



Watershed Management Toolbox Summary

prepared in support of the City of Bellevue Watershed Management Plan

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Bellevue Utilities Department

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Prepared with the Support of:

Jacobs Engineering Inc.

1100 112th Avenue NE, Suite 500
Bellevue, Washington 98004-5118
United States
T +1.425.453.5000
www.jacobs.com

The logo for Jacobs Engineering Inc., consisting of the word "Jacobs" in a bold, black, sans-serif font.

Herrera Environmental Consultants, Inc.

2200 6th Avenue, Suite 1100
Seattle, WA 98121
United States
T +1.206.441.9080
www.herrerain.com



Watershed Management Toolbox Summary

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Executive Summary

City of Bellevue Watershed Management Plan

Urban development in the lowland regions of the Puget Sound over the past 150 years has resulted in the conversion of forested land to residential, industrial, and commercial uses. This conversion has dramatically impacted the health of the region's streams, lakes, and marine water bodies. Common symptoms of surface water degradation from urbanization include poor water quality, loss of riparian and aquatic habitat, and stream channel erosion. In combination, these impacts have resulted in widespread disruption in the ecological function of water bodies causing sensitive aquatic life to decline in abundance or disappear completely. To address this problem, state and local jurisdictions are making a concerted effort to rehabilitate these water bodies through coordinated planning efforts that direct new storm and surface water management practices to existing urban development with inadequate controls.

Commensurate with these regional efforts, the City of Bellevue (City) is committed to improving and protecting the aquatic health of water bodies within its boundaries. To that end, the City is developing a Watershed Management Plan (WMP) that will focus on improving the health and condition of the City's streams using a toolbox of holistic storm and surface water management practices. The WMP will direct investments to high-priority watersheds providing measurable environmental benefits to stream health within a shorter time frame compared to past or current approaches. The WMP will also help prevent further degradation in non-priority watersheds. The WMP will include an implementation plan with recommended projects, policies, programs, and maintenance practices to meet performance goals for Bellevue's streams, and to provide multiple benefits that help advance City objectives across departments and programs.

Purpose of this Watershed Management Toolbox

This Watershed Management Toolbox was prepared to identify and document the different tools (or strategies) that could address the stressors that are responsible for a decline in stream health. The value of outlining these different tools in one place is for ease in selecting the most appropriate and cost-effective tool to address specific issues identified in the City's watersheds. This Watershed Management Toolbox has been developed for this purpose. If, for example, the user of the toolbox is looking for a tool to mitigate the effects of pollutant transport to surface waters, the toolbox allows for filtering by that stressor. The toolbox can be filtered or sorted in multiple ways to meet the need of the user.

Contents of this Watershed Management Toolbox

This Watershed Management Toolbox is a database of individual 'tools' that can be used by the City to address watershed health. This Watershed Management Toolbox includes various types of tools grouped into categories: capital projects, non-structural 'programmatic' investments, planning/data collection efforts, maintenance practices, and City internal policies and external regulatory requirements (for development or other actions conducted that fall under City codes and other regulations). The toolbox contains a short name and description for each tool, outlines the applicability of each tool to individual stream health stressor, and describes the feasibility, benefit, and cost of each tool. The Watershed Management Toolbox does not have every activity and action required by the City's NPDES MS4 permit, as those activities are outlined elsewhere.

Approach to Develop this Watershed Management Toolbox

The first step in developing this Watershed Management Toolbox was to identify individual tools. To identify tools, Jacobs and Herrera reviewed the requirements of the City's current *Western Washington Phase II Municipal Stormwater Permit* (Permit), issued by the Department of Ecology (Ecology). This Permit requires the City to have in place certain Ecology-approved maintenance standards as well as regulations to control stormwater runoff from development to protect wetlands and other surface waters. Next, tools currently in use by City staff from all departments as well tools used by others outside of the City to improve watershed health, were assessed. From there, Jacobs and Herrera, after categorizing each tool as mentioned above, characterized each tool in terms of applicability, feasibility, benefits, and cost. City of Bellevue reviewed this toolbox during development to provide feedback. Once feedback was incorporated, Jacobs and Herrera updated the toolbox to reflect City comments.

Next Steps for this Watershed Management Toolbox

As part of WMP development, the City will use this Watershed Management Toolbox to develop potential 'early action' projects, aimed at addressing stream health issues sooner. The Watershed Management Toolbox will then be used during development of Watershed Improvement Plans (WIPs) that will list and describe each of the solutions recommended for watershed improvement with associated costs and a schedule for implementation. In addition to its use during WMP development, the City may find the toolbox helpful in workload and/or budget planning as a means to characterize all the individual actions taken by the City to address stream health.

The City prepared this Watershed Management Toolbox with a grant from King County Department of Natural Resources and Parks Wastewater Treatment Division (WTD). While the Watershed Management Toolbox was developed with Bellevue in mind, the identified tools have broad applicability beyond the City of Bellevue's boundaries. Therefore, King County WTD may wish to distribute this toolbox to other entities.

1. Introduction and Purpose of this Watershed Management Toolbox

Urban development in the lowland regions of the Puget Sound over the past 150 years has resulted in the conversion of forested land to residential, industrial, and commercial uses. This conversion has dramatically impacted the health of the region's streams, lakes, and marine water bodies. Common symptoms of surface water degradation from urbanization include poor water quality, loss of riparian and aquatic habitat, and stream channel erosion. In combination, these impacts have resulted in widespread disruption in the ecological function of water bodies causing sensitive aquatic life to decline in abundance or disappear completely. To address this problem, state and local jurisdictions are making a concerted effort to rehabilitate these water bodies through coordinated planning efforts that direct new storm and surface water management practices to existing urban development with inadequate controls.

Commensurate with these regional efforts, the City of Bellevue (City) is committed to improving and protecting the aquatic health of water bodies within its boundaries. To that end, the City is developing a Watershed Management Plan (WMP) that will focus on improving the health and condition of the City's streams using a toolbox of holistic storm and surface water management practices. The WMP will direct investments to high-priority watersheds providing measurable environmental benefits to stream health within a shorter time frame compared to past or current approaches. The WMP will also help prevent further degradation in non-priority watersheds. The WMP will include an implementation plan with recommended projects, policies, programs, and maintenance practices to meet performance goals for Bellevue's streams, and to provide multiple benefits that help advance City objectives across departments and programs.

The City is developing the WMP using a stepwise process that builds on information obtained from each preceding step to ensure the final plan is comprehensive, makes the most use of new and existing data and information, and reflects the community's values and goals. One such step is the preparation of this Watershed Management Toolbox. This Watershed Management Toolbox was prepared to identify and document the different tools (or strategies) that could address the stressors that are responsible for a decline in stream health. As this report describes, the Watershed Management Toolbox includes various types of tools including capital projects, non-structural 'programmatic' investments (including planning/data collection efforts), maintenance practices, and City policies and regulatory requirements.

The value of outlining these different tools in one place is for ease in selecting the most appropriate and cost-effective tool to address specific issues identified in the City's watersheds. This Watershed Management Toolbox has been developed for this purpose

This Watershed Management Toolbox will also be used to develop 'early action' projects; those projects that can be placed in the delivery pipeline prior to completion of the Watershed Management Plan. The Watershed Management Toolbox will primarily be used during development of the Watershed Improvement Plans (WIPs) that will list and describe each of the solutions recommended to mitigate the stressors for watershed improvement with associated costs and a schedule for implementation. The Watershed Management Plan will be a series of projects, polices, programs, and maintenance practices prioritized from the WIPs.

2. Contents of this Watershed Management Toolbox

This Watershed Management Toolbox is a database of individual tools (such as an activity, action, or project) that could be used to address watershed health. In identifying individual tools, Jacobs and Herrera identified tools that could be used specifically by the City (or other municipal entity) to impact watershed health. Only those tools that fall into the City's mission were included in the toolbox. Appendix A shows all the detail contained within the Watershed Management Toolbox. The toolbox is available an Excel spreadsheet for ease of use. Note

that the Watershed Management Toolbox does not contain all the different activities required by the City's NPDES MS4 permit, as those activities are summarized elsewhere.

2.1 Applicability of Tools to Address Stressors on Stream Health

The City developed a conceptual model (Figure 1) that describes the primary effects of urban runoff on stream health. The model shows the linkages between specific sources of stress (stressors) on stream health and the consequences, impacts, and outcomes that collectively contribute to degraded stream health. As part of the City's WMP, the conceptual model is currently being used to identify and characterize the specific limiting factors (stressors) that are responsible for impaired stream health for each of the City's watersheds. For each watershed, factors limiting the health of streams will be identified and prioritized for their relative importance in determining the existing health of the watershed.

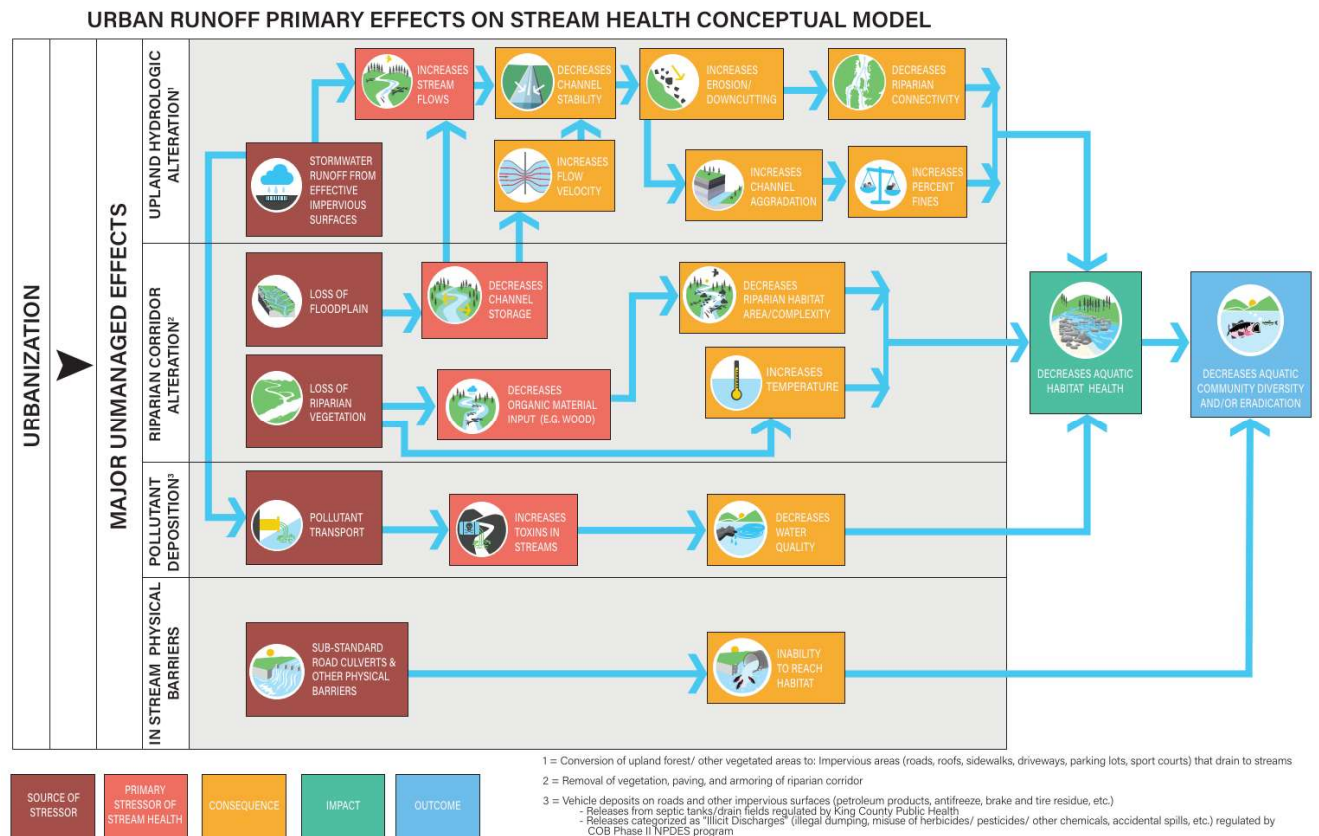


Figure 1. Conceptual Model Describing the Primary Effects of Urban Runoff on Stream Health

To aid in determining which tool or tools would be most applicable in a particular situation, Jacobs and Herrera assessed the applicability of each capital and maintenance tool to each of the five primary 'stressors' in the conceptual model (shown in brown on Figure 1): runoff from effective impervious surfaces, loss of floodplain connectivity, loss of riparian vegetation, pollutant transport, and physical barriers. Each capital and maintenance tool in the Watershed Management Toolbox has an attribute on which of specific primary stressor(s) it can mitigate.

The programmatic, policy, and regulatory requirement tools vary in their ability to directly mitigate the stressors in the conceptual model. For those tools that do, they were assigned an attribute on which of specific primary stressor(s) it can mitigate. Other tools in these categories support or enable the capital, and maintenance tools and are not directly attributed to a specific model stressor.

If, for example, the user of the toolbox is looking for a tool to mitigate the effects of pollutant transport to surface waters, the toolbox allows for filtering by that stressor. The toolbox can be filtered or sorted in multiple ways to meet the need of the user

2.2 Tool Characterization

In the Toolbox, each tool is identified by a short name and a long description. Each tool has been grouped into one or more of the categories listed in Table 1. The benefit of grouping these tools is for ease in tool selection in future steps of WMP development.

Table 1. Types of ‘Tools’ in the Watershed Management Toolbox

Type	Description	Example(s)
Capital	Structural investments	Stormwater flow control facility; water quality treatment retrofit
Programmatic	Non-structural investments/ Actions to inform decision-making about other tools	Education, inspections, Storm and surface water management plan; Open Stream Condition Assessment (OSCA), monitoring plans
Maintenance Practice	Activities to maintain storm and surface water system	Catch basin cleaning or targeted street sweeping
City Internal Policy	New or change in City policy guiding the internal operations of various Departments	How the City assists property owners with streams on private property
City Requirement	Applies to development within the City or other actions that trigger City Codes and other regulations	Change in City code affecting residents/developers

Each tool also includes the following attributes:

- Has the tool been used (or is being used) by the City or within the City by others?
- Which tools can be implemented within the mission of which City Department(s) now or in the future (Applicable Department - Utilities, Parks, Transportation, Development Services, and/or Community Development)?
- A characterization of each tool's typical application (public property, private property, or either), and
- Typical scale (site-specific, neighborhood scale, or city-wide).

Other attributes of the tools to help select them for use are describes in the following sections.

2.3 Tool Feasibility Characterization

The Watershed Management Toolbox contains attributes on the feasibility of each tool according to:

- Degree of Potential Public Acceptance (based on past experience)
- For Capital projects only
 - If infiltration potential is needed for the tool to be successful (yes, no) (infiltration potential is the characterization of how much water (as precipitation) can seep into the ground, as opposed to running off as stormwater)
 - Requirements for physical space (small, medium, large)
 - Degree of Engineering design required (low, medium, high)
 - Whether the tool is best suited to be used in the upland areas or in the instream/riparian areas.

These feasibility attributes were assigned based on the Consultant's and the City's experience with implementing these tools.

Understanding these aspects of feasibility will help the City determine the applicability of tools to specific locations.

2.4 Tool Benefits / Impacts

The Watershed Management Toolbox contains attributes of the following benefits/impacts:

- Potential for Community Benefits (ex: green space, passive recreation)
- Is it grey (conventional) infrastructure, or is it considered green infrastructure?
- Potential impacts during construction (high degree, medium degree, low degree, neutral)
- Potential to address (or help address) equity or environmental and/or social justice issues? (yes, no)
- Addresses (or helps address) current or potential future regulatory requirements on the City of Bellevue? (yes, no)
- Types of Watershed Benefits Provided (flow, habitat, and/or water quality?)
- If flow benefits provided, how much? (low, medium, high)
- If water quality benefits provided, how much? (low, medium, high)
- Degree of maintenance requirements? (low, medium, high)

Understanding these impacts/benefits will help the City determine the applicability of tools to specific locations. This preliminary characterization of impact/benefit would be updated based on site-specific considerations as tools are considered for implementation. The assignment of value to these benefit/impact attributes is based on the Consultant's experience with implementing these tools.

2.5 Tool Costs

Lastly, the Watershed Management Toolbox contains an attribute of relative cost (low, medium, high), including consideration of maintenance requirements, capital costs, programmatic costs, etc. This relative assessment of cost would then be revised based on site-specific considerations as tools are considered for implementation.

3. Approach to Develop this Watershed Management Toolbox

The first step in developing this Watershed Management Toolbox was to identify individual tools. To identify tools, Jacobs and Herrera reviewed the requirements of the City's current *Western Washington Phase II Municipal Stormwater Permit* (Permit), issued by the Department of Ecology (Ecology). This Permit requires the City to have

in place certain Ecology-approved maintenance standards as well as regulations to control stormwater runoff from development in order to protect wetlands and other surface waters. Next, tools currently in use by City staff from all departments (includes Utilities, Parks, and Transportation) were assessed. Finally, a review of tools used by others to improve watershed health were included from various literature reviews.

Once tools were identified, Jacobs and Herrera proposed bundling of these tools into categories: capital, program, planning (plans, data collection/monitoring), maintenance practice, City internal policy, or City requirement (ex: code), as described in the previous section.

After identifying individual tools and bundling the tools into categories, Jacobs and Herrera characterized each tool in each of the fields described in the previous section. To assist with later application of the Watershed Management Toolbox, feasibility, benefits, and costs, were characterized. Each of these fields are based on a relative comparison such as low, medium, and high, rather than by a numeric measure.

4. Next Steps for this Watershed Management Toolbox

As a next step in toolbox refinement, Jacobs and Herrera will update the Watershed Management Toolbox to reflect City experience with and preference for each of the tools identified. The benefit of taking this step is to document City preferences for future use. These preferences will be relative, based on a scale such as negative, neutral, and positive. As part of this preferences characterization, Jacobs and Herrera will also coordinate with City staff from different Departments in addition to Utilities. Jacobs and Herrera will also identify potential partnership opportunities (either within or outside of the City) for implementation of these various tools.

As part of the WMP development process, the City will use this Watershed Management Toolbox to develop potential 'early action' projects, aimed at addressing stream health issues prior to completion of WMP. Individual 'tools' can be applied to specific opportunities identified in the Watershed Assessment Reports or by other means.

The Watershed Management Toolbox will then be used during development of the Watershed Improvement Plans to develop and refine actions to improve stream health in the City's watersheds. Once limiting factors have been identified in the Watershed Assessment Reports, tools can be identified that specifically address those limiting factors, which are organized by elements of the conceptual model.

The internal policies and City code requirements listed in this Toolbox will be used to guide a review of current policies and code requirements. If there are new or modified internal policies and code requirements that are necessary to address watershed health limiting factors as described in the WIPs, these will be recommended in the WMP.

Also, if there are tools that need to be used to address limiting factors that are not being used now, a check will be performed to see if internal policies or current regulatory requires "allow" for the use of this tool. If not, a new policy/regulation will be proposed.

In addition to its use during WMP development, the City may find the toolbox helpful in workload and/or budget planning as a means to characterize all the individual actions taken by the City to address stream health.

The City of Bellevue prepared this Watershed Management Toolbox with a grant from King County Department of Natural Resources and Parks Wastewater Treatment Division (WTD). While the Watershed Management Toolbox was developed with Bellevue in mind, the identified tools have broad applicability beyond the City of Bellevue's boundaries. Therefore, King County WTD may wish to distribute this toolbox to other entities.

Appendix A

Toolbox Content and Details

TYPES/CATEGORIES OF TOOLS:

Type	Description	Example
Capital	Structural investments/Capital Projects	Stormwater flow control facility
Programmatic	Non-structural investments, including things you are doing to inform decision-making about other tools (ex: Planning, data collection, monitoring)	Education or inspections; storm and surface water management plan; Monitoring
Maintenance	Activities to maintain storm and surface water system	Catch basin cleaning
COB internal policy	Internal COB departmental policies	How city approaches streams on private property
COB regulatory requirements	COB's own regulations that apply to project in the City	Stormwater regulations on new/redevelopment

CAPITAL TOOLS: Tool is applicable to which stressor(s) (as identified in the conceptual model?) (Y/N)					Tool Characterization					For Capital Only		feasibility characterization					benefits / impacts							Cost	
Stormwater runoff from effective impervious surfaces	Pollutant transport	Loss of floodplain	Loss of riparian vegetation	Physical barriers	Short Name	Description and Notes	Is the COB already using this tool for watershed/stormwater? (if yes, state minimal, moderate, or extensive use)	Applicable COB Department (Utilities, Parks, Transportation, Community Development)	Typical Application (public property, private property, or both)	If capital project, Scale (site-specific, neighborhood scale, city-wide)	In-Stream/Riparian OR Upland	Requires a setting where infiltration is feasible to be successful	Requirements for Additional Physical Space (small, med, large)	Degree of Engineering Design Required (low, medium, high)	Degree of Potential Public Acceptance Post-Construction (desired, neutral, resistant)	Potential for Community Benefits (ex: green space, passive recreation) (Low, Medium, High)	Grey vs Green	potential impacts during construction (high degree, medium degree, low degree, neutral)	Potential to address (or help address) racial equity, environmental and/or social justice issues?	Addresses (or helps address) current or potential future regulatory requirement on the COB (yes, no, maybe)	Benefit (for flow) (none, low, medium, high)	Benefit (for water quality) (none, low, medium, high)	Benefit (for Habitat) (none, low, medium, high)	maintenance requirements (low, medium, high)	Relative Cost (L, M, H)
No	Yes	No	No	No	Filter system (high rate underground filter system)	An underground stormwater treatment device comprised of one or more structures that house rechargeable, media-filled cartridges that trap particulates and adsorb pollutants from stormwater runoff. These devices are often used in highly urbanized settings and may be proprietary. Provides water quality treatment.	yes - moderate	utilities	public	site-specific	Upland	no	medium	medium	neutral	low	grey	medium	no	possibly - retrofit	none	high	none	medium	medium
No	Yes	No	No	No	Media filter drain	A linear flow-through stormwater treatment device that can be sited along roadway side slopes (conventional design) and medians (dual MFD), borrow ditches, or other linear depressions. Cut-slope applications may also be considered. MFDs have four basic components: a gravel no-vegetation zone, a vegetated filter strip, the MFD mix bed, and an optional gravel-filled underdrain trench or layer of crushed surfacing base course. Treated water is either infiltrated into the underlying soil or collected by an underdrain and discharged to the drainage system. Provides volume and peak flow reduction and water quality treatment.	yes - moderate	utilities	public	site-specific	Upland	no	medium	medium	neutral	low	grey	medium	no	possibly - retrofit	none	medium	none	medium	medium
No	Yes	No	No	No	Vegetated media filtration (regional scale)	A large-scale vegetated media filtration facility designed to treat stormwater runoff from a large drainage area. Provides water quality treatment.	no	utilities	public	neighborhood scale	Upland	no	large	high	neutral	high	green	high	yes - aesthetics/green space benefit	possibly - retrofit	none	high	medium	high	high
No	Yes	No	No	No	Hyporheic zone enhancement	may include bioengineering of subsurface proximate to streams to promote hyporheic flow and connectivity	no	utilities, parks	both	site-specific		no	medium	high	desired (could be resistant, depending on location)	medium	green	medium	yes - green space, reducing ambient temps	possibly - retrofit	none	medium	low	medium	medium
No	Yes	No	No	No	Treatment wetland	Similar to a wet pond but also provides a shallow marsh area to allow the establishment of emergent wetland aquatic plants, which can improve pollutant removal through biological processes. Provides water quality treatment and peak flow reduction. Includes all types of constructed wetlands.	no	utilities	public	site-specific		no	large	high	desired (could be resistant, depending on location)	high	green	high	yes - green space, reducing ambient temps	possibly - retrofit	none	medium	medium	medium	high
No	yes	Yes	Yes	Yes	Stream daylighting	daylighting of stream	yes - moderate	utilities, parks	public	site-specific	Instream/Riparian	no	large	high	desired	high	green	high	yes - aesthetics, also indigenous peoples/salmon	possibly - in-stream req. like mitigation	none	none	high	low	high
No	Yes	No	No	Yes	Stream channel bank stabilization	stabilizing stream bank to reduce erosion	yes - moderate	utilities, parks	both	site-specific	Instream/Riparian	no	medium	high	desired	high	green	medium	yes - aesthetics, also indigenous peoples/salmon	possibly - in-stream req. like mitigation	none	none	medium	low	medium
No	No	Yes	Yes	Yes	Riparian enhancement	may include removal or control of aquatic and riparian invasive species that inhibits natural channel/sediment process and natural recruitment of native riparian species (though controlling invasive is listed as separate tool)	yes - moderate	utilities, parks	both	neighborhood scale	Instream/Riparian	no	large	medium	desired	high	green	medium	yes - aesthetics, also indigenous peoples/salmon	possibly - in-stream req. like mitigation	none	none	high	low	low
No	No	Yes	Yes	No	Riparian vegetation planting	Planting of specialized, native vegetation in riparian areas along streams and waterbodies. Typically associated with habitat restoration efforts but can provide water quality benefits as a vegetative buffer.	yes - moderate	utilities	both	neighborhood scale	Instream/Riparian	no	medium	low	desired	high	green	low	yes - aesthetics, also indigenous peoples/salmon	possibly - in-stream req. like mitigation	none	none	medium	low	low
No	No	Yes	No	Yes	Channel hard armoring removal	removal of artificial armoring	yes - minimal	utilities	both	site-specific	Instream/Riparian	no	medium	high	resistant	medium	green	medium	yes - aesthetics, also indigenous peoples/salmon	possibly - in-stream req. like mitigation	none	none	high	low	medium
No	No	No	No	Yes	Fish passage improvement project	Remove barriers and artificial impediments to fish passage (often culverts, weirs, or fishways), replacing with bridge or daylighting stream channel and restoring instream and riparian habitat.	yes - moderate	utilities	public	site-specific	Instream/Riparian	no	medium	high	desired	medium	grey	high	yes - aesthetics, also indigenous peoples/salmon	possibly - in-stream req. like mitigation	none	none	high	low	high
Yes	Yes	Yes	Yes	No	Floodplain re-connection	Benefits flood, sediment and nutrient storage as well as LWD, sediment recruitment for the stream. constraints to channel migration (ex. armoring, etc.) to allow for floodplain reconnection (might require land acquisition or other repurposing city-owned property?) design may include creation/restoration of the hyporheic zone. Benefits flood, sediment and nutrient storage as well as LWD, sediment recruitment for the stream. design may include creation/restoration of the hyporheic zone (though hyporheic zone improvements are listed as separate tool)	yes - minimal	utilities, parks	public	neighborhood scale		no	large	high	desired	high	green	medium	yes - aesthetics, also indigenous peoples/salmon	possibly - in-stream req. like mitigation	none	none	high	low	medium
No	Yes	No	No	Yes	Stream channel improvements (bioengineering)	may include fish habitat structures such as constructed log jams, spawning riffles, side channels and off-channel habitat. Includes channel roughening. Will benefit instream and overwater cover.	yes - moderate	utilities, parks	both	site-specific		no	medium	high	desired	high	green	medium	yes - aesthetics, also indigenous peoples/salmon	possibly - in-stream req. like mitigation	none	none	high	low	medium
Yes	No	Yes	Yes	No	Tree planting	Planting or retaining trees. Provides flow control via interception, transpiration, and increased infiltration. Additional environmental benefits include improved air quality, carbon sequestration, reduced heat island effect, pollutant removal, and habitat preservation or formation. Benefits vary based on tree species (SWMWAYS).	yes - moderate	utilities	both	neighborhood scale	Instream/Riparian and Upland	no	medium	low	desired (could be resistant, depending on location)	high	green	low	yes - green space, reducing ambient temps	possibly - retrofit	medium	low	medium	low	low
Yes	Yes	No	No	No	Bioretention	Shallow earthen depressions with a designed soil mix and plants adapted to the local climate and soil moisture conditions. Stormwater is stored as surface ponding before it filters through the underlying bioretention soil. Stormwater that exceeds the surface storage capacity overflows to an adjacent drainage system. Treated water is infiltrated into the underlying soil or, in soils with lower infiltration rates, collected by an underdrain and discharged to the drainage system. Provides volume and peak flow reduction and water quality treatment.	yes - moderate	utilities	both	site-specific	Upland	no	medium	medium	desired (could be resistant, depending on location)	medium	green	medium	yes - aesthetics/green space benefit	possibly - retrofit	medium	medium	low	medium	medium
Yes	Yes	No	No	No	Bioretention Planter	Similar to bioretention, includes a designed soil mix and a variety of plant material including trees, shrubs, grasses, and/or other herbaceous plants; however varies from bioretention in that the sides are vertically contained by walls constructed from formed concrete. These designs are often used in highly-urbanized settings. Provides water quality treatment and peak flow reduction.	yes - moderate	utilities	both	site-specific	Upland	no	medium	medium	desired (could be resistant, depending on location)	medium	green	low	yes - aesthetics/green space benefit	possibly - retrofit	medium	medium	low	medium	medium
Yes	Yes	No	No	No	Bioswale	An open, gently sloped, vegetated channel designed for treatment of stormwater. Grass is most common vegetation, but wetland vegetation can be used if soil is saturated. Provides water quality treatment, peak flow reduction, and conveyance. These are designed to "filter" water as it is conveyed through a vegetated swale. While this BMP may provide incidental infiltration, that is not the primary treatment mechanism.	yes - moderate	utilities	both	site-specific	Upland	no - can do underdrain	medium	medium	desired (could be resistant, depending on location)	medium	green	medium	yes - aesthetics/green space benefit	possibly - retrofit	medium	high	low	high	medium
Yes	Yes	No	No	No	Rain garden	A shallow, landscaped depression with adapted plants, visually similar to bioretention but with compost-amended native soils and no underdrain. The depression is designed to pond and temporarily store stormwater runoff from adjacent areas and to allow stormwater to pass through the amended soil profile. Provides volume and peak flow reduction and water quality treatment.	yes - moderate	utilities	both	site-specific	Upland	yes - shallow infiltration	small	low	desired (could be resistant, depending on location)	medium	green	low	yes - aesthetics/green space benefit	possibly - retrofit	medium	medium	low	medium	medium
Yes	Yes	No	No	No	Depaving	Depaving, or removal of impervious surfaces down to bare soil. The area is amended with soil and planted with low lying ground cover. Provides volume and peak flow reduction.	yes - minimal	utilities	public	neighborhood scale	Upland	no	medium	medium	desired (could be resistant, depending on location)	medium	green	medium	yes - aesthetics/green space benefit	possibly - retrofit	medium	none	none	low	medium
Yes	Yes	No	No	No	Detention - vault	A box-shaped underground facility that provides temporary storage of stormwater runoff. The stored stormwater runoff is then released through a control structure at an attenuated rate. Provides peak flow reduction.	yes - moderate	utilities	both	site-specific	Upland	no	medium	medium	neutral	low	grey	medium	no	possibly - retrofit	medium	none	none	medium	medium
Yes	Yes	No	No	No	Drywell	A gravel filled hole that conveys stormwater runoff into the soil matrix. Provides volume and peak flow reduction.	yes - minimal	utilities	public	site-specific	Upland	yes - shallow infiltration	small	low	neutral	low	green	low	no	possibly - retrofit	medium	none	none	medium	medium
Yes	Yes	No	No	No	Green roof (called "vegetated roof" in the Bellevue 2010 Maint. Standards)	A vegetated rooftop installation constructed of thin layers of engineered soil and designed to manage rainwater that falls upon the roof. May be installed upon conventional, flat, or sloped roofs. Provides volume reduction and flow attenuation.	yes - minimal	utilities	both	site-specific	Upland	no	large	high	desired	high	green	neutral (new construction)	yes - aesthetics/green space benefit	possibly - retrofit	medium	none	low	medium	high
Yes	Yes	No	No	No	Infiltration - vault	An open bottomed, box-shaped underground facility that stores stormwater runoff similar to detention vaults, but also provides infiltration via an open bottom. Provides volume reduction and peak flow reduction.	yes - moderate	utilities	public	site-specific	Upland	yes - shallow infiltration	medium	medium	neutral	low	grey	medium	no	possibly - retrofit	medium	none	none	medium	medium
Yes	Yes	No	No	No	Permeable pavement	Includes pervious concrete, porous asphalt, permeable pavers or other forms of pervious or porous paving material. Intended to allow passage of water through pavement. Provides volume and peak flow reduction. Provides water quality treatment when sand treatment layer is provided.	yes - moderate	utilities	public	site-specific	Upland	yes - shallow infiltration	medium	high	desired (could be resistant, depending on location)	low	green	medium	no	possibly - retrofit	medium	none	none	medium	medium
Yes	Yes	No	No	No	Wet vault	An underground structure similar to a detention vault, except that a wet vault has a permanent pool of water that dissipates energy and improves the settling of particulate pollutants. Provides water quality treatment and peak flow reduction.	no	utilities	public	site-specific	Upland	no	medium	medium	neutral	low	grey	medium	no	possibly - retrofit	medium	none	none	medium	medium
Yes	Yes	No	No	No	Smart Stormwater Control System (ex. Opt)	adaptive control technology used to manage stormwater in real-time	no	utilities	both	site-specific	Upland	no	medium	medium	neutral	low	grey	medium	no	possibly - retrofit	medium	none	none	medium	medium
Yes	Yes	No	No	No	Soil cells	intended to improve infiltration and soil volume, which leads to improved habitat and stormwater management	no	utilities, parks	both	site-specific	Upland	no	small	low	desired	medium	green	medium	no	possibly - retrofit	medium	none	low	medium	low
Yes	No	No	No	No	Blue roof	Rainwater is temporarily detained on a flat or mildly sloped roof surface using rooftop check dams or roof drain restrictors. Discharge from the roof is controlled by orifices and directed to the building's storm drains, scuppers, or downspouts. Provides temporary storage and peak flow reduction.	no	utilities	private	site-specific	Upland	no	large	high	desired	high	green	neutral (new construction)	yes - aesthetics/green space benefit	possibly - retrofit	medium	none	low	medium	high
Yes	No	No	No	No	Cistern	A tank designed to provide temporary storage and slow release of rooftop stormwater runoff. Provides peak flow reduction.	no	utilities	private	site-specific	Upland	no	small	low	neutral	low	grey	low	no	possibly - retrofit	medium	none	none	medium	medium
Yes	No	No	No	No	Underground Injection Control (UIC) well	A well that extends below an upper confining layer and discharges into the underlying vadose zone. This includes drywells where drilling extends through a surficial till layer into the vadose zone below. Provides volume and peak flow reduction. Regulations require stormwater to be treated prior to infiltration via a UIC.	yes - moderate	utilities	public	site-specific	Upland	yes - deep infiltration	medium	high	neutral	low	grey	medium	no	possibly - retrofit	medium	none	none	medium	medium
Yes	Yes	No	No	No	Wet pond	A constructed stormwater pond that retains a permanent pool of water ("wet pool"), at least during the wet season, for settling of particulate pollutants. Provides water quality treatment and peak flow reduction.	no	utilities	public	site-specific	Upland	no	large	medium	neutral	medium	grey	high	yes - aesthetics/green space benefit	possibly - retrofit	high	medium	medium	medium	medium
Yes	Yes	No	No	No	Detention - pond	A surface basin that provides temporary storage of stormwater runoff. The stored stormwater runoff is then released through a control structure at an attenuated rate, allowing the basin to dry out between storm events. Provides peak flow reduction.	yes - extensive	utilities	both	site-specific	Upland	no	large	medium	neutral	medium	grey	medium	yes - aesthetics/green space benefit	possibly - retrofit	high	none	low	high	high
Yes	Yes	No	No	No	Infiltration - pond	A surface basin that temporarily stores stormwater runoff similar to a detention pond, but also provides infiltration. Provides volume and peak flow reduction.	yes - moderate	utilities	public	site-specific	Upland	yes - shallow infiltration	large	medium	neutral	medium	grey	medium	yes - aesthetics/green space benefit	possibly - retrofit	high	none	low	high	high

PROGRAMMATIC TOOLS: Tool is applicable to which stressor(s) (as identified in the conceptual model?) (Y/N)					Short Name	Description and Notes	Is the COB already using this tool for watersheds/stormwater? (if Yes, state minimal, moderate, or extensive use)	Applicable COB Department (Utilities, Parks, Transportation, Community Development)	Typical Application (public property, private property, or both)	If capital project, scale (site-specific, neighborhood scale, city-wide)	Requires a setting where infiltration is feasible to be successful	Requirements for Additional Physical Space (small, med, large)	Degree of Engineering Design Required (low, medium, high)	Degree of Potential Public Acceptance Post-Construction (desired, neutral, resistant)	Potential for Community Benefits (green space, passive recreation) (Low, Medium, High)	Grey vs Green	potential impacts during construction (high degree, medium degree, low degree, neutral)	Potential to address (or help address) racial equity, environmental and/or social justice issues?	Addresses (or helps address) current or potential future regulatory requirement on the COB (yes, no, maybe)	Benefit (for flow) (none, low, medium, high)	Benefit (for water quality) (none, low, medium, high)	Benefit (for habitat) (none, low, medium, high)	maintenance requirements (low, medium, high)	Relative Cost (L, M, H)
stormwater runoff from effective impervious surfaces	pollutant transport	loss of floodplain	loss of riparian vegetation	Physical barriers	Stormwater treatment retrofit	Installation of stormwater best management practices in areas where none previously existed, or improvement of existing storm water management practices so that they provide greater flow control and/or runoff treatment benefit.	yes-moderate	all	public	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	neutral	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	yes	yes	medium	medium	low	(not applicable for non-capital tools)	medium	
Yes	Yes	No	Yes	No	Stormwater Pollution Prevention Plans (SWPPPs)	A SWPPP is a site-specific plan that identifies potential pollutant sources and preventative measures. This tool is the program to develop and implement SWPPPs across all heavy equipment maintenance or storage yards and material storage facilities owned or operated by the Permittee (part of NPDES permit requirement - SS.C.7).	yes - NPDES requirement	utilities, parks, transportation	public	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	neutral	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	yes	none	low	none	(not applicable for non-capital tools)	low	
Yes	No	No	Yes	No	Urban tree canopy restoration	Planting trees at a site scale in urban neighborhoods (typically street trees in the right-of-way) to improve canopy coverage and provide stormwater, ecological, community benefits.	yes - moderate	all	both	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	desired (could be resistant, depending on location)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	yes - green space, reducing ambient temps	no	medium	low	medium	(not applicable for non-capital tools)	medium	
See Note below.	See Note below.	See Note below.	See Note below.	See Note below.	Controlling Runoff from New Development, Redevelopment, and Construction Sites	Program to reduce pollutants in runoff from new development, redevelopment, and construction sites, includes both private and public development sites (NPDES Permit Requirement SS.C.6)	yes - NPDES requirement	all	private	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	neutral	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	yes	none	medium	none	(not applicable for non-capital tools)	medium	
See Note below.	See Note below.	See Note below.	See Note below.	See Note below.	Land acquisition	purchase of property (common uses of property: stormwater detention/retention and/or treatment, protection of riparian area, floodplain connectivity, etc.); land acquisition is a means to an outcome (not the outcome itself)	no	all	public	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	neutral	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	no	low	low	low	(not applicable for non-capital tools)	high	
See Note below.	See Note below.	See Note below.	See Note below.	See Note below.	Maintenance Program of stormwater facilities owned or operated by the permittee	Annually inspect treatment and flow control BMPs/facilities and maintain according to adopted maintenance standards (part of NPDES permit requirement - SS.C.7)	yes - NPDES requirement	utilities, parks, transportation	public	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	neutral	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	yes	low	low	none	(not applicable for non-capital tools)	medium	
See Note below.	See Note below.	See Note below.	See Note below.	See Note below.	Maintenance Program of stormwater facilities regulated by permittee	Verify adequate long-term O&M of stormwater treatment and flow control BMPs/facilities (part of NPDES permit requirement - SS.C.7)	yes - NPDES requirement	utilities	private	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	neutral	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	yes - historic flooding issues	yes	low	low	none	(not applicable for non-capital tools)	medium	
See Note below.	See Note below.	See Note below.	See Note below.	See Note below.	Partnerships - with other jurisdictions (neighboring, also County and/or State)	Partnerships with neighboring jurisdictions or private entities for cost sharing on mutually beneficial projects or programs to improve or maintain healthy environmental conditions.	yes - moderate	all	private	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	neutral	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	no	none	none	none	(not applicable for non-capital tools)	medium	
See Note below.	See Note below.	See Note below.	See Note below.	See Note below.	Partnerships - with private entities or NGOs	Partnership with private entity or NGOs to implement plans and programs. This is different from a partnership on a particular capital project.	no	all	both	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	neutral	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	no	none	none	none	(not applicable for non-capital tools)	medium	
See Note below.	See Note below.	See Note below.	See Note below.	See Note below.	Public Education and Outreach (E&O)	Published materials, campaigns, and other activities designed to communicate with and educate the public regarding water quality and preventative practices (ex: raising awareness, behavior change, stewardship) (NPDES permit requirement - SS.C.2)	yes - NPDES requirement	all	both	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	neutral	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	yes	yes	none	low	none	(not applicable for non-capital tools)	low	
See Note below.	See Note below.	See Note below.	See Note below.	See Note below.	Public Involvement and Participation	Providing opportunities for communities to review, comment, and participate in programs and projects (ex: watershed committees, advisory councils) (NPDES permit requirement - SS.C.3)	yes - NPDES requirement	all	both	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	desired	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	yes	yes	low	low	low	(not applicable for non-capital tools)	low	
See Note below.	See Note below.	See Note below.	See Note below.	See Note below.	Reduce Stormwater impacts from lands owned or operated by permittee (including roads)	Implement practices, policies and procedures to reduce stormwater impacts associated with runoff from land owned or operated by permittee, including roads and road maintenance activities (part of NPDES permit requirement - SS.C.7)	yes - NPDES requirement	utilities, parks, transportation	public	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	neutral	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	yes	medium	medium	none	(not applicable for non-capital tools)	medium	
See Note below.	See Note below.	See Note below.	See Note below.	See Note below.	Stormwater Planning - Interdisciplinary team	Convene a team to inform/assist/influence the progress of the stormwater planning program (part of NPDES permit requirement - SS.C.1)	yes - NPDES requirement	all	both	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	neutral	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	yes	none	none	none	(not applicable for non-capital tools)	medium	
See Note below.	See Note below.	See Note below.	See Note below.	See Note below.	Training program for Employees	Training for employees of the permittee whose primary construction, operations, or maintenance job functions may impact stormwater quality (part of NPDES permit requirement - SS.C.7) May include training on basic water quality and environmental regulations, etc.	yes - NPDES requirement	utilities, parks, transportation	both	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	neutral	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	yes	none	low	none	(not applicable for non-capital tools)	low	
See Note below.	See Note below.	See Note below.	See Note below.	See Note below.	Stormwater workgroup	a dedicated/chartered workgroup within the City to focus on stormwater management	yes - minimal	all	both	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	neutral	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	no	none	none	none	(not applicable for non-capital tools)	medium	
See Note below.	See Note below.	See Note below.	See Note below.	See Note below.	Integrated planning	A holistic, multi-disciplinary approach to planning that develops cross-functional solutions via close collaboration of otherwise separate sectors, such as transportation and surface water management.	yes - minimal	all	both	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	neutral	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	no	none	none	none	(not applicable for non-capital tools)	medium	
See Note below.	See Note below.	See Note below.	See Note below.	See Note below.	Integrated planning (per USEPA)	(while might not be applicable to COB, is applicable to other jurisdictions) An integrated plan is a process that identifies efficiencies from separate wastewater and stormwater programs to best prioritize capital investments and achieve human health and water quality objectives. This approach can also lead to more sustainable and comprehensive solutions, such as green infrastructure, that improve water quality and provide multiple benefits that enhance community vitality (USEPA).	no (not applicable to COB)	Not applicable to Believee	not applicable to Believee	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	neutral	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	no	none	none	none	(not applicable for non-capital tools)	medium	
See Note below.	See Note below.	See Note below.	See Note below.	See Note below.	MS4 Mapping and Documentation	NPDES permit requirement - SS.C.4: Create and maintain electronic (GIS, CAD) mapping of the MS4 system with fully described mapping standards. Mapping should include known MS4 outfalls and discharge points, receiving waters, stormwater treatment and flow control facilities, tributary conveyances, connections to MS4 systems owned by other entities, and other requirements listed in SS.C.4. Ancillary benefits of mapping include integration with asset management and spill tracing systems.	yes - NPDES requirement	utilities	public	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	neutral	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	yes	none	none	none	(not applicable for non-capital tools)	medium	
See Note below.	See Note below.	See Note below.	See Note below.	See Note below.	Stormwater Discharge Monitoring and Assessment	NPDES Permit Requirement - SB: Permittees may choose to conduct self-performed stormwater discharge monitoring at independent discharge locations or contribute to a regional approach by making annual payments into a collective fund to implement effectiveness and source identification studies (Believee has chosen to opt in to regional approach)	yes - NPDES requirement	utilities	public	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	neutral	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	yes	none	none	none	(not applicable for non-capital tools)	medium	
See Note below.	See Note below.	See Note below.	See Note below.	See Note below.	Stormwater Planning - Coordinate long-range plan updates	Coordination with updates to long-range plans to determine that stormwater management needs and protection/improvement of receiving waters is addressed (part of NPDES permit requirement - SS.C.1)	yes - NPDES requirement	all	both	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	neutral	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	yes	none	none	none	(not applicable for non-capital tools)	medium	
See Note below.	See Note below.	See Note below.	See Note below.	See Note below.	Stormwater Planning - SMAP	NPDES permit requirement - SS.C.1: Stormwater Management Action Planning (SMAP) is a process that requires permittees to assess and prioritize watersheds with input from the public. Permittees must then develop a Stormwater Management Action Plan (SMAP) for one high priority catchment area by 2023. Provides a watershed-scale framework to focus improvement or conservation efforts on receiving waters that can be positively influenced by stormwater management.	yes - NPDES requirement	utilities	both	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	neutral	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	yes	yes	none	none	none	(not applicable for non-capital tools)	medium	
See Note below.	See Note below.	See Note below.	See Note below.	See Note below.	Stormwater Planning - Storm and Surface Water Plan	NPDES permit requirement - SS.C.1: Permittees are required to implement a stormwater planning program to inform and assist in the development of policies and strategies to protect receiving waters. The City of Believee has a Storm and Surface Water System Plan to establish the city's storm and surface water policy.	yes - extensive	utilities	both	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	neutral	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	yes	none	none	none	(not applicable for non-capital tools)	medium	
See Note below.	See Note below.	See Note below.	See Note below.	See Note below.	Stream Data Collection/Monitoring (biological/effectiveness monitoring)	Establish a baseline and evaluate changes over time in stream condition. Useful to identify data and information gaps, identify restoration opportunities, and develop criteria for prioritizing streams and objectives throughout the city. Could be monitoring of biologic and/or physical response to restoration or land use changes. In Believee, the OSCA (Open Stream Condition Assessment) is one of five strategic initiatives in the Storm and Surface Water Plan. The frequency and duration of data collection will be dependent on the specific parameters being measured.	yes - extensive	utilities, parks	both	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	neutral	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	yes	none	none	none	(not applicable for non-capital tools)	medium	
No	Yes	No	No	No	Illicit Discharge Detection and Elimination (IDDE)	Program to prevent, detect, characterize illicit connections and discharges. Involves field screening and source tracing (NPDES Permit Requirement SS.C.5).	yes - NPDES requirement	all	both	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	neutral	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	yes - environmental justice	yes	none	medium	none	(not applicable for non-capital tools)	medium	
No	Yes	Yes	Yes	Yes	Stream/Riparian Incentives	Lots of different types: including: targeting private property owners with streams in their yards/on their property - riparian planting or streambank improvement assistance (cost share, wave permit fees, provide city labor, assist with grants)	yes - minimal	all	private	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	neutral	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	no	none	none	none	(not applicable for non-capital tools)	low	
No	Yes	Yes	Yes	Yes	Instream cleanup	clean up trash etc. and fix broken pipes, etc. in or near stream channels (Identified during OSCA field work) Basic program that supports City or Volunteer efforts to keep our streams free of trash and debris materials (i.e. water bottles, toilets, microwaves, balls, etc.)	yes - minimal	utilities, parks	both	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	neutral	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	no	none	low	none	(not applicable for non-capital tools)	low	
No	Yes	Yes	Yes	Yes	sediment cleanup (ex: contaminated sediment within the waterways)	Construction, drilling, or other activities can expose and mobilize contaminated soil. Targeted cleanup efforts can remove an otherwise persistent source of poor water quality.	no (not applicable to COB)	utilities, parks	both	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	neutral	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	yes - environmental justice	no	none	low	none	(not applicable for non-capital tools)	high	
No	Yes	No	No	No	Source Control Program	Aimed at existing development; program to prevent and reduce pollutants to the MS4, includes both operational source control BMPs and if necessary structural BMPs. Types: inspection of private and public institutional and commercial sites, application and enforcement of ordinances, practices to reduce pesticides, herbicides and fertilizers into MS4 system. (NPDES Permit Requirement SS.C.8)	yes - extensive	all	both	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	neutral	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	yes	none	medium	none	(not applicable for non-capital tools)	medium	
No	No	Yes	Yes	Yes	fish passage blockage identification/prioritization program (ex: culverts)	ID and prioritize blockages to fish passage. ALSO: at a set frequency, observe/confirm fish passage is possible at City's assets: culverts, pond inlets/outlets, weirs, etc.	yes - minimal	utilities, parks	public	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	neutral	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	yes - indigenous peoples and salmonids	yes	none	none	medium	(not applicable for non-capital tools)	medium	
No	No	Yes	Yes	Yes	Invasive species awareness/control	This item includes both plant and animal invasive. Geared at staff/public awareness, monitoring, and control of NIMS. May include stream sampling through e-DNA or macroinvertebrate sampling; updating GIS maps; distributing information to the public and streamside property owners; posting signs at stream crossings and parks; maintaining decontamination protocols and facilities. Includes both City-driven programs and public volunteer programs.	yes - minimal	utilities, parks	both	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	neutral	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	yes	none	low	medium	(not applicable for non-capital tools)	low	
No	Yes	Yes	Yes	Yes	Rebate/incentive Program	Lots of different types: stormwater/impervious surface reduction, also see stream/riparian incentives tool in this toolbox, also stream/riparian incentives.	yes - minimal	all	private	not applicable	(not applicable for non-capital tools)	(not applicable for non-capital tools)	neutral	(not applicable for non-capital tools)	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	no	none	none	none	(not applicable for non-capital tools)	low	

Note: Programs are a means of programmatically addressing these elements of the conceptual model; could apply to all elements.

MAINTENANCE TOOLS: Tool is applicable to which stressor(s) (as identified in the conceptual model?) (Y/N)					Short Name	Description and Notes	Is the COB already using this tool for watersheds/stormwater? (if Yes, state minimal, moderate, or extensive use)	Applicable COB Department (Utilities, Parks, Transportation, Community Development)	Typical Application (public property, private property, or both)	Feasibility Characterization (Degree of Potential Public Acceptance Post-Construction (desired, neutral, resistant))	benefits / Impacts								Relative Cost (L, M, H)	
stormwater runoff from effective impervious surfaces	pollutant transport	loss of floodplain	loss of riparian vegetation	Physical barriers							Potential for Community Benefits (ex: green space, passive recreation) (Low, Medium, High)	Grey vs Green	potential impacts during construction (high degree, medium degree, low degree, neutral)	Potential to address (or help address) racial equity, environmental and/or social justice	Addresses (or helps address) current or potential future regulatory requirement on the	Benefit (for flow) (none, low, medium, high)	Benefit (for water quality) (none, low, medium, high)	Benefit (for Habitat) (none, low, medium, high)		maintenance requirements (low, medium, high)
No	No	No	No	Yes	cleaning of culverts (both in drainage system and streams)	Removal of sediment, debris, or vegetation that impedes culvert function or inhibits inspection. Crucial to reduce flooding, reduce damage to both public and private property, improve water quality, and protect aquatic habitat (part of NPDES permit requirement 55.C.7).	yes - NPDES requirement	utilities, parks, transportation	public	desired	low	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	yes	none	low	none	(not applicable for non-capital tools)	medium
No	Yes	No	No	No	ditch maintenance	Vegetation in ditches often prevents erosion and cleanses runoff waters. Remove vegetation only when flow is blocked or excess sediments have accumulated. Remove common road debris (including eroded soils, oils, vegetative particles, and heavy metals) to prevent pollutants from being mobilized and transported downstream where they can pollute stormwater and receiving waters. Crucial to reduce flooding, reduce damage to both public and private property, improve water quality, and protect aquatic habitat (mentioned in NPDES permit requirement 55.C.7).	yes - NPDES requirement	utilities, transportation	public	desired	low	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	yes	none	low	none	(not applicable for non-capital tools)	medium
No	Yes	No	No	No	pipe cleaning	Activities may include flushing or pigging to remove sediment or debris from pipe(s) to avoid capacity restrictions that may occur due to blockages. Cleaning activities should restore pipe (to the extent possible) to original design performance (part of NPDES permit requirement 55.C.7).	yes - NPDES requirement	utilities	public	neutral	none	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	yes	none	low	none	(not applicable for non-capital tools)	medium
No	Yes	No	No	No	street cleaning/sweeping	Streets can be the source of vegetative debris, paper, fine dust, vehicle liquids, tire and brake wear residues, heavy metals (lead and zinc), soil particles, ice control salts, domestic wastes, lawn chemicals, and vehicle combustion products. Conduct street sweeping to minimize the contamination of stormwater. Do not wash street debris into storm drains (mentioned in NPDES permit requirement 55.C.7).	yes - NPDES requirement	utilities, transportation	public	desired	low	(not applicable for non-capital tools)	(not applicable for non-capital tools)	yes	yes	none	medium	none	(not applicable for non-capital tools)	medium
Yes	Yes	No	No	Yes	Implementing the Best Management Practices (BMPs) in the Regional Road Maintenance Endangered Species Act (ESA) Program Guidelines (includes all street maintenance activities that, if not properly managed, could add pollution to an MS4 and ultimately impact a stream's health)	In response to the ESA listing of Chinook Salmon and Bull Trout, the Regional Road Maintenance ESA Program Guidelines were developed. The purpose of the Regional Road Maintenance ESA Program Guidelines is to provide a consistent, regional program that can be used by any agency wishing to limit, reduce or eliminate the prohibition on take of threatened species. The BMPs for road maintenance to reduce the impact on streams.	Implementation in progress	utilities, transportation	public	desired	low	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	yes	none	medium	none	(not applicable for non-capital tools)	low
No	Yes	No	No	No	inspection - visual or via CCTV	Regular maintenance visit or activity to check for potential issues that may impair performance of an infrastructure asset. Examples include (1) visual inspection of a pond to identify inlet damage or debris accumulation or (2) closed-circuit television (CCTV) to inspect a pipe via crawler camera that might identify cracks or illicit connections.	yes - extensive	utilities	both	neutral	none	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	yes	none	none	none	(not applicable for non-capital tools)	medium
No	Yes	No	No	No	cleaning catch basins	Removal of accumulated trash, sediment, dead animals, vegetation, pollutants such as oil, or other debris that may be washed downstream or impede catch basin function by blocking inlet/outlet pipes. Crucial to reduce flooding, reduce damage to both public and private property, improve water quality, and protect aquatic habitat.	yes - extensive	utilities, transportation	public	neutral	low	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	yes	none	medium	none	(not applicable for non-capital tools)	medium
Yes	Yes	No	No	Yes	Sufficient maintenance on all City operated Stormwater BMPs such that they continue to operate as designed to protect ground and surface waters.	Per 2019 Ecology Stormwater Management Manual for Western Washington, Volume V, Appendix V-A - Maintenance Tables (Adopt by 6/30/2022). City is required to adopt 2019 SWMMWW or equivalent by 6/30/2022.	yes, COB code requirement per adopting Ecology Manual.	Utilities	Both	desired	none	(not applicable for non-capital tools)	(not applicable for non-capital tools)	yes	yes	none	medium	none	(not applicable for non-capital tools)	medium
Yes	Yes	No	No	Yes	Sediment Removal from Built Stormwater/Drainage Infrastructure	Removal and proper disposal of sediment from stormwater ponds and stream sediment-catching facilities.	yes-extensive	Utilities	Public	neutral	none	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	yes	medium	medium	none	(not applicable for non-capital tools)	medium
No	Yes	No	No	No	Repairing pipe/culvert and other asset defects	These defects can allow soil and other pollutants to enter the storm system and thus enter streams. City has significant backlog of pipe defect repair/replacement/rehab needs	Yes-minimal	Utilities	Public	desired	none	(not applicable for non-capital tools)	(not applicable for non-capital tools)	yes	yes	none	none	none	(not applicable for non-capital tools)	medium
No	Yes	No	No	No	Pet waste management	Pet waste is a serious concern as it contains disease-causing organisms and flushes bacteria into stormwater. BMPs include posting signage and providing well-maintained pet waste stations to encourage proper collection of pet waste (via bags or scoopers) and disposal (mentioned in NPDES permit requirement 55.C.7).	yes - NPDES requirement	utilities, parks, transportation	both	desired	low	(not applicable for non-capital tools)	(not applicable for non-capital tools)	no	yes	none	low	none	(not applicable for non-capital tools)	medium

COB internal policies are a means of addressing stressors called out in the conceptual model; indirectly apply to all	Tool Characterization						Feasibility characterization (only 1 criterion for this tool category)	Benefits/Impacts				
Short Name	Description and Notes	Is the COB already using this tool for watersheds/stormwater? (if Yes, state minimal, moderate, or extensive use)	Applicable COB Department (Utilities, Parks, Transportation, Community Development)	Typical Application (public property, private property, or both)	Degree of Potential Public Acceptance Post-Construction (desired, neutral, resistant)	Potential to address (or help address) racial equity, environmental and/or social justice issues?	Addresses (or helps address) current or potential future regulatory requirement on the COB (yes, no, maybe)	Benefit (for flow) (none, low, medium, high)	Benefit (for water quality) (none, low, medium, high)	Benefit (for Habitat) (none, low, medium, high)	maintenance requirements (low, medium, high, or none)	Relative Cost (L, M, H)
Cross-department requirements	Implementing cross-department review to identify potential issues or opportunities and mutual interest that might not otherwise be recognized. For example, review by stormwater group of development proposals or review of any transportation projects/programs. Another example could be joint investment in park improvements that incorporate stormwater management elements.	yes - moderate	all	both	neutral	no	no	none	none	none	none	low
Fee in lieu	Programs that allow owners of new development and redevelopment projects to submit a cash payment to the municipality instead of installing required permanent, onsite, project-specific stormwater detention and/or treatment facilities.	no	utilities, community development	private	neutral	no	no	low	none	none	none	low
Environmental Impact Bonds	Programs that enable entities to increase investment in environmental projects.	no	utilities, community development	both	neutral	no	no	low	none	none	none	low
GSI Incentive program	Program that helps eligible property owners manage stormwater by installing green stormwater infrastructure (e.g., rain gardens and/or cisterns) on private property.	yes - minimal	utilities, community development	private	neutral	yes - aesthetics/green space benefit	no	low	low	none	none	low
Impervious Surface Incentive program	Program that helps eligible property owners manage stormwater by reducing impervious surface on private property.	yes - minimal	utilities, community development	private	neutral	yes - aesthetics/green space benefit	no	low	low	none	none	low
Stream/Riparian Area Incentive program	Program that helps eligible property owners improve stream health by managing streams/riparian areas on private property.	yes - minimal	utilities, community development	private	neutral	yes - aesthetics/green space benefit	no	low	low	medium	none	low
Maintenance Standards	Implement maintenance standards that are as or more protective than Stormwater Management Manual for Western Washington (part of NPDES permit requirement - SS.C.7)	yes - NPDES requirement	all	public	neutral	no	yes	none	none	none	none	low
public private partnership (funding share)	Similar structure but different from a P3 (with private capital). Cost is shared with either a private entity or a NGO non profit.	yes - minimal	all	both	desired	no	no	none	none	none	none	low
Public private partnership (P3)	Public Private Partnership (P3) is an alternative approach to procuring infrastructure wherein a private entity provides up-front capital to finance construction of the infrastructure asset.	no	utilities	both	neutral	no	no	none	none	none	none	medium
Stormwater Planning - Low Impact Development (LID) code-related requirements	NPDES permit requirement - SS.C.1: Continue to require LID principles and LID BMPs when reviewing or revising code to make LID the preferred and commonly-used approach to site development. LID design should minimize impervious surfaces, native vegetation loss, and stormwater runoff.	yes - NPDES requirement	utilities	both	desired	no	yes	low	low	none	none	low
Stormwater Control Transfer program	Program that allows a redevelopment project to transfer a portion of required stormwater improvements for flow control from a "sending" watershed to a higher priority "receiving" watershed.	no	utilities, community development	both	neutral	no	no	none	none	none	none	medium
Water quality credit trading	Option for compliance with a water quality-based effluent limitation that involves trading a portion of the requirement to a higher priority watershed. There is flexibility on the timing and level of technology that a facility might install to meet the requirement.	no	utilities	public	neutral	no	no	none	none	none	none	medium

COB Regulatory Requirements are a means of addressing stressors called out in the conceptual model; indirectly apply to all						Feasibility characterization (only 1 criterion for this tool category)	benefits / Impacts						Cost
Short Name	Description and Notes	Is the COB already using this tool for watersheds/stormwater? (if Yes, state minimal, moderate, or extensive use)	Applicable COB Department (Utilities, Parks, Transportation, Community Development)	Typical Application (public property, private property, or both)	If capital project, Scale (site-specific, neighborhood scale, city-wide)	Degree of Potential Public Acceptance Post-Construction (desired, neutral, resistant)	Potential to address (or help address) racial equity, environmental and/or social justice issues?	Addresses (or helps address) current or potential future regulatory requirement on the COB (yes, no, maybe)	Benefit (for flow) (none, low, medium, high)	Benefit (for water quality) (none, low, medium, high)	Benefit (for Habitat) (none, low, medium, high)	maintenance requirements (low, medium, high, or none)	Relative Cost (L, M, H)
behavior bans/substitutions (source control action)	An ordinance restricting or requiring certain behaviors from the public (e.g., restrict car washing at home, require picking up after pets) to address pollutant sources in the watershed.	no	utilities, community development	both	not applicable	resistant	no	yes	none	medium	none	none	medium
code updates	A process to review and update code to integrate changes required by the NPDES permit. These changes are required and the City is obligated to comply by the deadlines. For example, code review to make Low Impact Development (LID) the preferred and commonly-used approach to site development (part of NPDES permit requirement - 55.C.1).	yes - moderate	all	both	not applicable	neutral	no	no	low	none	none	none	medium
product bans/substitutions (source control action)	An ordinance restricting the use of specific products (e.g., detergents) that are harmful to surface water quality.	no	utilities, community development	both	not applicable	resistant	no	no	low	none	none	none	medium
zoning updates	Zoning updates are a subcategory of code updates to eliminate barriers or to promote creative solutions for stormwater management. For example, allowing more flexibility in clustering arrangements or lot design can help achieve stormwater goals.	no	utilities, community development	private	not applicable	resistant	no	no	none	none	none	none	medium