for stormwater

The BCMS provided the following summary of BMPs recommended by catchment.

Summary of BMPs recommended by catchment for priority basins

Catchment	Cost (\$M)	Area		Bio-retention	Roadside Bioretention Ditch	Cisterns	Permeable Pavement	Gravity Wells	Infiltration Ponds	Dry + Wet Ponds	Wet ponds
	Capital	O&M (acres)	(Inches of storage)			Units / acre		(Inches of storage)			
BEA120	\$6.43	\$0.0	241.1	0.048	0.008	0.004	0.066	0.025	0.041	0.172	0.093
BEA200	\$13.88	\$0.1	321.0	0.033	0.025	0.018	0.256	0.022	0.100	0.314	0.133
BEA230	\$1.97	\$0.0	43.9	0.034	0.056	0.010	0.301	0.114	0.112	0.000	0.255
BEA240	\$5.68	\$0.1	99.8	0.061	0.096	0.023	0.309	0.040	0.025	0.416	0.149
BEA245	\$9.51	\$0.1	117.4	0.142	0.055	0.026	0.474	0.102	0.210	0.152	0.317
BEA250	\$43.42	\$0.5	493.3	0.011	0.096	0.017	0.768	0.187	0.000	0.505	0.336
BEA300	\$2.04	\$0.0	62.7	0.049	0.013	0.007	0.105	0.048	0.315	0.000	0.030
BEA740	\$10.88	\$0.1	160.5	0.045	0.075	0.032	0.340	0.118	0.015	0.444	0.278

Table 3 Summary of BMPs recommended by catchment for priority basins

* Catchments highlighted in yellow were chosen for the SMAP Subbasin

SMAP Sub-Basin

The SMAP Sub-Basin is intended to meet the permit requirements. For the purposes of the SMAP, it was determined that combining catchments BEA240, BEA245 and BEA250 into a single SMAP sub-basin to achieve appropriate size and allow flexibility in meeting requirements. The combination of these catchments creates a SMAP sub-basin sized at around 700 acres.

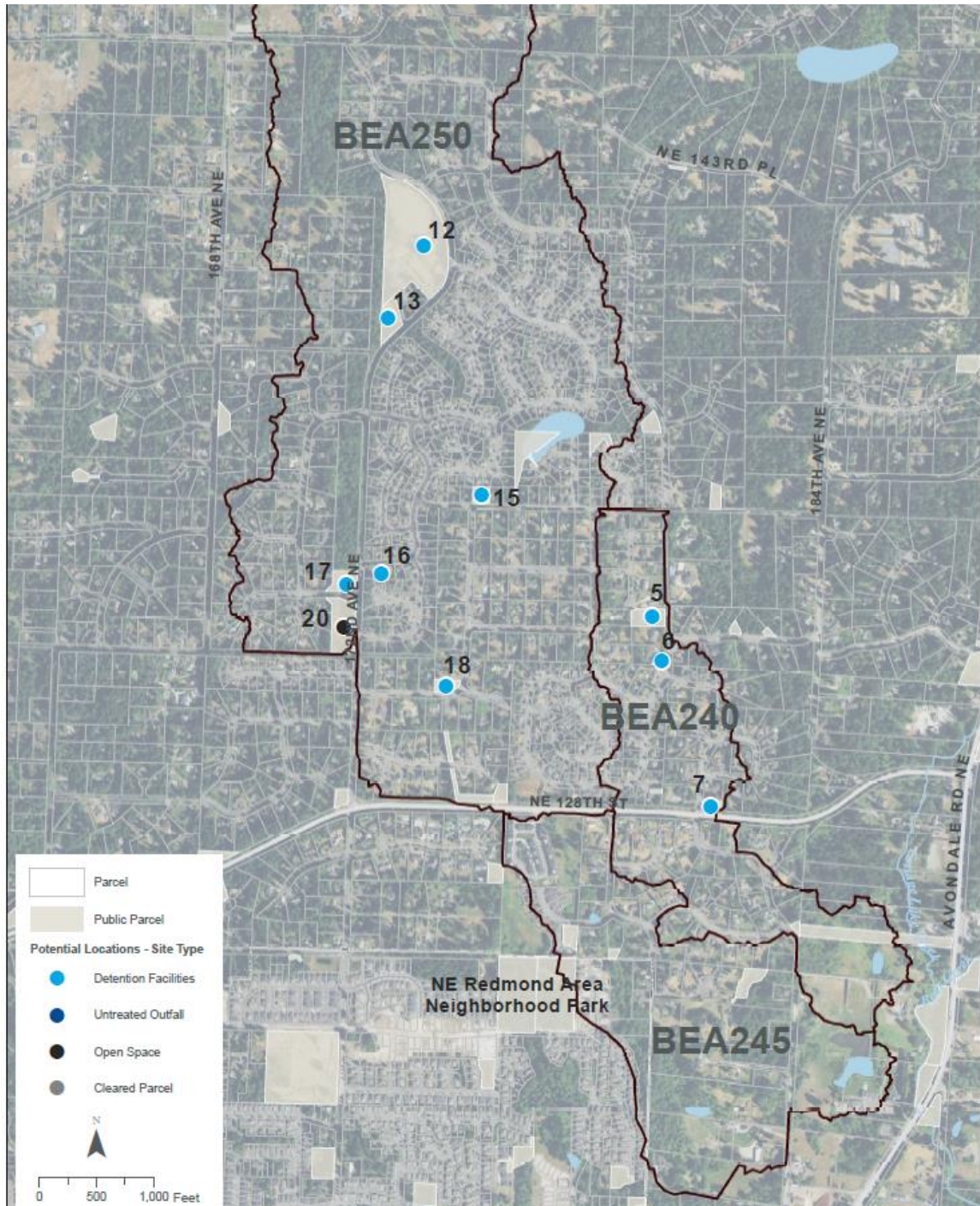


Figure 5 SMAP Sub-Basin

Specific Short-Term Actions *S5.C.6.d.ii.(a)*.

Objectives for the SMAP for Short Term Actions

The following provides more details on the actions, projects or strategies proposed to meet *S5.C.6.d.(a)*, *Specific short-term actions* and *(c). Land management / development strategies and/or actions*.

Specific short-term project - Retrofit Projects – Sunrise Elementary Bostic Creek Retrofit

Sunrise Elementary - modernize stormwater management at Sunrise Elementary through implementation of GSI. Existing stormwater management systems on site were designed prior to current surface water regulations. This project provided one opportunity for complementary actions to modernize stormwater management. King County continues to seek additional opportunities for complementary actions and regional partners to update older stormwater features.

Hydrologic models were used to analyze multiple GSI BMPs for each stormwater source on site, including, but not limited to: use of aboveground GSI for managing roof runoff to prevent ponding near school buildings while also providing educational opportunities for students and teachers, a GSI retrofit at the playfield to direct flows from offsite through a sand filter vault for treatment, and a GSI retrofit at the southwest corner and the King Country treatment facility to manage all other collected stormwater.

See [Attachment - Short Term Actions - Sunrise Elementary Bostic Creek Retrofit](#) for the full analysis.

Land management/development strategies and/or actions

Land management / Land Acquisitions - Eight Land Acquisitions in the Bostic Creek (SMAP) Subbasin or Bear Creek Watershed in 2022-2029 permit cycle.¹

King County's Stormwater Retrofit Prioritization Framework Project

There is not enough funding to construct a sufficient number and scale of stormwater management facilities in all developed areas immediately. To identify and prioritize the most valuable retrofit actions in the highest-priority areas on the fastest time frame practicable, a comprehensive set of goals, criteria, and evaluation techniques must first be developed and agreed upon by multiple King County divisions and regional partners.

Purpose of this Project

The purpose of this project is to develop clear goals and a strategic decision-making framework for identifying, prioritizing, and implementing stormwater management and engineering projects led or influenced by the County's Stormwater Services Section (SWS) that restore aquatic resources. Building on existing County programs, policies, and initiatives, the project will not only focus on water quality and aquatic health, but on broader principles of critical importance, such as equity and social justice (ESJ) and climate change preparedness.

The resulting framework will provide a decision tool for the County and its regional partners to identify and target high-priority areas and retrofit opportunities in which to invest that will deliver the highest-value aquatic restoration and community benefits. The tool provides the County and regional partners with the data and analysis needed to develop a budgetary strategy for implementing the recommended actions and

¹ *Note: These acquisitions cannot yet be specifically identified since they involve negotiation with private parties. The SMAP will be updated with specifics. Acquisitions will be in the SMAP Subbasin, if possible, or, at a minimum, within the Bear Creek Watershed Study area. All acquisitions depend on grant funding.*

achieving the intended community and aquatic health outcomes. Prioritization will consider all of King County, both incorporated and unincorporated lands, and will include both programmatic and structural solutions.

Specific Long-Term actions *S5.C.6.d.ii.(b)*.

Objectives for the SMAP:

The following is proposed to meet *S5.C.6.d.(b)*. *Specific long-term actions*

Specific long-term project - Retrofit Projects

Sunrise Elementary bioretention/industrial rain garden and/or regional detention vault beneath the school playfield or a similar retrofit project in the Bear Creek Watershed – This project will enhance the partnership with the Sunrise school community and the City of Redmond as well as meet permit requirements.

Land management/development strategies and/or actions

Land management / Land Acquisitions - Eight Land Acquisitions in the Bostic Creek Subbasin or Bear Creek Watershed in 2022-2029 permit cycle.² See [Land management/development strategies and/or actions needed for water quality management for additional information.](#)

² *Note: These acquisitions cannot yet be specifically identified since they involve negotiation with private parties. The SMAP will be updated with specifics. Acquisitions will be in the SMAP Subbasin, if possible, or, at a minimum, within the Bear Creek Watershed Study area. All acquisitions depend on grant funding.*

King County Land Conservation

From the Bear Creek Study - Page 7

King County and its advisory group has identified and prioritized conservation and preservation of 65,000 acres of critical natural lands and green spaces countywide. At the current level of investment, this objective is projected to be achieved in 70 years. King County Executive Dow Constantine has proposed an initiative to “finish the job of protecting our great places forever.” The Land Conservation Initiative (LCI) sets forth the goal of conserving and preserving the remaining high conservation value lands throughout King County within the next 30 years.

King County acquires land for conservation/protection as conservation easement, as full parcel open space, and development prevention, or to restore and enhance natural assets such as tree canopy, riparian areas, or wetlands. The purchased lands provide water quality and flow control benefits (e.g., interception, infiltration, soil-plant treatment), which in turn defrays or prevents future costs of stormwater facility construction and operation & maintenance (O&M).

If required, SMAP land acquisition will coordinate and prioritize based on S.5.C.7. 2024 - 2029 permit requirements using the approach outlined in Appendix 12.

Specific land management strategies

Targeted land acquisition under the **Land Conservation Initiative (LCI)** includes conservation easement or full fee acquisition of land parcels to protect and restore hydrologic function and watershed health, and in some cases, to provide project footprints for restoration and stormwater retrofit projects. As required, project footprints for stormwater retrofit projects would be excluded from the [Appendix 12 - Structural Stormwater Controls Project List](#) unless completed as part of a

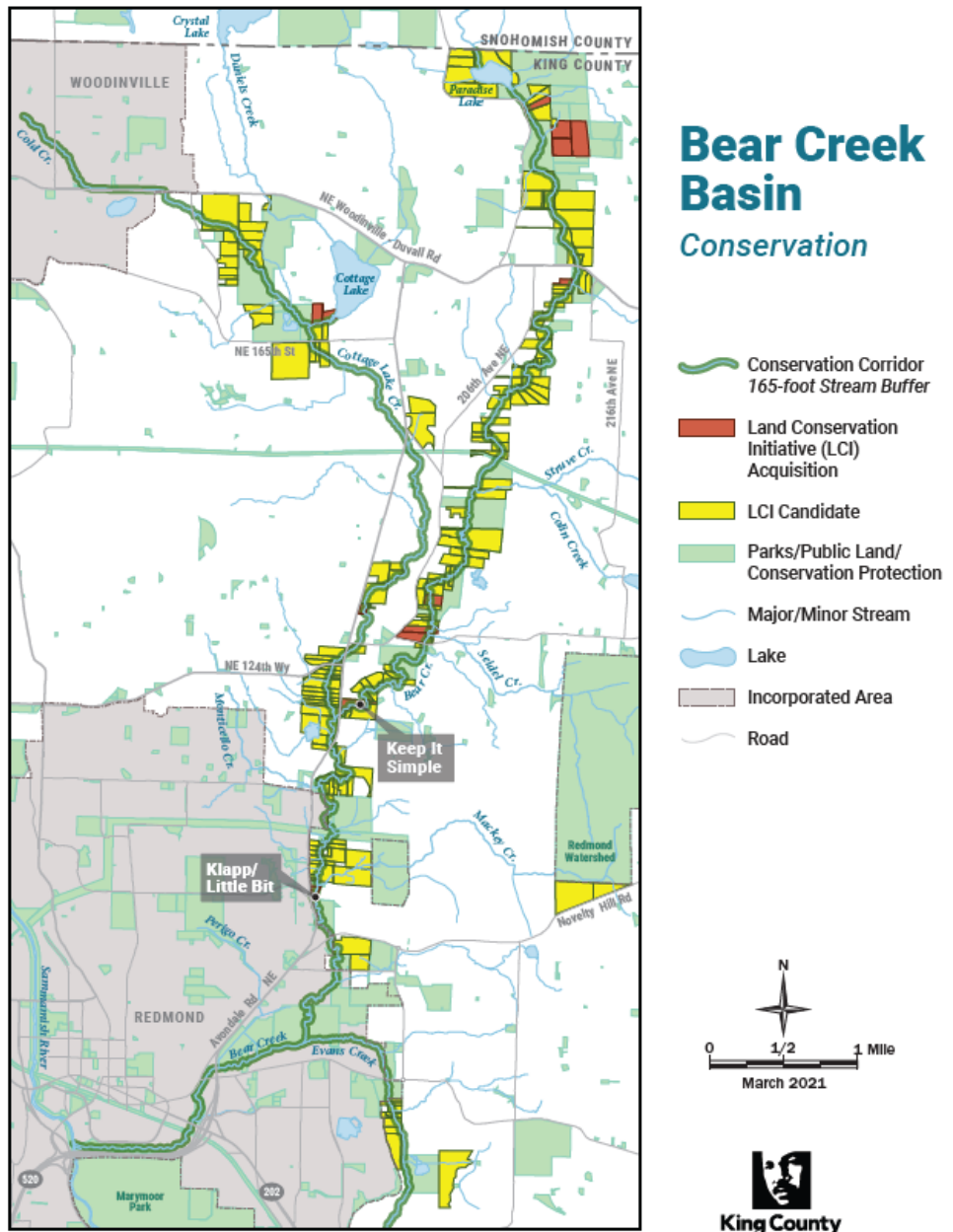


Figure 6 Bear Creek Basin Land Conservation Initiative

- 1) *New flow control facility,*
- 2) *New runoff treatment facility or*
- 3) *New LID BMP.*

[Protecting and restoring Bear Creek watershed, one of the most productive salmon habitats in all of King County](#)

“A key segment of the Bear Creek watershed near Redmond – one of the most productive salmon habitats in the Central Puget Sound region – is now permanently protected, the latest progress by the Land Conservation Initiative ...”

<https://kingcounty.gov/elected/executive/constantine/news/release/2021/May/26-bear-creek-watershed.aspx>

King County’s vision and approach in the Bear Creek watershed is that targeted acquisitions, habitat restoration, and retrofit projects work in tandem to protect and restore land, thereby improving water quality.

This multi-pronged approach in the watershed that includes the following LCI goal cross walked with SSC projects:

Land Conservation Initiative Goals	Associated SSC Project – Appendix 12	SSC Program Point Multipliers
Targeted land acquisition under the Land Conservation Initiative, which includes conservation easement or full fee acquisition of land parcels to protect and restore hydrologic function and watershed health, and in some cases, provide project footprints for restoration.	<i>(5) Property acquisition³ for water quality and/or flow control benefits - ... purchase of a likely development site to permanently prevent it from being developed would qualify under this category. This category includes forest protection and conservation easements. Riparian habitat acquisition qualifies under this project type.</i>	0.50 times acres acquired
Sponsoring internally, or enabling through public and private partnerships: Habitat restoration projects under the Water Resource Inventory Area (WRIA) 8 Salmon Recovery Plan, with outcomes that may provide improved hydrologic function and conveyance, and streamflow and water quality improvement (e.g., reduced erosion, sediment input, temperature). These improvements may result from floodplain reconnection, increased channel complexity, and riparian planting and other actions such as community outreach and technical assistance.	<i>(7) Restoration of riparian buffers (S5.C.7.a.ii.(a)) — This project type describes planting and restoring of riparian buffers above the ordinary high watermark that can reduce the discharge of pollutants, and reduce impacts to waters of the state by protecting or restoring hydrologic capacity. (8) Restoration of forest cover (S5.C.7.a.ii.(b)) — This project type describes planting and restoring of forest cover that can reduce the discharge of pollutants, and reduce impacts to waters of the state by protecting or restoring hydrologic capacity. (9) Floodplain reconnection projects on water bodies that are not flow control exempt per Appendix 1 (S5.C.7.a.ii.(c)) – Qualifying floodplain reconnection projects will provide flow reduction and runoff treatment benefits.</i>	0.35 times acres restored 0.25 times acres restored 0.10 times acres reconnected

³ This category excludes the purchase of property for the siting of a stormwater facility.

Land Conservation Initiative Goals	Associated SSC Project – Appendix 12	SSC Program Point Multipliers
	<p><i>(10) Permanent removal of impervious surfaces (S5.C.7.a.ii.(d)) This project type describes permanent removal of impervious surfaces and replacement with pervious vegetated surfaces meeting BMP T5.13 or trees that promote infiltration, dispersion, and uptake by plants or reduce the amount of pollution generating impervious surfaces.</i></p>	<p><i>1.0 times the sq. ft. of impervious surface removed</i></p>
<p>Working to support King County’s retrofitting of the basin with green stormwater infrastructure, and new or upgraded stormwater facilities to provide improved water quality and flow control.</p>	<p><i>(3) New LID BMPs (S5.C.7.a.i.(c))—These facilities are consistent with the lists of On-Site Stormwater Management BMPs of Minimum Requirement 5 and reduce the volume of runoff by infiltrating runoff from the small, more frequent storms. Qualifying new LID BMP projects result in the reduction or prevention of hydrologic changes through use of on-site (e.g., infiltration, dispersion, evapotranspiration, rainwater harvesting) stormwater management BMPs. LID principles reflected in site design techniques do not qualify because projects that apply LID principles in a retrofit setting should be accommodated in other qualifying project types (such as property acquisition and restoration of forest cover). Qualifying projects in this category will be compared against the LID Performance Standard for SSC Program Point calculations.</i></p>	<p><i>1.5 times LID Equivalent area</i></p>

Targeted, enhanced, or customized implementation of stormwater management actions related to permit sections within S5

Current stormwater regulations that apply to Bear Creek watershed require that new development be mitigated in a manner that matches forested conditions by installing ponds, vaults, and flow control best management practices.

Targeted/Enhanced/Customized IDDE Field Screening S5.C.6.d.(d)

Identified actions shall support other specifically identified stormwater management strategies and actions for the basin overall, or for the catchment area in particular.

Background for Targeted/Enhanced/Customized IDDE field screening

From the Bear Creek Watershed Management Study

Bear–Evans Multi-Parameter TMDL

The Bear–Evans Multi-Parameter TMDL covers the entire Bear Creek watershed, including both the Evans Creek and Cottage Lake sub-watersheds (Ecology, 2011b). The water quality concerns identified for improvement are temperature, dissolved oxygen, and fecal coliform bacteria. As part of the TMDL study, Ecology identified the pollution problems and specified how much pollutant loading needs to be reduced to achieve clean water. As a follow-up to the TMDL study, Ecology worked with the local community to prepare a Water Quality Implementation Plan detailing the specific actions needed to improve water quality in the basin. The plan describes management roles, activities, and schedules for partners.

EPA approved the TMDLs in August and September 2008.

TMDL implementation is currently underway. Ecology and other watershed stakeholders are working on projects that are consistent with the Water Quality Implementation Plan. As part of its fecal coliform TMDL implementation plan, King County expects to spend approximately \$2 million on source control in Bear Creek over the next 10 years.

Description	Near-term Action (Years 1-10)
Fecal Bacteria Source Tracking Study	Follow-up IDDE work for TMDL by King County SWS
	\$60,000/year over 5 years

From the Phase I Permit - Appendix 2

Name of TMDL	WRIA 8 - Bear-Evans Watershed
Document(s) for TMDL	<i>Bear-Evans Watershed Fecal Coliform Bacteria Total Maximum Daily Load, Water Quality Improvement Report, June 2008, Ecology Publication No. 08-10-026.</i> https://fortress.wa.gov/ecy/publications/documents/0810026.pdf <i>Bear-Evans Watershed Temperature, Dissolved Oxygen and Fecal Coliform Bacteria Total Maximum Daily Load, Water Quality Implementation Plan, March 2011, Ecology Publication No. 11-10-024.</i> https://fortress.wa.gov/ecy/publications/documents/1110024.pdf
Location of Original 303(d) Listings	<i>Bear Creek (EW54VY, BA64JJ, WR69YU))</i> <i>Cottage Lake Creek (NO74J5)</i> <i>Unnamed Tributary to Bear Creek (EU47RU)</i>

	Evans Creek (MI67EG)
Area Where TMDL Requirements Apply	Bear Creek and Evans Creek watersheds (includes Cottage Lake watershed)
Parameter	Fecal Coliform
EPA Approval Date	August 11, 2008
MS4 Permittee	Phase I: King County Phase II: No actions identified for Phase II Permittees

KING COUNTY - Actions Required

- Install and maintain animal waste education and/or collection stations at municipal parks and other Permittee owned and operated lands reasonably expected to have substantial domestic animal (dog and horse) use and the potential for pollution of stormwater.
- Designate previously unscreened areas discharging via the MS4 to the TMDL area as high priority areas for illicit discharge detection and elimination. Complete IDDE field screening for bacteria sources in these areas, including rural MS4 sub-basins, by January 1, 2022, and implement the schedules and activities identified in S5.C.9 of the Phase I Permit for response to any illicit discharges found.

Targeted/Enhanced/Customized IDDE Field Screening Objectives for the SMAP:

King County has targeted, enhanced and customized IDDE field screening in the Bear Creek watershed as part of its efforts to comply with Appendix 2 of the 2013-2018 and 2019-2024 Phase I Municipal Stormwater Permit. Going forward and building on this foundation of work and data, King County will continue to work to improve water quality in the Bear Creek watershed as part of the SMAP.

1. Comply with Appendix 2 of the 2024-2029 permit.
2. Complete the evaluation of King County’s methods used to gather and analyze data and information during implementation of the 2019-2024 Bear-Evans Basin Fecal Coliform Total Maximum Daily Load Work Plan.
3. Formulate *targeted, enhanced and customized* additional IDDE field screening, if needed, as well as identify other actions that would improve water quality based on this work.

3a. Within sewerred portions of the subbasin, in the dry season, updated and/or higher-resolution screening of the MS4 than required by the permit or previously performed (extensive dry-season screening has *already* taken place in the subbasin, and has been documented)

3b. Within non-sewerred portions of the subbasin, in the wet season, updated and/or higher-resolution screening of the MS4 than required by the permit or previously performed (extensive wet-season screening has *already* taken place in the subbasin, and has been documented)

If required, these targeted, enhanced, or customized implementation of stormwater management actions will be used to formulate a plan of action to be implemented during the 2024-2029 permit cycle and will dovetail with any actions identified in the Appendix 2 of the 2024-2029 permit.

Targeted/Enhanced/Customized **Source Control Inspections** S5.C.6.d.(d)

Identified actions shall support other specifically identified stormwater management strategies and actions for the basin overall, or for the catchment area in particular.

Targeted/Enhanced/Customized Objectives for the SMAP:

Source Control inspections in the SMAP subbasin will include targeted, enhanced, or customized implementation of stormwater management actions for Source Control inspection. This will take two forms:

1. Prioritized Schedule for required inspections in the Subbasin or Bear Creek Watershed and
2. Implementation of a new source control and education / outreach behavior change pilot implementation for mobile businesses.

1. Business Inspection at the SMAP Subbasin or Watershed Level

From King County's 2021 SWMP

King County identifies multifamily, commercial, and industrial sites that are potentially pollutant generating. On identified sites, the Business Inspection Program inspects structural and operational BMPs and onsite conveyance systems to ensure that the appropriate operational and structural source control BMPs are employed and properly maintained. If BMPs are lacking and/or inadequate, verbal and/or written notice is provided along with technical assistance, detailing what must be done to achieve compliance. Failure to comply will trigger progressive enforcement. The authority to issue written notices and enforce their contents is found in KCC Chapter 9.12.

Stormwater Services Section (SWSS) developed an inventory of the land uses/businesses using the categories found in Appendix 8 of the Permit. King County has implemented an approach to develop the inventory list to meet this permit requirement.

King County uses a combination of historical inspection and complaint records, information available through the King County Department of Assessments, map review, and field inspections to determine potential pollutant generating sites within unincorporated King County. Properties within the unincorporated area that are owned by the County and have the potential to produce pollutants are included in this inventory. The inventory is updated annually.

With the implementation of new software, CityWorks, in 2019, as the inventory is entered into the system, businesses have been rated according to compliance history and potential to pollute. This rating is used to determine inspection frequency, resulting in businesses with a higher risk and/or poor compliance history being inspected on a more frequent basis.

In addition to what is described in the SWMP, the SMAP Subbasin or Bear Creek Watershed will have a prioritized schedule for the inspection of commercial animal handling areas and commercial composting facilities to ensure implementation of source control BMPs for bacteria. In the 2019-2024 permit, King County was not required to inspect commercial animal handling areas and commercial composting facilities in the WRIA 8 Bear-Evans Watershed Fecal Coliform Bacteria TMDL.

2. Implement Mobile Business source control and education / outreach behavior change pilot implementation

King County is piloting a project to create and advance resources available to municipal stormwater source control programs and address several issues related to engaging with and educating mobile businesses. As a subset of commercial enterprises, mobile businesses have unique challenges related to stormwater and pollution prevention due to their mobile nature and working at dispersed sites in multiple jurisdictions.

The pilot will develop and test new tools and guidance to support municipal stormwater permittees in identifying, inspecting, and coordinating on source control and mobile businesses. Once refined the end products will then be rolled out more broadly within the SMAP watershed to support targeted source control inspections and coordination across jurisdictional boundaries to reduce pollution and encourage behavior change.

Targeted/Enhanced/Customized Public Education and Outreach Behavior Change Programs S5.C.6.d.(d)
Identified actions shall support other specifically identified stormwater management strategies and actions for the basin overall, or for the catchment area in particular.

Targeted/Enhanced/Customized Public Education and Outreach Behavior Change Programs Objectives for the SMAP:

Targeted, enhanced, or customized implementation of stormwater management actions will be used to formulate a plan of action to be implemented during the 2024-2029 permit cycle and will dovetail with the needs of the Short-Term Actions project and the Mobile Business Source Control and Education / Outreach Behavior Change Pilot Implementation.

1. Short / Long Term Action - [Sunrise Elementary Bostic Creek Retrofit](#) - Public Education and Outreach project support and behavior change programs

Sunrise Elementary Bostic Creek Retrofit or equivalent project would modernize stormwater management at Sunrise Elementary through implementation of GSI. To reduce stormwater runoff and provide ongoing educational/behavior change benefits to Sunrise Elementary.

This project involves a diverse set of stakeholders, including but not limited to: King County, Sunrise Elementary School faculty, students, and facilities maintenance staff, and the English Hills homeowner's association (HOA) which owns much of the land on and surrounding the school site. Therefore, soliciting feedback from these stakeholders was, and continues to be, an important component of the project.

- Outreach and education would be conducted to continue stakeholder support for this project and the maintenance of installed facilities. The primary goal of this project is to improve water quality for downstream habitat; ongoing education leading toward behavior change supports moving toward that goal.
- Continuing education and behavior change would be supported by the following options:
 - Use the undeveloped hill in the SW corner of the campus to implement a terraced bioretention facility to mitigate large storm events and treat runoff from the school catchment.
 - Locate an outdoor classroom at the base of the terraced bioretention facility. The classroom is placed next to the bioretention cells to facilitate use of the facility for educational purposes.
 - Use native plants in the bioretention cells, with appropriate signage, to educate students about the plant-soil relationship and habitat.
 - Provide access to the classroom with an American Disability Act (ADA) compliant walkway lined with permeable pavers.
 - Install a second classroom that will utilize cisterns, planter boxes and raingardens, providing opportunities for teaching students about water collection, plant selection and treatment.

Also see 4.5 Educational Options in the attachment - [Sunrise Elementary Bostic Creek Retrofit](#)

2. Mobile Business Source Control and Education / Outreach Behavior Change Pilot Implementation

King County is piloting a project to create and advance resources available to municipal stormwater source control programs and address several issues related to engaging with and educating mobile businesses. As a subset of commercial enterprises, mobile businesses have unique challenges related to stormwater and pollution prevention due to their mobile nature and working at dispersed sites in multiple jurisdictions.

The pilot will develop and test new tools and guidance to support municipal stormwater permittees in identifying, inspecting, and coordinating on source control and mobile businesses. Once refined the end products will then be rolled out more broadly within the SMAP watershed to support targeted source control inspections and coordination across jurisdictional boundaries to reduce pollution and encourage behavior change.

King County's Recommendations for the 2024-2029 Permit S.5. C.6. Stormwater Planning

King County recommends Ecology identify Planning Elements in the next permit as opposed to specific planning efforts such as the Comprehensive Plan.

King County views stormwater planning in two separate categories:

- 1) New development and redevelopment as dictated by S.5.C.5. of the permit and
- 2) Retrofitting.

The easiest way to explain retrofitting is to use the description of projects listed in S.5.C.7.a. It is King County's recommendation that, as much as possible, C.6. Stormwater Planning be incorporated into S.5.C.7. **The need for retrofit at this moment in time far exceeds the resources to meet the need.** Therefore, a finely tuned planning methodology or narrow focus on a specific watershed is not necessarily helpful. Rather, since it is likely that most jurisdictions are already aware of retrofit needs, a flexible approach that allow jurisdictions to maximize their ability to implement retrofit projects would be the most beneficial.

Recommended Elements for 2024-2029 Permit Requirements

1. Clarify How S.5.C.6. Stormwater Planning and S.5.C.7. Stormwater Structural Controls Work Together to Accomplish Improved Water Quality

It would be helpful if Ecology could provide more information or guidance on how Ecology intends for S.5.C.6. Stormwater Planning and S.5.C.7. Stormwater Structural Controls permit sections work together. The Permit appears to use three approaches to improving stormwater / water quality:

- a) Controlling Runoff from New Development, Redevelopment, and Construction Sites requirements.
- b) Retrofit requirements such as Planning and Structural Stormwater Control
- c) Programmatic requirements such as Source Control, IDDE and Education and Outreach.

Once the 2019 – 2024 Permit cycle is complete initial stormwater planning as envisioned in this permit will be complete.

In the next permit cycle, does it make sense to simplify Stormwater Planning to focus on retrofitting as envisioned in S.5.C.7. Stormwater Structural Controls?

2. Describe how your jurisdiction plans

For an example, please see [King County's Stormwater Planning, Retrofits and the SMAP - How King County Implements Stormwater Planning](#).

In this required description, the permittee would be required to provide the following elements to demonstrate compliance with the requirement to *implement a Stormwater Planning program to inform and assist in the development of policies and strategies as water quality management tools to protect receiving waters.*:

A process by which the jurisdiction plans and implements retrofit projects described in S5.C7.a.i. This process would have the goal of protecting receiving waters and to synchronize Stormwater Planning with the requirements under S.5.C.7.

Examples of this could be (from S.5.C.7. b.). Permit requirements in *italics*.

- a) *The geographic scale of the planning process.*
- b) *Issues and regulations addressed.*
- c) *Steps in the planning process.*
- d) *Types of characterization information considered.*
- e) *Amount budgeted for implementation.*
- f) *The public involvement processes.*
- g) *A description of the prioritization process, procedures and criteria used to select projects.*
- h) With each Annual Report, each Permittee shall provide a list of planned, individual projects scheduled for implementation during this Permit term for the purpose of meeting this requirement.

3. A required element of this plan would need include elements outlined in 5.6 SMAP Table - Implementation schedule and budget sources

For example:

Project Type	King County Permit Required Actions / Projects	Budget / Funding Source	Implementation Time Frame	Anticipated Costs	Planned Expenditures by Year
<input checked="" type="checkbox"/> New flow control facilities. <input type="checkbox"/> New treatment (or treatment and flow control) facilities. <input checked="" type="checkbox"/> New LID BMPs. <input type="checkbox"/> Retrofit of existing treatment and/or flow control facilities. <input type="checkbox"/> Property acquisition for water quality and/or flow control benefits (not associated with future facilities). <input type="checkbox"/> Maintenance with capital construction costs ≥ \$25,000 Restoration of riparian buffers <input type="checkbox"/> Restoration of forest cover. <input type="checkbox"/> Floodplain reconnection projects on water bodies that are not flow control exempt per Appendix 1. <input type="checkbox"/> Permanent removal of impervious surfaces. <input type="checkbox"/> Other actions to address stormwater runoff into or from the MS4.	1. Sunrise Elementary - modernize stormwater management at Sunrise Elementary through implementation of green stormwater infrastructure (GSI).	1. Sunrise Elementary will need to be staffed and funded in the 2023 budget and beyond to be completed by 2029.	2024 – 2029 Permit Cycle	\$2 M	2023 – Design 2024-25 – Construction 2025 and beyond - Maintenance
<input type="checkbox"/> New flow control facilities. <input type="checkbox"/> New treatment (or treatment and flow control) facilities. <input type="checkbox"/> New LID BMPs. <input type="checkbox"/> Retrofit of existing treatment and/or flow control facilities.	2. Land management / Land Acquisitions - Eight Land Acquisitions in the Bostic Creek (SMAP) Subbasin or Bear Creek Watershed in	2. These acquisitions will be grant funded.	2024 – 2029 Permit Cycle	\$ X M	

Project Type	King County Permit Required Actions / Projects	Budget / Funding Source	Implementation Time Frame	Anticipated Costs	Planned Expenditures by Year
<input checked="" type="checkbox"/> Property acquisition for water quality and/or flow control benefits (not associated with future facilities). <input type="checkbox"/> Maintenance with capital construction costs ≥ \$25,000 Restoration of riparian buffers <input type="checkbox"/> Restoration of forest cover. <input type="checkbox"/> Floodplain reconnection projects on water bodies that are not flow control exempt per Appendix 1. <input type="checkbox"/> Permanent removal of impervious surfaces. <input checked="" type="checkbox"/> Other actions to address stormwater runoff into or from the MS4. Property acquisition for water quality and/or flow control benefits (associated with future facilities)	2022-2029 permit cycle.				
Etc.					

4. Describe Receiving Water Assessment and Prioritization Alternatives

This could be done using watershed-scale plans developed in the 2013 Permit by the Phase I counties or the approach put forth in the Ecology SMAP Guidance – **Receiving Water Conditions Assessment**.

It is also recommended that Ecology consider and allow alternative assessment approaches. King County anticipates completing its Stormwater Retrofit Framework to support King County decision making and to potentially facilitate collaboration with other jurisdictions. *“There is not enough funding to construct a sufficient number and scale of stormwater management facilities in all developed areas immediately. To identify and prioritize the most valuable Actions in the highest-priority areas on the fastest time frame practicable, a comprehensive set of goals, criteria, and evaluation techniques must first be developed and agreed upon by multiple King County divisions and regional partners.”*

The purpose of this project is to develop clear goals and a strategic decision-making framework for identifying, prioritizing, and implementing stormwater management and engineering projects led or influenced by the County’s Stormwater Services Section (SWS) that restore aquatic resources. Building on existing County programs, policies, and initiatives, the project will not only focus on water quality and aquatic health, but on broader principles of critical importance, such as equity and social justice (ESJ) and climate change preparedness.

The resulting framework will provide a decision tool for the County and its regional partners to identify and target high-priority areas and retrofit opportunities in which to invest that will deliver the highest-value aquatic restoration and community benefits. The tool provides the County and regional partners with the data and analysis needed to develop a budgetary strategy for implementing the recommended Actions and achieving the intended community and aquatic health outcomes. Prioritization will consider all of King County, both incorporated and unincorporated lands, and will include both programmatic and structural solutions.” – STORMWATER RETROFIT FRAMEWORK project.

In addition, assessment could also include the actual feasibility of individual project. Are the soils conducive to all the installed project to function properly, will its location provide the best outcome, etc.

5. The SMAP As a Living Document

King County recommends that Ecology view each jurisdiction’s SMAP as a “living document”. In other words, it would be beneficial if jurisdictions could be allowed to update and improve the SMAP as information becomes available.

Required framework elements, such as a specific project, should be required for the SMAP. However, if new information arises making the specific project submitted infeasible, an equivalent project could be proposed with a similar timeframe.

These required elements already exist in Ecology permit structure. For example:

- (a) Specific short-term actions (*i.e.*, actions or projects to be accomplished within six years).
- (b) Specific long-term actions (*i.e.*, actions or projects to be accomplished within seven to 20 years).
- (d) Targeted, enhanced, or customized implementation of stormwater management actions related to permit sections within S5.

A way of updating, refining, or if necessary, replacing a project or action is needed.

Appendices


S5.C6. Stormwater Planning – 2021 Annual Report Questions

Each Permittee shall implement a Stormwater Planning program to inform and assist in the development of policies and strategies as water quality management tools to protect receiving waters.

Question	Answer
<p>27. Have you convened an interdisciplinary team to inform and assist in the development, progress, and influence of the stormwater planning program? (Required no later than August 1, 2020 – S5.C.6.a)</p>	<p>Yes – King County’s Strategic Policy and Performance Unit (SPPU)</p>
<p>28. List the relevant land use planning efforts that have taken place in your jurisdiction (land use plans that are used to accommodate growth, stormwater management, or transportation). (S5.C.6.b.i(a) and (b) – Required by March 31, 2021, and March 31, 2022, respectively)</p>	<ol style="list-style-type: none"> 1. Chapters 5, 8 and 9 – KC Comprehensive Plan KC is implementing a series of long-range plans that will have land use planning impacts. These are all coordinated through the King County Comprehensive Plan. Chapters in the Comp plan that directly speak to the protection of aquatic resource are Chapters 5, 8 and 9. 2. Bear Creek Watershed Management Study¹ Bear Creek Watershed Management Study. King County is required to conduct a watershed-scale stormwater planning effort to satisfy permit obligations under section (S5.C.5.c) in the National Pollutant Discharge Elimination System (NPDES) Phase I Municipal Stormwater Permit. 3. KC Surface Water Design Manual King County’s Design Manual is equivalent and exceeds Ecology requirements for LID. King County continued to implement changes identified in the 2016 LID review. <p>¹ Future land use conditions were based on the full build-out of the most recent Comprehensive Plans (as of 2016) from King and Snohomish counties and the cities of Redmond and Woodinville.</p>
<p>29. List stormwater capital projects (currently in, or slated for future, design and construction) that resulted from this planning. (S5.C.6.b.i(a) and (b) – Required by March 31, 2021, and March 31, 2022, respectively)</p>	<p>King County Bear Creek Watershed Management Study resulted in stormwater capital projects plans. Specific objectives of the study included identifying the land use and stormwater management strategies to achieve established goals for restoring Bear Creek, while recognizing possible economic constraints.¹ See:</p> <ul style="list-style-type: none"> • Bear Creek Watershed Management Study¹ <p>¹ Future land use conditions were based on the full build-out of the most recent Comprehensive Plans (as of 2016) from King and Snohomish counties and the cities of Redmond and Woodinville.</p>
<p>30. Describe watershed protection measures associated with stormwater management and land use planning actions that resulted from this planning. (S5.C.6.b.i(a) and (b) – Required by March 31, 2021, and March 31, 2022, respectively)</p>	<p>King County Comprehensive Plan On July 24, 2020, the King County Council adopted the 2020 Comprehensive Plan update via Ordinance 19146. 2020 Comprehensive Plan Update - Adopted - King County The Puget Sound Regional Council adopted VISION 2050, in October 2020. Focus areas in VISION 2050 include the following:</p> <ul style="list-style-type: none"> • Restoring the health of the Puget Sound. The plan establishes a coordinated approach to watershed planning to restore the health of Puget Sound. <p>Bear Creek Watershed Management Study The objective of watershed-scale stormwater planning is to identify a stormwater management strategy or strategies that would result in hydrologic and water quality conditions that fully support “existing uses,” and “designated uses” throughout the stream system.</p> <p>Bear Creek Watershed Management Study The Bear Creek Watershed Study recommends:</p> <ol style="list-style-type: none"> 1) Updating and building new stormwater infrastructure on public land, <ol style="list-style-type: none"> a. upgrade existing infrastructure for highly developed areas and build additional stormwater infrastructure on public lands. b. Flow Transfer Feasibility Study – studies whether flow credit transfer between watersheds would be effective. c. Existing Pond Optimization Program – evaluates existing infrastructure to provide improvements. 2) Providing incentives for installing rain gardens, cisterns, and permeable pavement on private land, <ol style="list-style-type: none"> a. Flow Control Incentives – provide assistance to private landowners to install rain gardens and cisterns. b. In-lieu Fee Program – allows those proposing development to pay for mitigation when it is infeasible to provide mitigation.

Question	Answer
	<p>3) Restoring habitat along streams and wetlands, and</p> <ul style="list-style-type: none"> a. Fish Passage Study & Mitigation Plan – locate and remove in-stream barriers preventing fish migration. b. Tree Planting Programs – (e.g. City of Redmond, King County’s 1 Million Trees campaign) – plant trees on public land and incentivize property owners to plant trees. c. Mitigation Banking – sell credits to developers. d. Complementary Eff orts <ul style="list-style-type: none"> i. WRIA 8 Salmon Recovery Plan acquisition projects ii. King County Land Conservation eff orts <p>4) Supporting the success of the Study.</p> <ul style="list-style-type: none"> a. Involve the community and provide training and technical assistance. b. Implementing a monitoring program to track strategy effectiveness, to be used in adaptively managing the Study. c. Complete program review at ten-year and adapt strategies for moving forward. d. Monitoring and Assessment Management Program – collects data to assess effectiveness, tracks actions, outcomes, and makes modifications. e. Preservation and Acquisition – of high priority open space. f. King County’s Neighborhood Drainage Assistance Program g. Puget Sound Starts Here h. Fecal Bacteria Source Tracking Study i. Bear Creek/Sammamish Community Service Area <p>The Study recommends a ten-year eff ort to improve water quality and stream flows in five high-priority areas and begin to restore habitat throughout the watershed.</p> <p>KC’s Surface Water Design Manual creates incentives to reduce impervious surface footprints. In addition, KC Code does not allow the development of critical areas address stormwater management needs.</p>
<p>31. Were land acquisitions identified (or are planning ahead for) that are useful for stormwater facilities to:</p> <p>a) Accommodate growth or to better serve an existing developed area?</p> <p>31a. If yes, for what purpose?</p>	<p>Yes - Bear Creek Watershed Management Study - Pg. 80</p> <p>Evaluation - A total of 126 parcels were identified for potential wetland acquisition (had no development). Sixty-four (64) of those parcels were also identified in the riparian analysis for acquisition. This wetland cost analysis for acquisition only includes the remaining 62 parcels.</p> <p>Costs for acquisition for each partner jurisdiction are present in Table 22. Costs were separated out for priority basins in addition to the priority ranking described in this strategy. Total costs for acquisition in priority basins and remaining High and Medium ranked parcels would be approximately \$5,520,000.</p> <p>31a. To reduce impervious surface and reduce pollution run off to rivers and salmon habitat.</p>
<p>32. Identified corrective actions, in addition to the minimum requirements of the Municipal Stormwater Permits, to control or treat municipal stormwater discharges that pollute waters of the State (e.g., Limits to impervious cover added to any zoning districts, regional facility planning, minimization of vegetation loss, etc.)? (S5.C.6.b.i(a) and (b) – Required by March 31, 2021, and March 31, 2022, respectively)</p> <p>32a. If yes, briefly describe and list relevant plan or code sections, if applicable.</p>	<p>32. No</p> <p>32a. N/A</p>
<p>33. Updates to goals and policies related to investment in stormwater management facilities/BMPs? (yes/no)</p> <p>33a. If yes, briefly describe.</p>	<p>Yes – King County Comprehensive Plan</p> <p>33a.</p> <p>On July 24, 2020, the King County Council adopted the 2020 Comprehensive Plan update via Ordinance 19146. 2020 Comprehensive Plan Update - Adopted - King County</p> <p>The Puget Sound Regional Council adopted VISION 2050, in October 2020. Focus areas in VISION 2050 include the following:</p>



Question	Answer
	<ul style="list-style-type: none"> • Restoring the health of the Puget Sound. The plan establishes a coordinated approach to watershed planning to restore the health of Puget Sound.
<p>34. Does the long-range plan identify the location and existing capacity of the stormwater facilities and show which facilities have unused capacity?</p>	<p>34. See BCWMS - No</p>
<p>34a. Do these stormwater facility locations impact where housing, or other types of development are projected to be located, or influence the acquisition of land? (if yes, how?)</p>	<p>34a. See BCWMS - No</p>
<p>34b. Does the long-range plan identify a lack of facilities and the potential impacts of existing or new development to those areas and receiving waters?</p>	<p>34b. See BCWMS - No</p>
<p>34c. Any new proposed locations and capacities of stormwater facilities needed for the timeframe of the plan?</p>	<p>34c. See BCWMS - No</p>
<p>35. Based on the projected population densities and distribution of growth over the planning period, describe how stormwater runoff impacts are forecasted.</p> <p>Does stormwater management information (including water quality) direct where growth is directed?</p>	<p>35. Bear Creek Watershed Management Study (BCWMS) identified the lack of facilities. This study looked at future conditions and the potential impacts of existing or new development to those areas and receiving waters. It also looked at base condition verses future. Broad assumptions in Bear Creek modeling study included the assumption many existing stormwater facilities are aging or outdated structures, providing inadequate flow control and little to no water quality treatment. These facilities were built under old code and would not necessarily provide prevent impacts as we currently understand them.</p> <p>No, stormwater management information (including water quality) DOES NOT direct where growth is directed.</p>
<p>36. Continue to design and implement local development-related codes, rules, standards, or other enforceable documents to minimize impervious surfaces, native vegetation loss, and stormwater runoff, where feasible? See S5.C.6.c.i. (Required annually)</p>	<p>36 37 Questions LID Barriers</p> <p>36. Yes - King County’s Design Manual is equivalent and exceeds Ecology requirements for LID. Work is ongoing to improve and clarify other King County local development-related codes, rules, standards, or other enforceable documents to help remove inconsistencies that might impede LID. King County continues update the King County Comprehensive Plan which also influences LID. Updates include errata to ensure clarity.</p>
<p>37. From the assessment described in S5.C.6.c.i(a), did you identify any administrative or regulatory barriers to implementation of LID Principles or LID BMPs.</p>	<p>37. No</p>
<p>37a. If yes, describe the barrier and the measures taken to address them.</p>	<p>37a. N/A</p>
<p>Stormwater Management Action Planning</p> <p>38. Counties Only: Did you describe in your SWMP how the watershed-scale stormwater plans (developed in the 2013-2019 Permit) are being used to inform S5.C.7 project prioritization and selection? (S.5.C.6.d.i)</p>	<p>38. Yes</p>



KING COUNTY
WATER AND LAND RESOURCES DIVISION
STORMWATER SERVICES SECTION

**STORMWATER RETROFIT
FRAMEWORK**

DRAFT: April 2021



Appendix C - Short Term Actions - [Sunrise Elementary Bostic Creek Retrofit](#)

- At the upper classroom, the whiteboard was stipulated as two-sided so teachers and students can use it while at the planter boxes and while in the seating area.

Storage Box(es)

- Allows storage of classroom materials so they don't need to be carried to and from the school.

Signage

- Educational signs can be distributed around the school grounds, dedicated to the bioretention facility as well as other stormwater features, like downspouts, gutters, and catch basins, to help students visualize, think critically about, and observe the flow of water across the campus.
- Signage can also be at the top of the walkway down to the classroom for students, faculty, and community members to provide more information about the BMPs on school grounds and to encourage to explore them.
- Signage can also be placed at the bioswale in the southwest corner, and at each of the planter boxes, downspout planters, and bioretention cells to indicate their purpose and the types of plants present.
- A map of proposed signage locations is found on the callout map in Appendix D.

Cisterns

- Two 1,000-gallon cisterns can be placed near the planned upper outdoor classroom and the current planter boxes as shown on the callout map in Appendix D.
- The cisterns were sized using the average monthly rainfall from the Hollywood Hills gage data from October 2010 until April 2021, estimating the school could have a garden area of up to 20 four by eight-foot planters, estimating the plant water needs, and using a safety factor of 1.5. The cisterns will collect roof runoff that students can use to water the planter boxes and for teaching modules.
- The cistern designs include a sight glass allowing students to measure the water level in the cistern at any given time, or as a function of rain events.
- More cisterns can be added to provide water for toilet flushing in the future.

Downspout Planters

- Planter boxes are proposed to connect to the downspouts where teachers previously reported leaks, and at downspouts that outlet onto the ground. The downspout planters also collect roof runoff and can be used for demonstration purposes. Students can be involved with planting and managing the downspout planters. The location of the downspout planters is shown in the callout map in Appendix D.

Planter Boxes/Gardens

- Centering the second outdoor classroom around the current gardening area, which is directly adjacent to the main school buildings, allows for the addition of more planter boxes. The planter boxes frame the outdoor classroom. Narrow planter boxes with built-in benches act as seating at the upper classroom.
- Native plants are preferred for their environmental benefit and can be used as in educational lessons.
- Students, faculty, and the community can collectively interact with and manage the garden areas.

Student, Faculty, and Community Involvement During Design and Implementation

- The team recommends that students, faculty, and community be involved in the design, implementation, and maintenance of GSI BMPs implemented at the school. Involvement

Appendix D – Phase I Permit - APPENDIX 12 – Structural Stormwater Controls Project List

Instructions for Appendix 12 Reporting

Each year, Phase I City and County Permittees must submit an updated list of structural stormwater control (SSC) projects to Ecology with their Annual Reports. Table 1 provides a format for this reporting. This section provides additional information and instructions for completing Table 1, as required, per Permit section S5.C.7.c.

Even though the defined level of effort is due to be tallied at the end of 2022, annual reporting of SSC Program projects provides the opportunity to track and report progress. Fill in all values as completely as possible each year. In subsequent years, Permittees should update the values for each project and add projects to new rows, as needed. You may remove projects that are cancelled or otherwise will not be used toward achieving the defined level of effort (as expressed in SSC Program Points). Projects that were completed prior to July 1, 2019, may not be included.

Enter Design and Construction of Project Types 1, 2, 3, 4, or 6 (Table 2) on separate lines. Only show the Design Status until the project is completed. Then add the new line for the Construction status.

Table 1: SSC Project List Template

Project Name	Project Type	Status	Cost Est.	Basin Area (ac)	LID Equiv. Area	LID Point Factor	RT Equiv. Area	RT Point Factor	FC Equiv. Area	FC Point Factor	Other Project Area- Ac or mi	Other Point Factor	Total SSC Program Points	Lat / Long (X,Y)	Receiving waterbody name	Comments

Project List & Project Name

Permittees shall assign each SSC project its own row. Project names may change over time. If a project name changes, include a note or parenthetical that ties the new name to the old name. Maintenance actions with a recurring event frequency over multiple years must be named uniquely for each year (e.g., Sweeping for WQ 2020).

Project Type

Ecology assigned each project type a number as described in Table 2 and this document. The project type numbers reflect the order in which they are listed in S5.C.7.a.

Status

The defined level of effort can be reflected in SSC Program Points calculated for either of two project stages: Design and Completion/Maintenance. Projects at or beyond the 60% design stage by

December 31, 2022, shall be counted toward the defined level of effort allowed for design-stage projects. The Complete/Maintenance stage is for on-line facility construction projects, fully executed property purchases, implemented maintenance actions (that are associated with Project Types #6 and #11), and completed restoration projects. A restoration project is not considered completed until any maintenance warranty times established with the construction contract have been completed, or vegetation establishment can be verified. For tracking purposes, update the status of projects for each yearly submittal.

Cost Estimate

Estimate total costs during the Design stage and provide actual costs for the Complete/Maintenance stage. Update costs over the course of the project where known.

Where known, include local/state/federal funding sources by percentage in the 'Comments' field. Once a project is complete, the comments should reflect the accurate funding source distribution. For projects still underway, you may want to include an explanatory note to distinguish between funding sources that are secured and funding sources that you estimate.

Basin Area

Enter the total area served by the structural stormwater control project (e.g., the full basin area). For stormwater facilities, this is the catchment area contributing runoff to the facility, including upstream facilities working as a system. For other project types, this is the area purchased or otherwise conserved or restored. For line cleaning projects, this is the line miles cleaned. For street sweeping projects, enter the formula variables for curb miles swept x (# events/year – 1) event.

[e.g., 20 miles x (12 -1 sweeping events)]

LID Equivalent Area and SSC Program Points

For each structural stormwater control project that you expect to result in a hydrologic benefit for small storms, use the LID Performance Standard Equivalent Area process described in the section titled 'How to Calculate Equivalent Area'. Enter the calculated LID Equivalent Area in the relevant column, then use Table 3 to identify the appropriate LID SSC Program Points.

If the project also provides benefits for standard flow control and/or runoff treatment, calculate equivalent areas and SSC Program Points for each benefit. There can be different SSC Program Points for each of the three equivalent areas. The SSC Program Points for LID, runoff treatment and flow control can be summed.

Runoff Treatment (RT) Equivalent Area and SSC Program Points

For each structural stormwater control project that you expect to result in a runoff treatment benefit (e.g., TSS, dissolved Copper, dissolved Zinc, or Total Phosphorus), calculate Runoff Treatment Equivalent Area as described in the section titled, "How to Calculate Equivalent Area." Enter the calculated RT Equivalent Area in the relevant column then use Table 3 to identify the appropriate RT SSC Program Points.

If the project also provides benefits for LID and/or standard flow control, calculate equivalent areas and SSC Program Points for each benefit. There can be different SSC Program Points for each of the three equivalent areas. The SSC Program Points for LID, runoff treatment and flow control can be summed.

Flow Control (FC) Equivalent Area and SSC Program Points

For each structural stormwater control project that you expect to result in a hydrologic benefit for larger storms, use the Flow Control Equivalent Area process described in the section titled 'How to Calculate Equivalent Area'. Enter the calculated FC Equivalent Area then use Table 3 to identify the appropriate FC SSC Program Points.

If the project also provides benefits for LID and/or runoff treatment, calculate equivalent areas and SSC Program Points for each benefit. There can be different SSC Program Points for each of the three equivalent areas. The SSC Program Points for LID, runoff treatment and flow control can be summed.

Other Program Points

For each structural stormwater control project that is not Project Type 1, 2, 3, or 4, use Table 3 to identify the appropriate SSC Program Points and populate the "Other Project Area- Ac or mi" and "Other Program Point" column with the appropriate values.

Total SSC Program Points

Refer to Table 3 and associated project details to determine the SSC Program Points for each SSC project. Insert the calculated value in the SSC Program Points column.

For Project Types 1, 2, 3 and 4 that provide benefits for LID, runoff treatment and flow control, calculate SSC Program Points for each benefit based on the appropriate Equivalent Areas and SSC Program Points. Then add the results of the three calculations together to obtain the total SSC Program Points.

Latitude/Longitude and Receiving Water Body Name

If your project has multiple locations, include a Lat/Long for each location and describe the reason why in an explanatory note. Report Lat/Long in decimal degrees to six decimal places, and include the Geographic Coordinate System (e.g., WGS84). Maintenance actions that cover a geographic area shall provide zip codes for the area addressed and attach a map at the time the SSC Program Points are calculated. If a receiving water body is unnamed, also include the name of the water body that the unnamed creek/lake is a tributary.

Comments

If your project implements an Ecology-approved basin plan (refer to Appendix 1, Section 7) or Watershed-Scale Stormwater Plan from the 2013-2018 *Phase I Municipal Stormwater Permit*, Special Condition S5.C.5.c, or a TMDL (refer to Appendix 2) or an Ecology-approved adaptive Management Plan (refer to S4F and Appendix 13), note the specific plan in this field. This section should also be used to identify if a project is located in an overburdened community.

This section can also be used to note any other information you feel is relevant, that is not addressed in other columns.

Table 4 - Table 2: Qualifying Project Types

Project Types

The allowance of a program designed to implement small-scale projects that are not planned in advance (S5.C.7.a.iv) is not considered a project type in itself. Instead, those projects are expected to be reflected in the other project type categories as applicable.

(1) New flow control facilities (S5.C.7.a.i.(a))—Flow control facilities need not be regional. These facilities do not have to meet the “standard flow control requirement” (refer to Appendix 1, Section 4.7) but they shall be new facilities designed to control stormwater flow from existing development. Project proponents that don’t follow design criteria from the SWMMWW, or equivalent manual, should be prepared to provide additional project details at Ecology’s request to support calculations for equivalent area, water quality benefits, and SSC Program Points. Qualifying projects in this category will be compared against the Flow Control Standard for SSC Program Point calculations.

(2) New runoff treatment facilities (S5.C.7.a.i.(b))—Runoff treatment facilities include facilities that provide oil control, phosphorus treatment, enhanced (dissolved metals) treatment, and basic treatment. Facilities in this category do not have to meet runoff treatment requirements (e.g., treat 91% of the average annual runoff) but they shall be new facilities that provide a treatment benefit for existing development. Project proponents that don’t follow design criteria from the SWMMWW, or equivalent manual, should be prepared to provide additional project details at Ecology’s request to support calculations for equivalent area, water quality benefits, and SSC Program Points. Maintenance activities are not classified under this project type. Qualifying projects in this category will be compared against the Runoff Treatment Standard for SSC Program Point calculations.

(3) New LID BMPs (S5.C.7.a.i.(c))—These facilities are consistent with the lists of On-Site Stormwater Management BMPs of Minimum Requirement 5 and reduce the volume of runoff by infiltrating runoff from the small, more frequent storms. Qualifying new LID BMP projects result in the reduction or prevention of hydrologic changes through use of on-site (e.g., infiltration, dispersion, evapotranspiration, rainwater harvesting) stormwater management BMPs. LID principles reflected in site design techniques do not qualify because projects that apply LID principles in a retrofit setting should be accommodated in other qualifying project types (such as property acquisition and restoration of forest cover). Qualifying projects in this category will be compared against the LID Performance Standard for SSC Program Point calculations.

(4) Retrofitting of existing treatment and/or flow control facilities (S5.C.7.a.i.(d))—Retrofitting is expected to occur on previously constructed stormwater facilities that, if modified, would provide additional hydrologic or runoff treatment benefits. For example, Ecology considers the retrofit of a stormwater pond to provide a settling area and more storage, a retrofit to a stormwater facility.

Maintenance

1. New flow control facility
2. New runoff treatment facility (or treatment and flow control facility)
3. New LID BMPs
4. Retrofit of existing treatment and/or flow control facility
5. Property acquisition
6. Maintenance with capital construction costs \geq \$25,000
7. Restoration of riparian buffer
8. Restoration of forest cover
9. Floodplain reconnection projects
10. Removal of impervious surfaces
11. Other actions to address stormwater runoff into or from the MS4 not otherwise required in S5.C.

activities such as removing sediment to re-establish wet pool volume but not increasing volume beyond the initial design are not classified under this project type.

(5) **Property acquisition for water quality and/or flow control benefits** (S5.C.7.a.i.(e))— This category excludes the purchase of property for the siting of a stormwater facility. Instead, purchase of a likely development site to permanently prevent it from being developed would qualify under this category. This category includes forest protection and conservation easements. Riparian habitat acquisition qualifies under this project type. Property used for dispersion does not qualify under this project type; it is considered a new LID BMP (Project Type 3).

(6) **Maintenance with capital construction costs \geq \$25,000** (S5.C.7.a.i.(f)) — This project type applies to repair projects that improve the hydrologic or treatment performance of stormwater facilities. This project type is directly related to Operations and Maintenance Program requirements at S5.C.10.a.ii.(c) which reflects that maintenance projects, including repairs, which require capital construction \geq \$25,000 are not subject to the required 2-year window for completing the maintenance. These projects typically compete with the other types of retrofit projects for limited capital construction funding. Ecology intends that these projects be reflected in the SSC program in order to provide a comprehensive view of MS4 maintenance activities and requirements. Permittees may develop criteria for identifying maintenance projects that reach the capital construction cost threshold on an area-wide or system-wide basis per the requirement in S5.C.7.b.ii.(g). A maintenance project that removes sediment from an existing pond to re-establish the original design volume, will qualify under this project type.

(7) **Restoration of riparian buffers** (S5.C.7.a.ii.(a)) — This project type describes planting and restoring of riparian buffers above the ordinary high watermark that can reduce the discharge of pollutants, and reduce impacts to waters of the state by protecting or restoring hydrologic capacity.

(8) **Restoration of forest cover** (S5.C.7.a.ii.(b)) — This project type describes planting and restoring of forest cover that can reduce the discharge of pollutants, and reduce impacts to waters of the state by protecting or restoring hydrologic capacity.

(9) **Floodplain reconnection projects on water bodies that are not flow control exempt per Appendix 1** (S5.C.7.a.ii.(c)) – Qualifying floodplain reconnection projects will provide flow reduction and runoff treatment benefits.

(10) **Permanent removal of impervious surfaces** (S5.C.7.a.ii.(d)) This project type describes permanent removal of impervious surfaces and replacement with pervious vegetated surfaces meeting BMP T5.13 or trees that promote infiltration, dispersion, and uptake by plants or reduce the amount of pollution generating impervious surfaces.

(11) **Other actions to address stormwater runoff into or from the MS4 not otherwise required in S5.C** (S5.C.7.a.ii.(e)) Ecology intends this category to encompass the following “enhanced maintenance” projects, not otherwise used to comply with S5.C.10.

Limitations and details of specific applications of this project type are provided below.

Street Sweeping Programs – Ecology intends street sweeping projects to qualify under the SSC program, and be counted toward the SSC minimum level of effort, only if they are designed, executed, and documented to have the following characteristics:

- Only using a high efficiency sweeper.
- Only street sweeping routes from applicable MS4 service areas can be used to support runoff treatment benefit calculations.
- The SSC Program Points for a qualifying street sweeping program is based on curb miles swept (as documented through broom use and tracking of parked cars, vegetation, and other conditions that prevent the sweeper from reaching the edge of the roadway) and frequency of sweeping. Ecology added sweeping frequency because qualifying sweeping projects service the same surfaces (e.g., repeat routes swept) more than once per year. Each year this activity qualifies it shall be reported as an individual line item (not summed over the entire tallying period). Implementing the action over a documented route counts as one event. A street sweeping event that occurs only once per year, or less frequently, does not qualify under the SSC Program.

Line Cleaning Programs - SSC Program Points are based solely on line feet cleaned during the specified time period. Line cleaning of the same section of stormwater conveyance pipe within a

5-year permit cycle does not qualify under the SSC Program. Portions of lines that were inaccessible during line cleaning cannot be included in the calculation. If line cleaning is used to comply with S5.C.10.d.i Catch Basin Inspection Alternative (c), it cannot be counted toward the SSC program.

Non-Qualifying Projects

The following projects and project characteristics DO NOT qualify:

- Projects that do not have a nexus with the current MS4 or do not prevent future MS4 impacts.
- Projects that occur within the receiving water do not qualify, such as:
 - In-channel habitat and stream restoration
 - Fish barrier removal
 - Stabilization of down cutting
 - In-stream culvert replacement
 - Mitigation projects otherwise required to compensate for problems caused by excessive stormwater runoff peak flows and geomorphologically significant flows

Wetland restoration projects may qualify if existing degraded wetlands are designed to become treatment wetlands in accordance with the SMMWW. Such a project would be a “New Treatment Facility” Project Type (Project type 2).

SSC Program Point multipliers are described in Table 3.

Table 3: SSC Program Point Multipliers

Relevant Project Type #s	Project Achievement Description	SSC Program Point Multipliers
#1 & #4	Flow Control	1.0 times Flow Control Equivalent area
#1 & #4	Flow Control in a known flow control problem area.	1.5 times Flow Control Equivalent area
#2 & #4	Runoff Treatment	1.0 times Runoff Treatment Equivalent area
#2 & #4	Runoff Treatment in a known water quality problem area	1.5 times Runoff Treatment Equivalent area
#2 & #4	Achieves Enhanced or Phosphorus Treatment	2.0 times Runoff Treatment Equivalent area
#2 & #4	Meets WQ standards for target pollutant	2.5 times Runoff Treatment Equivalent area
#3	Provides LID Performance (i.e. On-site infiltration to manage low flows)	1.5 times LID Equivalent area
#5	Property Acquisition	0.50 times acres acquired
#6 & #11	Maintenance with capital construction costs \geq \$25,000 or other maintenance actions per S5.C.7.a.ii.(e).	0.25 times the area served by the maintenance activity, or 0.25 times (curb miles swept x (# events/year-1)), or 0.025 times the linear feet of lines cleaned.
#7	Restoration of Riparian Buffer	0.35 times acres restored
#8	Restoration of Forest Cover	0.25 times acres restored
#9	Floodplain Reconnection	0.10 times acres reconnected, with a maximum of 200 points
#10	Permanent removal of impervious surfaces	1.0 times the sq. ft. of impervious surface removed

Notes:

1. Project Type #11 may involve projects that are not maintenance activities addressed in this document. For such projects, Ecology expects that the SSC Program Points can be calculated based on the project's quantified water quality benefit as assigned to Project Types 1 – 3.
2. Multiply SSC point total by 0.10 for completed capital projects related to the MS4 which implement an Ecology-approved basin plan (refer to Permit Appendix 1, Section 7) or Watershed-Scale Stormwater Plan from the 2013 *Phase I Municipal Stormwater Permit*, Special Condition S5.C.5.c, or a TMDL (refer to Appendix 2), or an Ecology-approved Adaptive Management Plan (refer to Permit's Special Condition S4F and Appendix 13). Cite the specific plan associated with the project in the 'Comments' field of Table 1.
3. Multiply SSC point total by 0.10 for completed capital projects related to the MS4 which occur in overburdened communities.
4. Use the appropriate area or length unit (acres, curb miles, linear feet) for Project types 5 through 11.

How to Calculate Equivalent Area

LID Performance Standard (MR#5) Benefit Ratio and Equivalent Area Process

1. Determine the total area (in acres) draining to the project. This is called the “full basin” in these steps.
2. Run the Western Washington Hydrology Model (WWHM), or other approved continuous simulation model, to determine if the BMP meets the LID Performance Standard for the full basin area.
 - If the project meets the LID Performance Standard, the Equivalent Area equals the area draining to the BMP.
 - If the project uses Full Dispersion functionally equivalent to BMP T 5.30 in Chapter 5 of Volume V of the *Stormwater Management Manual for Western Washington*, the Equivalent Area equals the area draining to the BMP.
3. If the project does not meet the LID Performance Standard for the full basin use the Western Washington Hydrology Model (WWHM 2012), or other approved continuous simulation model, to calculate the infiltration area of the BMP required to meet the LID Performance Standard Requirement (refer to Permit Appendix 1, Section 4.5) (e.g., match developed discharge durations to applicable pre-developed durations for the range of pre-developed discharge rates from 8% of the 2-year peak flow up to 50% of the 2-year peak flow). Identify the area available for infiltration in the new facility. This is the “required” New/Redevelopment infiltration area for a new BMP project, or the “required” area added through a project that retrofits an existing BMP.
4. Determine the infiltration area provided by the project under consideration. This is the “actual” infiltration area.
5. Divide the actual infiltration area (4) by required New/Redevelopment infiltration area (3) to get the LID Benefit ratio.
6. Multiply the LID Benefit ratio (5) by the full basin area (1) to get LID Equivalent area. The equivalent area cannot be greater than the full basin area.
7. Multiply the LID Equivalent area (6) by the appropriate SSC Program Points to calculate the Flow Control SSC Program Points for the project.

Runoff Treatment (MR#6) Benefit Ratio and Equivalent Area Process

1. Determine the total area (in acres) draining to the project. This is called the “full basin” in these steps.
2. Use an approved continuous simulation model to determine the required New/Redevelopment Runoff Treatment flow (cfs) or Volume (ac-ft) for the full basin using WWHM 2012.
3. Determine the flow rate or volume provided by the project. This is the “actual” runoff treatment flow rate or volume of a new BMP project, or the “actual” flow rate or volume added through a project that retrofits an existing BMP.

Divide the actual flow rate or volume (3) by the full basin required flow rate or volume (2) to get the Runoff Treatment Benefit ratio.

Multiply the Runoff Treatment Benefit ratio (4) by the full basin area (1) to get the MR #6 Runoff Treatment Equivalent area. The equivalent area cannot be greater than the full basin area.

4. Identify the appropriate SSC Program Points from Table 3.
5. Multiply the Runoff Treatment Equivalent area (5) by the appropriate SSC Program Points (6) to calculate the Runoff Treatment SSC Program Points for the project.

Flow Control (MR#7) Benefit Ratio and Equivalent Area Process

1. Determine the total area (in acres) draining to the project. This is called the “full basin” in these steps. This area can include basins upstream of the new pond that are upstream of other retention/detention facilities if there is a series of facilities that work together to control stormwater flows.
2. Use an approved continuous simulation model, to calculate the amount of retention/detention storage required to meet the Standard Flow Control Requirement (refer to Permit Appendix 1, Section 4.7) (e.g., match developed discharge durations to applicable pre-developed durations for the range of pre-developed discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow) for the full basin.
3. Identify the volume of retention/detention at the overflow installed for the project (ac-ft). This is the “actual” retention/detention volume of a new BMP project, or the “actual” volume added through a project that retrofits an existing BMP.
4. Divide the actual retention/detention volume (3) by the full basin required New/Redevelopment retention/detention volume (2) to get the Flow Control Benefit ratio. If the ratio is greater than 1.0, use 1.0 as your Flow Control Benefit ratio.
5. Multiply the Flow Control Benefit ratio (4) by the full basin area (1) to get the Flow Control Equivalent area. The equivalent area cannot be greater than the full basin area.
6. Identify the appropriate SSC Program Points from Table 3.
7. Multiply the Flow Control Equivalent area (5) by the appropriate SSC Program Points (6) to calculate the Flow Control SSC Program Points for the project.

The Bear Creek Watershed Management Study

King County’s Bear Creek Watershed Management Study was developed per the requirements in the 2013-2019 Phase I Permit. The Permit-defined objective of watershed-scale stormwater planning is to identify a stormwater management strategy or strategies that would result in hydrologic and water quality conditions that fully support “existing uses,” and “designated uses” throughout the stream system. While the Permit requires the development of watershed strategies, it does not require implementation of the strategies.

King County will use the Bear Creek Watershed Management Study efforts to inform the implementation of “a Stormwater Planning program to inform and assist in the development of policies and strategies as water quality management tools to protect receiving waters”.

A community engagement and planning effort to comply with this directive was undertaken by WLRD, and culminated in 2018. This effort reviewed hydrologic, development and other existing conditions of the Bear Creek basin, and provided [recommendations](https://your.kingcounty.gov/dnrp/library/2018/kcr2955.pdf) (<https://your.kingcounty.gov/dnrp/library/2018/kcr2955.pdf>) for prioritizing subbasins within the Bear Creek Basin for stormwater management, looking to maximize multi-benefit outcomes.

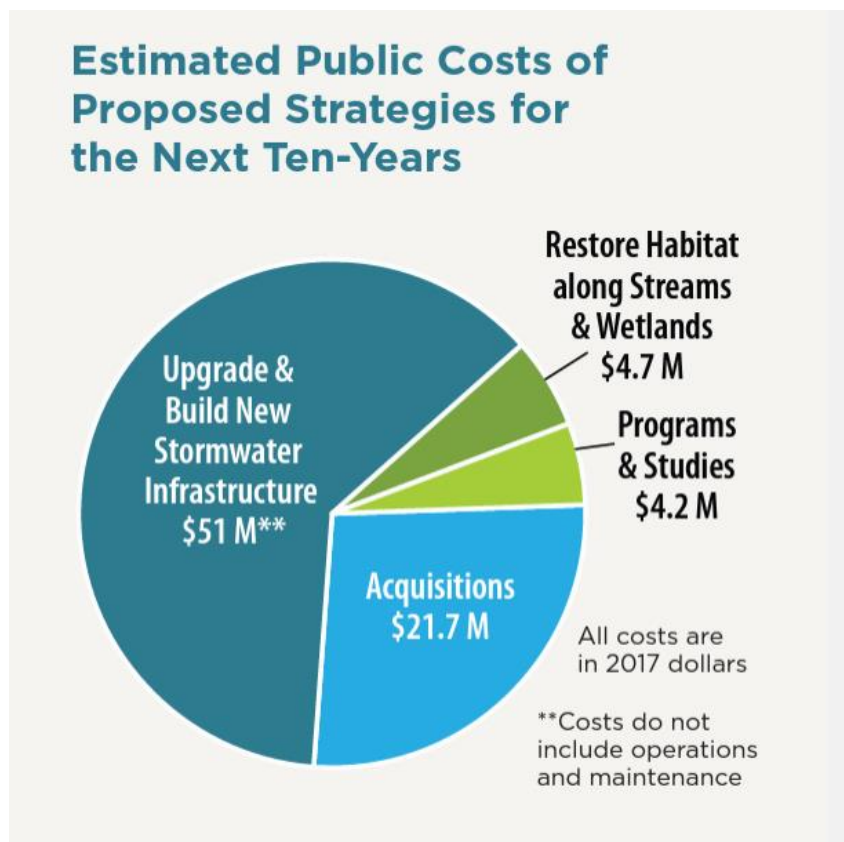
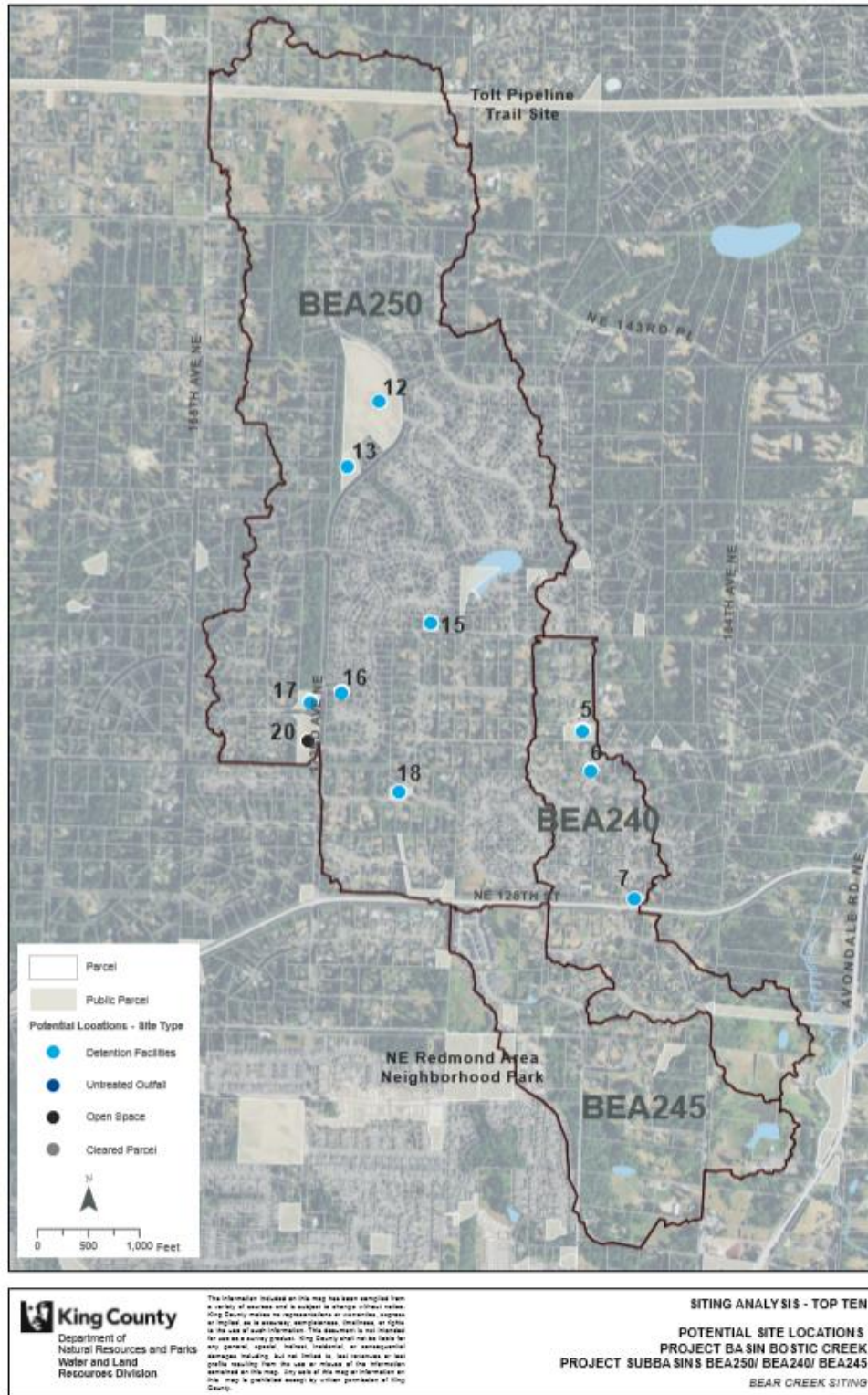


Figure 7 Estimated Public Costs - Bear Creek Basin

Bear Creek Project Siting and Prioritization – Sunrise Elementary School:

A consultant study conducted by King County’s consultant, HDR, Inc., for the Water Quality Capital Program identified and prioritized potential Stormwater Infrastructure Project sites within subbasins targeted by the Bear Creek Watershed Management Study. This effort identified Sunrise Elementary School as a potential Project site.



CSU – Seattle University Sponsorship Project: County staff worked with Seattle University College of Science and Engineering students to engage the Sunrise Elementary School community to learn about Green Stormwater Infrastructure (GSI) and develop a conceptual design of potential projects for the elementary school. The project developed an ‘a la carte menu’ of potential GSI retrofits for the school, ranging from relatively small projects such as cisterns, medium scale projects like a community-sized rain garden & outdoor classroom, to projects as large in scope as a regional stormwater detention vault

beneath the school's play field. This project earned the 2022 National Council of Examiners for Engineering and Surveying (NCEES) Engineering Education Award.



Sunrise Elementary School Green Stormwater Infrastructure Retrofit: This retrofit project was first conceptualized by the CSU-Seattle University Sponsorship Project mentioned above. It is supported by the King County RainWise program, which helps property owners install rain gardens and cisterns to help manage the rain that falls on roofs. This project is supported by RainWise to continue to work with the Sunrise Elementary School to Co-Design and implement modular Stormwater Best Management Practices (BMPs) such as Cisterns and downspout planters. This project was awarded \$100,000 in [2022 Subregional Opportunity Funds](#) by King County's Flood Control District in November 2021 and is preparing to design during the 2022 – 23 school year with the intent of summer 2023 implementation.

