

***City of Shoreline
Stormwater Management Action Plan
(SMAP)
Boeing Creek Watershed***



March 2023



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1.0 Introduction and Background

This Stormwater Management Action Plan (SMAP) was prepared by the City of Shoreline (City) as required by Condition S5.C.1.d of the 2019-2024 Western Washington Phase II Municipal Stormwater Permit (Permit) issued by the Washington State Department of Ecology (Ecology, 2019a). This document was created specifically to meet the requirements of Permit Section S5.C.1.d.iii. A summary of the preliminary analysis conducted prior to development of this SMAP and the results that informed development of the projects and strategies is contained in this document. Additional programs and projects were considered and evaluated during the process but not necessarily selected for inclusion in the final SMAP; see the *SMAP Program and Project Matrix* in Appendix A for additional information.

The City has, through the watershed assessment and prioritization process described below, selected the Boeing Creek Basin as its highest priority watershed for stormwater action planning. Figure 1 shows the location of the Boeing Creek Watershed.

Permit section S5.C.1.d.iii lists the following to be included in the SMAP:

- *(a) A description of the stormwater facility retrofits needed for the area, including the BMP types and preferred locations.*
- *(b) Land management/development strategies and/or actions identified for water quality management.*
- *(c) 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 the catchment area.

- *(d) If applicable, identification of changes needed to local long-range plans, to address SMAP priorities.*
- *(e) A proposed implementation schedule and budget sources for:*
 - *Short-term actions (i.e., actions to be accomplished within six years), and*
 - *Long-term actions (i.e., actions to be accomplished within seven to 20 years).*
- *(f) A process and schedule to provide future assessment and feedback to improve the planning process and implementation of procedures or projects.*

Beginning in Section 3 Stormwater Actions below, this SMAP roughly follows the same categories and order as listed in the Permit section S5.C.1.d.

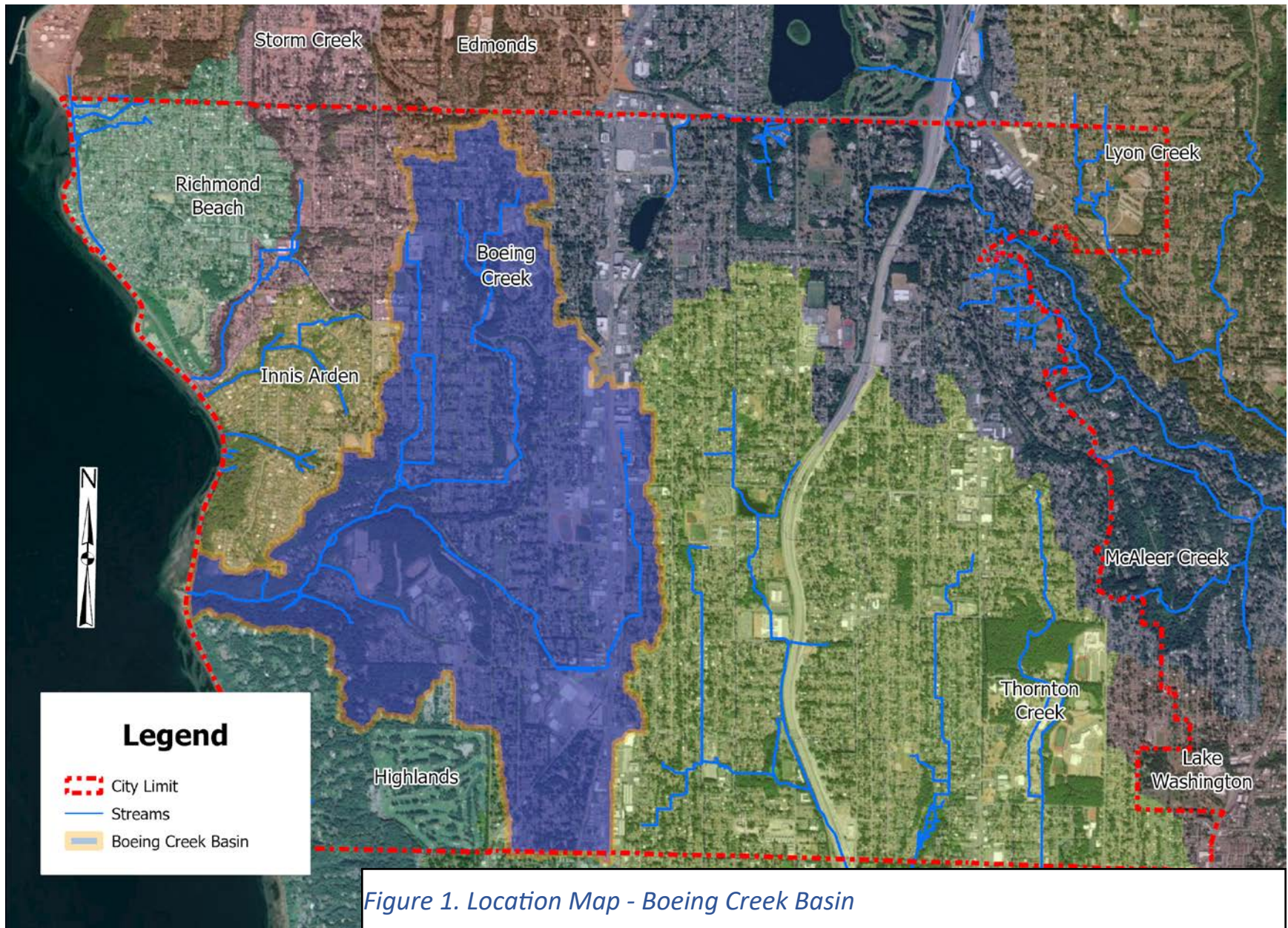


Figure 1. Location Map - Boeing Creek Basin

2.0 Executive Summary

Table 1 below provides a summary of actions proposed by the City of Shoreline as the Stormwater Management Action Plan (SMAP) for the Boeing Creek watershed. Discrete actions are identified as specific Stormwater Management Actions (SWMA) and sections 3 and 4 of this SMAP provide additional information and context for the actions identified.

The City's process for authorizing any new or expanded Surface Water programs or projects requires a Surface Water Master Planning effort to determine overall Surface Water Utility priorities and requirements, and to allocate Surface Water Management (SWM) Fee funding by means of a SWM Fee Rate Study. The City's SW Master Planning interval is roughly six years: the previous SW Master Plan was finished in 2018; accordingly, the next SW Master Plan update is starting (as of early 2023) and expected to be completed by end of 2024. Because the present SMAP requirement arose between City SW Master Plan processes, the only Stormwater Management Actions that the City can propose at this time are those which can be implemented under existing planned projects and programs and/or that fit within discretionary spending allowed under previously authorized budgets as informed by the 2018 SW Master Plan. It is the City's understanding that the Stormwater Management Actions proposed under this SMAP are sufficient to satisfy current Permit requirements. The City expects that future Permit cycles will include additional direction for updating and managing the SMAP and corresponding stormwater management actions. Additional long-term actions can be identified and implemented under any subsequent iterations of the SMAP document as required by future Permit cycles; such action would then need to be incorporated into City budget and plans by the City's recurring SW Master Planning process.

Table 1 has been arranged to follow an operational distinction in the City's approach to each action. *Completed Actions* are projects which the City has recently completed, or programs the City already had in place, to benefit the priority watershed. *Short-term Planned Actions* are those actions which benefit the priority watershed and are planned and budgeted as a result of previous City stormwater planning efforts; these actions will generally be able to proceed without additional planning efforts. *Short-term SWMP-Dependent Actions* are those actions which will benefit the priority watershed and which the City has identified as *more likely* to proceed, but which are subject to additional planning, prioritization, resource management, and budgeting processes in order to become actionable projects or programs; these actions are generally *planned* to be assessed in the 2024 SW Master Plan. *Long-term SWMP-Dependent Actions* are those actions which will benefit the priority watershed and which the City has identified as *less likely* to proceed but which *could* be considered in the 2024 SW Master Plan as budget and resources permit, or included in future master plans update processes; two master plan updates are anticipated within the suggested timeline for long-term actions.

Table 1: Executive Summary

SWMA #	Project	Budget Source	Frequency	Action Type
Completed Actions				
1	Hidden Lake Phase 1: Dam Removal	SWU & Grant Funds	One-time	Stormwater Retrofit
2	Additional Drainage Codes above SWMMWW Minimums	SWU Funds	One-time	Land Management or Development Strategies
3	Land-use and Zoning Codes which Reduce Impacts to Receiving Waters	General Fund (PCD)	One-time	Land Management or Development Strategies
4	Tree Planting Program	General (Enviro. Serv.) & SWU Funds	On-going	Targeted Enhanced Stormwater Mgmt.
Short-term Planned Actions				
5	Hidden Lake Phase 2: Culvert Removal	SWU & Grant Funds	One-time	Stormwater Retrofit
6	Aurora Bioretention Improvements	SWU Funds	One-time	Stormwater Retrofit
7	Linden Avenue Bioretention and Flood Reduction	SWU Funds	One-time	Stormwater Retrofit
8	N. 149 th St. Bioretention Restoration and Retrofit	SWU & Grant Funds	One-time	Stormwater Retrofit
9	Strategic Opportunities Fund	SWU Funds	On-going / Ad-hoc	Stormwater Retrofit
10	Surface Water Master Plan Update	SWU Funds	One-time	Long Range Plan Changes
Short-term SWMP-Dependent Actions				
11	Public Education and Outreach Event	General (Enviro. Serv.) & Grant Funds	On-going	Targeted Enhanced Stormwater Mgmt.
12	Study retrofit opportunities to enhance <i>existing</i> stormwater facilities	SWU Funds	One-time	Stormwater Retrofit

SWMA #	Project	Budget Source	Frequency	Action Type
13	Study Potential <u>New</u> Stormwater Retrofit Opportunities	SWU Funds	One-time	Stormwater Retrofit
Potential Long-term SWMP-Dependent Actions				
14	Incentivize Development to Provide Additional Mitigation above Permitting Minimums	SWU Funds	One-time	Land Management or Development Strategies
15	Stormwater Utility Land Purchases	SWU Funds	On-going	Land Management or Development Strategies
16	Surface Water Fee Restructuring	SWU Funds	One-time	Land Management or Development Strategies
17	Source Control Inspections	SWU Funds	On-going	Targeted Enhanced Stormwater Mgmt.
18	Non-NPDES Private Facility Inspection and Maintenance	SWU Funds	On-going	Targeted Enhanced Stormwater Mgmt.
19	LID Rebate Program	SWU Funds	On-going	Targeted Enhanced Stormwater Mgmt.
20	Maintenance Efficiency Study	SWU Funds	One-time	Targeted Enhanced Stormwater Mgmt.
21	Outreach Programs	SWU Funds	On-going	Targeted Enhanced Stormwater Mgmt.

3.0 Summary of Watershed Assessment and Prioritization

The City conducted a receiving water inventory and assessment pursuant to Permit requirement S5.C.1.d.i by March 31, 2022, and submitted the results to Ecology (City of Shoreline, 2022a), and included in Appendix B. Following the watershed inventory and receiving water conditions, the City completed its prioritization process (Permit section S.5.C.1.d.ii) by June 30, 2022 (City of Shoreline, 2022b). A summary of the prioritization process is included in Appendix C.

3.1 Receiving Water Characteristics

Receiving water conditions were evaluated for the City's eleven (11) identified and delineated watersheds, including the following characteristics:

- Overall size
- Percent of basin within the City of Shoreline
- Habitat and fish use
- Land cover and type (impervious surface, current and projected development, green spaces, City ownership)
- Water quality conditions compared to designated receiving water uses
- Existing stormwater management and opportunities for retrofit
- Environmental justice opportunities
- City's relative stormwater management influence

Based on the results of the initial receiving water characterization, and stormwater management influence, the City included five of its watersheds in the prioritization process and eliminated six of the watersheds from further consideration because they had one or more of the following characteristics:

1. Entire watershed area is small or comprised of multiple small individual catchments that are hydraulically independent of each other.
2. Small percentage of watershed is located within Shoreline's jurisdiction.
3. Watershed drains directly to Puget Sound or Lake Washington and has little to no open stream channel, fish habitat, or water quality issues.

Table 2 shows the summary results of the receiving water characterization and the watersheds chosen for inclusion in the prioritization process.

Table 2 Summary of Receiving Water Characteristics Results

Receiving Water	Sub-basin Name	Overall Size (sq. mi.)	Size within City of Shoreline (sq. mi.)	% Within Shoreline's jurisdiction	Stormwater Management Influence	Include in prioritization process (S5.C.a.d.ii)?
Boeing Creek/ Puget Sound	Boeing Creek	2.8	2.8	100%	Moderate-High	Yes
Thornton Creek/ Lake Washington	Thornton Creek	11.5	3.7	32%	Moderate-High	Yes
McAleer Creek/ Lake Washington	McAleer Creek	8.0	2.1	27%	Moderate-High	Yes
Storm Creek/ Puget Sound	Storm Creek	0.8	0.5	62%	Moderate	Yes
Lyon Creek/ Lake Washington	Lyon Creek	3.8	0.3	7%	Moderate	Yes
Puget Sound	Highlands	1.3	0.7	53%	Low	No
Puget Sound	Richmond Beach	0.7	0.7	94%*	Low	No
Bitter Lake/ Lake Union	Bitter Lake	12.5	0.0	0%*	Low	No
Puget Sound	Edmonds	4.2	0.1	2%	Low	No
Puget Sound	Innis Arden	0.6	0.6	100%	Low	No
Lake Washington	Lake Washington	1.2	0.1	11%	Low	No

*Rounding of square miles in adjacent columns does not reflect small portions of basin that are inside or outside of Shoreline's jurisdiction. For instance, a small percentage of Bitter Lake watershed is in Shoreline, but due to rounding, 0% is reported. Likewise, a small portion of Richmond Beach watershed is outside Shoreline's jurisdiction.

3.2 Watershed Prioritization

Boeing Creek was chosen as the highest priority watershed because it meets the City's criteria and intended benefits of Stormwater Management Action Planning, including the following:

- 100% of the watershed is within the City of Shoreline. The City will have more opportunities to influence stormwater management.
- Water quality impairment is typical of urban streams, but not severely degraded. As

a less severely impaired stream, there is a better chance to see improvements from stormwater management actions.

- Communities are present in portions of this watershed which can be considered as overburdened communities (relative to overall Shoreline city-wide demographics).
- Salmon are present in Boeing Creek (lower reach).
- Public support for focusing on the Boeing Creek watershed was highest among people that responded to an on-line survey.
- Relative total public land available for stormwater management actions compared to other watershed areas is high.

The City decided to develop the SMAP for the entire Boeing Creek Watershed rather than a smaller catchment to not put potentially arbitrary limitations on the array of stormwater management action options available and needed in the watershed.

3.3 Public Input/Survey Results

Input from the public was solicited via a community survey between January and April 2022. The survey link was shared on the City's social media and listservs, in a local newspaper, through Neighborhood associations, and in City-wide mailings including "Currents" and the Surface Water Utility Annual Report. The purpose of the survey was to educate and engage the Shoreline community about the SMAP, and to factor community input into the watershed prioritization process and selection of stormwater management actions.

Survey participants were asked to select their top three priority watersheds. Boeing, Thornton, and McAleer Creek watersheds were the three highest-selected, with Boeing selected the most.

Survey participants were also asked to indicate their level of support for different types of potential stormwater actions the City could take. The survey responses were generally supportive of all stormwater actions and there were very few negative responses for any; however, some actions received more supportive responses than others. These include:

- Increase opportunities for community members to volunteer in stewardship activities
- Provide new incentives for property owners to voluntarily improve stormwater quality
- Increase installation of natural drainage systems

Community preference was considered when evaluating the selected stormwater management actions proposed in this plan and will be referenced for any potential future updates to the City's SMAP.

A summary of the survey results is provided in Appendix D.

4.0 Stormwater Management Actions

Potential stormwater management actions (SWMA) were identified through a review of existing or planned projects and programs within the Boeing Creek Watershed, existing City-wide programs that are applicable to the Boeing Creek Watershed, potential enhancements to existing programs and projects within the Boeing Creek Watershed, and potential future new projects and programs within the Boeing Creek Watershed .

The City prioritized actions to be included in this plan according to expected effectiveness and feasibility of implementation at the time of creating this report. Future SMAP updates are expected to extend and expand the City’s array of Permit required Stormwater Management Actions.

4.1 Stormwater Retrofits

Stormwater retrofit projects were considered for their impact on the Boeing Creek watershed; several recent or currently planned projects were identified as meeting this intent.

- Hidden Lake Phase 1: Dam Removal
- Hidden Lake Phase 2: Culvert Removal
- Linden Avenue N Bioretention
- Aurora Bioretention Improvements
- N 149th Street and Evanston Avenue N Bioretention Restoration and Retrofit

4.1.A Completed Actions

[The Hidden Lake Phase 1: Dam Removal project \(SWMA1\)](#) was physically complete as of February 2023. This project removed an earthen dam along Boeing Creek (that had created a small artificial impoundment) and restored a natural stream channel and wetlands for the creek within the area formerly covered by the lake and dam. Water quality improvements to Boeing Creek include lower coliform bacteria (by removing lake as waterfowl habitat) and lower temperature (by removing solar heating effects of shallow, unshaded lake). Habitat benefits include restoration of natural sediment transport, restoration of natural stream channel, and removal of a fish passage barrier (the dam).

4.1.B Short-term Planned Actions

Figure 2 shows the location of short-term planned actions including the following:

[The Hidden Lake Phase 2: Boeing Creek Culvert Replacement project \(SWMA5\)](#) is scheduled for construction in 2024 and follows up on improvements done under Phase 1 for replacement of aging and undersized Boeing Creek twin 48”-diameter pipe culverts crossing NW Innis Arden Way just downstream of the former dam area. Improvements will install a large steel arch

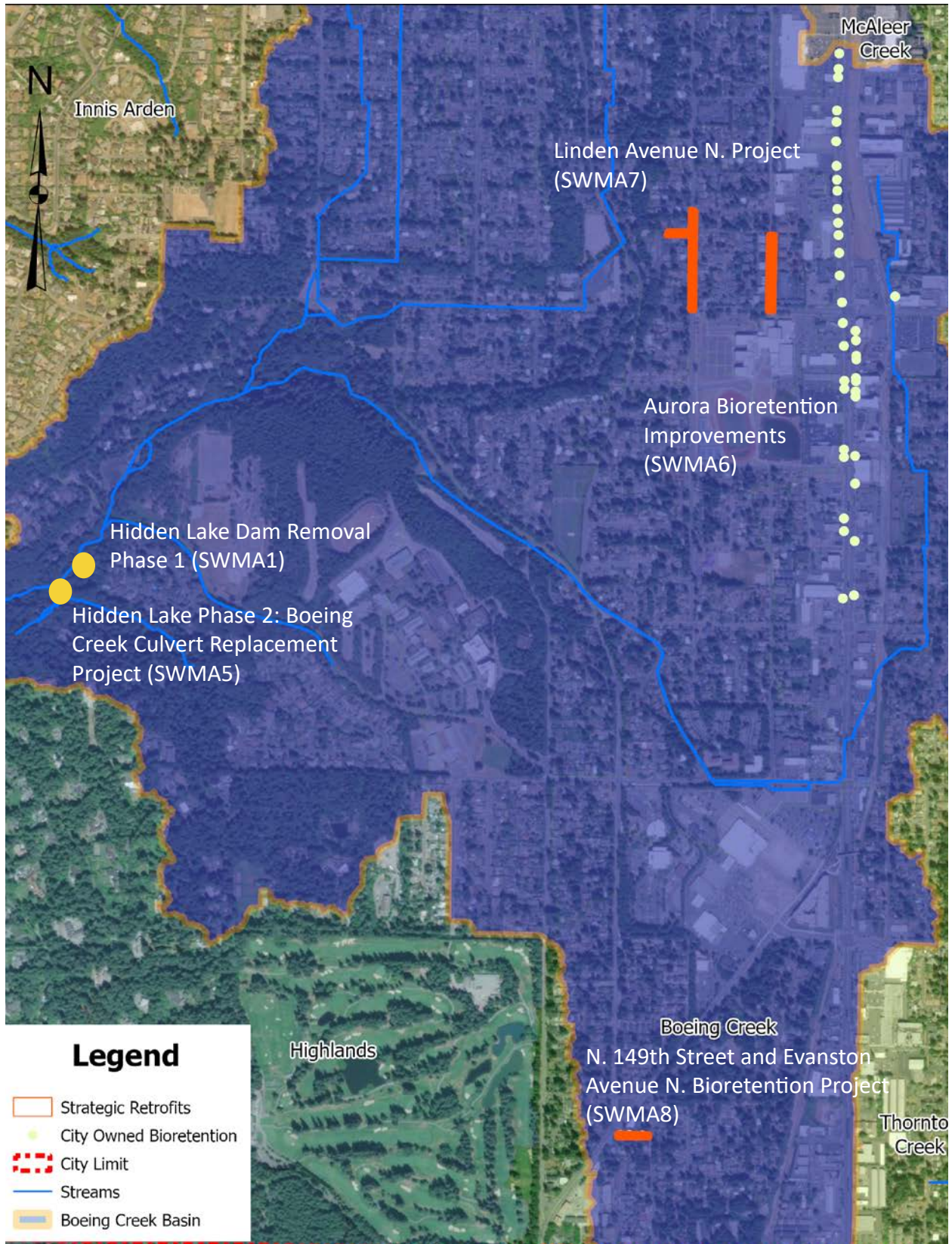


Figure 2. Location of Completed and Short-term Planned Actions

culvert with natural stream channel. Benefits include restoration of natural sediment and woody debris transport, restoration of natural stream channel within the culvert, and removal of a fish passage barrier (the existing culverts).

Results of the community survey indicated that there is high support for natural built systems and stream habitat restoration as compared to traditional stormwater infrastructure.

[The Aurora Bioretention Improvements \(SWMA6\)](#) have been initiated as part of a larger study of the conditions and maintenance needs of the early phases of the constructed City improvements on Aurora Ave (Highway 99). The project will ultimately restore the intended design capacity of the BMPs which have been heavily impacted by poor construction techniques, excessive road debris, challenging maintenance needs, vehicle damages, and more. This project is already underway and will improve treatment of high-use heavily urbanized runoff from the Aurora corridor, a major portion of which is within the Boeing Creek basin.

[The Linden Avenue N project \(SWMA7\)](#) was originally identified in the 2013 Boeing Creek Basin Plan and further prioritized under the 2018 Surface Water Master Plan (Brown and Caldwell, 2018). The project will be a combination of upgrading the pipe network and installing multiple bioretention retrofit facilities on Linden, Fremont, Evanston and Dayton Avenues within the neighborhood north of N 175th Street to slow runoff and alleviate flooding while also improving water quality.

[The N 149th Street and Evanston Avenue N bioretention project \(SWMA8\)](#) will retrofit existing shallow bioretention facilities to improve function and increase effectiveness and area treated. Improvements will increase the volume of water that can be treated from the neighborhood runoff and accommodate overflows from nearby isolated small infiltration systems. By treating the on-going drainage issues in this neighborhood locally with improved bioretention and infiltration facilities, the City can avoid the need to add tightline systems to Boeing Creek and keep roadway runoff out of the receiving water all together.

4.1.C Short-term SWMP-Dependent Actions

Two currently unplanned short-term retrofit actions for the Boeing Creek Watershed were identified.

The City intends to [study and evaluate existing stormwater facilities for potential operational changes or enhancements \(SWMA12\)](#), including retrofit improvements, expansions, or rehabilitations, that could improve functionality and benefits to Boeing Creek.

The City also intends to [study and evaluate opportunities for new stormwater retrofit facilities \(SWMA13\)](#) to treat currently untreated or under-treated impervious areas. Figure 3 shows the locations of city-owned stormwater facilities in the watershed.

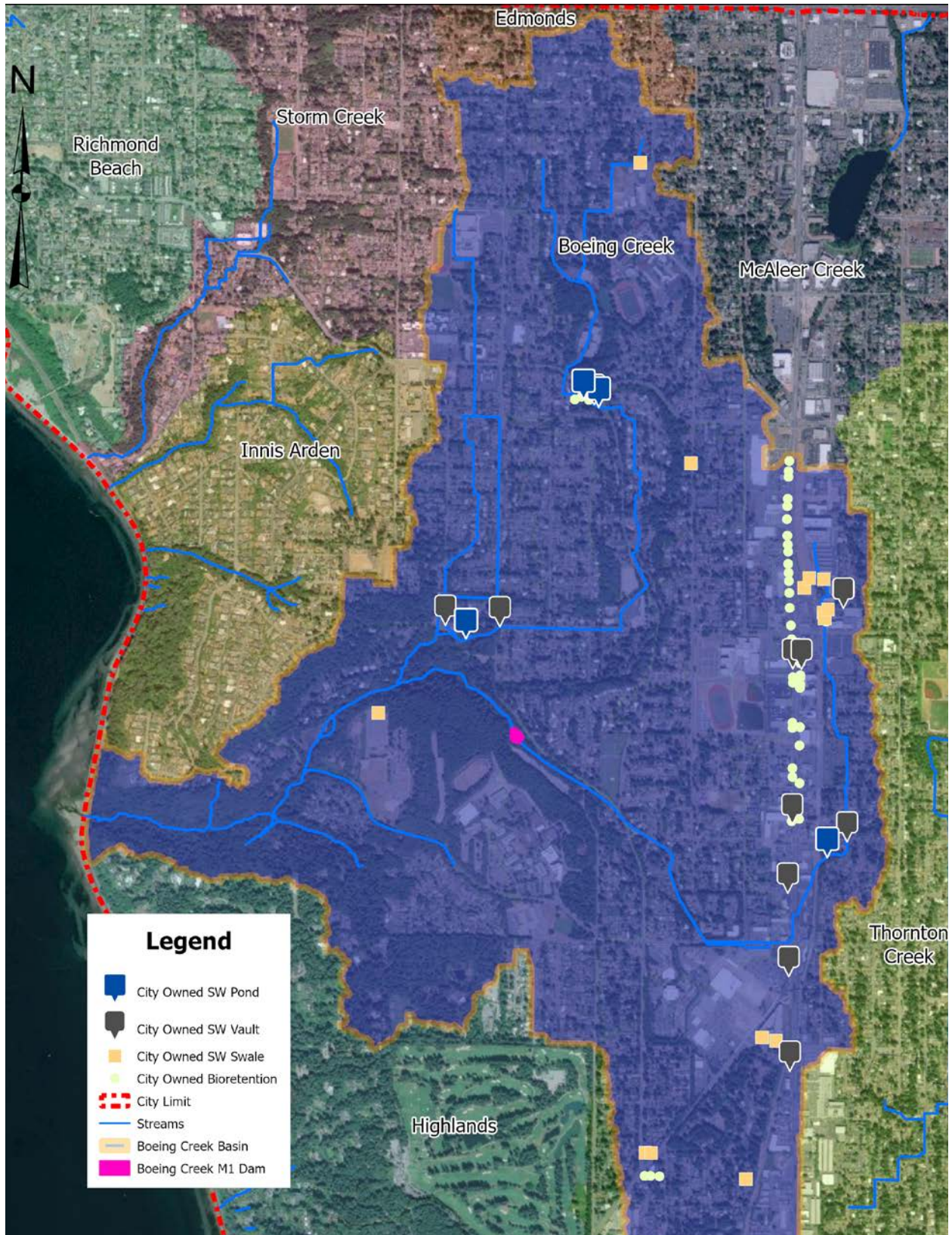


Figure 3. Locations of city-owned stormwater facilities in Boeing Creek Basin.

The City intends to include a short-term project for each study as part of the [2024 Surface Water Master Planning process \(SWMA10\)](#), but the projects will be subject to prioritization within the larger capital improvements planning process.

The above projects will plan and implement retrofits to reduce runoff to the stormwater systems discharging to Boeing Creek, which for decades has experienced significant erosion from high peak storm-driven flows.

Because City resources are limited and require prioritization within competing needs, the City intends to [further study and plan for retrofit opportunities \(SWMA 12 & SWMA 13\)](#) after the SSC retrofit requirements from the next reissuance of the Phase II Permit are known. The City is starting a [Surface Water Master Plan update in 2023 \(SWMA10\)](#) that will afford the opportunity to bridge the planning gap between this SMAP and the 2024 Permit reissuance, and further advance some of the less-certain SMAP priorities into fully authorized and funded recommended programs and projects. The current SMAP is thus somewhat limited in short-term retrofit opportunities and the schedule and authorization for this study is pending prioritization and funding processes to be done under the 2024 SW Master Plan. It is also anticipated that many retrofit projects require grant funding in order to advance without disrupting competing needs or generating significant fee increase, so the plan may remain dependent on successful grant awards even after said planning and studies are complete.

[Strategic Opportunity Projects Funding \(SWMA9\)](#) was formally established under the City's 2023-2028 Capital Improvement Plan (CIP), although the City had been informally advancing this work since around 2020. Strategic Opportunity Projects allocates funding each year to expand the scope of stormwater work done under non-stormwater projects to go above and beyond required minimums and contribute toward surface water climate resiliency. Typically, this scope expansion includes expanding quantities of green stormwater infrastructure, water quality treatment, and/or flow control BMPs installed by a project. Examples include increasing detention and infiltration volumes and square footage of bioretention and permeable pavements for new sidewalk projects that otherwise would carry a smaller mitigation impact for such work. While no retrofits have yet been constructed within the Boeing Creek watershed under this program, multiple opportunities to do so are expected within the six-year short-term timeframe, including as part of multiple priority new sidewalk projects and/or parks improvements within the watershed.

4.1.D Long-term SWMP-Dependent Actions

The long-term timeline suggested in the Permit is beyond typical planning horizons for surface water capital project spending plans and no specific long-term projects are identified at this time. It is anticipated that, in addition to the retrofit studies identified above ([SWMA12 & SWMA13](#)), two full SW master plan updates would be completed prior to the long-term

implantation timelines. Future SMAP updates can, and should, incorporate findings into a proposed long-term retrofit list as a result of these additional studies and planning efforts.

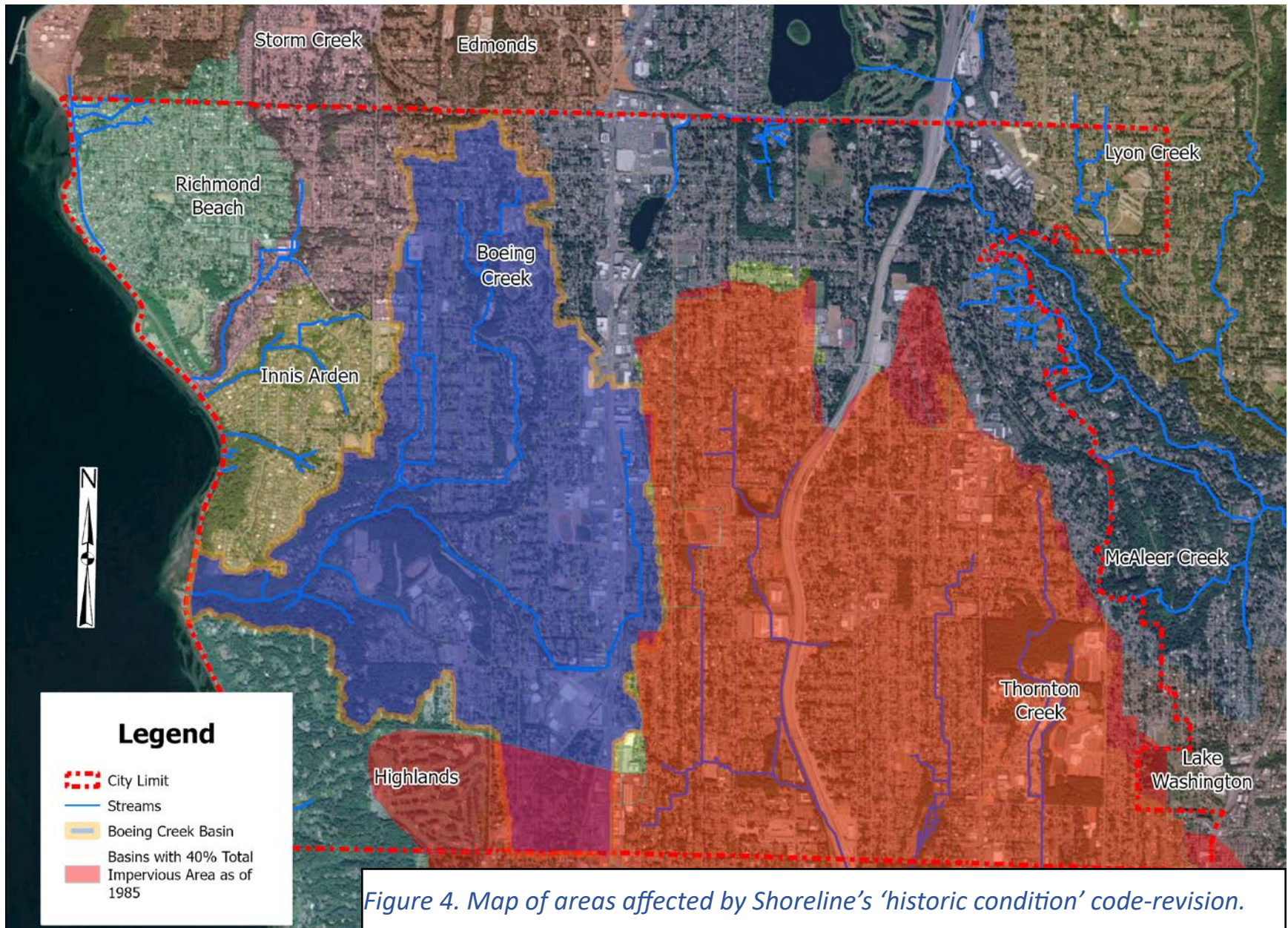
4.2 Land Management and Development Strategies

Land management and development strategies were evaluated for potential to improve ecological conditions in the watershed or alleviate impacts from development or redevelopment. The following land management and development strategies were identified for the Boeing Creek Watershed.

4.2.A Completed Actions

The City has already implemented more [stringent flow control requirements \(SWMA2\)](#) than what is required in Ecology’s 2019 Stormwater Management Manual for Western Washington (Ecology, 2019b). Specifically, the City requires flow control (Minimum Requirement #7) on all projects that exceed 50 percent effective impervious surfaces. Additionally, the City does not allow the exception for basins that have exceeded 40% total impervious surface since 1985 (City of Shoreline, 2021). Figure 4 shows the basins that Ecology allows to be modeled with pre-developed conditions as existing land cover (in red) and the extent that this elevated stormwater code improves flow control through the entire City, including the Boeing basin. The Shoreline requirement for flow control above 50% effective impervious helps close a gap in which smaller sites were allowed to fully develop without stormwater mitigations. Shoreline’s requirement for projects in the Boeing Creek basin to match developed conditions to pre-developed forested conditions, rather than existing land cover, is significant to basin hydrology long-term. As the older commercial developments within the basin are redeveloped, the flow regime to Boeing Creek is expected to improve.

The City continues to implement land use planning that benefits the Boeing Creek Watershed. Subarea plans (City of Shoreline, 2023a) have been developed for areas in the city where light-rail stations are being built to focus housing, and commercial centers in the areas where people have easy access to high-capacity transportation. This kind of [land use planning \(SWMA3\)](#) benefits Boeing Creek Watershed by taking the pressure off growth in the most vulnerable portions of the watershed and focusing the extensive housing expansion needed to meet regional housing needs to the smallest footprint possible. The focus on maximizing public transit usability also reduces the amount emissions and pollutions from vehicles and tires, including 6PPD. The resulting high-density development that occurs under this type of plan, and which are found in potential redevelopment portions of the Boeing Creek Basin along Aurora Avenue, typically require underground parking, which further reduces the amount of pollution generating impervious surfaces for stormwater to be exposed to.



4.2.B Short-term Planned Actions

The City does not plan to complete any major changes to the drainage codes until the next Permit cycle, and until the breadth of the next Permit-required code updates is fully understood.

The land use and zoning efforts identified above ([SWMA3](#)) were very recent and development is still beginning to pick up under the new codes. The light rail stations within Shoreline are scheduled to open in 2024 and are anticipated to drive more development under these new codes. The existing plan must be given time to generate the anticipated incremental benefits and there is no plan to revisit this large-scale effort in the short-term.

4.2.C Short-term SWMP-Dependent Actions

The [2024 SW Master Plan \(SWMA10\)](#) will explore and suggest necessary code edits to remain consistent with Permit updates and requirements of Permit Appendix A and the City will update its drainage codes accordingly per Permit timelines. Additional changes to the drainage codes above the permit minimums could be considered at that time, and identified potential changes are discussed below as possible long-term actions.

4.2.D Long-term SWMP-Dependent Actions

Additional potential land use actions were identified during the SMAP process which could benefit the priority watershed. However, it was also recognized that there are competing needs within our community and that these actions have the potential to impact individuals, or groups of individuals, inequitably. The City may consider: [incentivizing developments to provide additional mitigations above the permitting minimums \(SWMA14\)](#), [additional surface water land purchases \(SWMA15\)](#), [surface water fee restructuring to incentivize voluntary stormwater mitigations in the watershed \(SWMA16\)](#). However, any incentives potentially identified during the planning process would be implemented as a long-term strategy in the Boeing Creek Watershed, subject to further professional evaluation, public input, City Council approval, and prioritization in competition for City resources, including funding and staff hours.

4.3 Targeted Enhanced Stormwater Management Strategies

Operational and community outreach and engagement programs are important stormwater management strategies to integrate with capital improvements and regulatory/land development driven techniques to achieve water quality and watershed improvement goals. Existing stormwater management programs were evaluated for potential enhancements in the Boeing Creek watershed, as well as new stormwater management programs that could be effective. The following strategies were identified.

4.3.A Completed Actions

Shoreline’s existing [Trees for Shoreline program \(SWMA4\)](#) provides a free tree, watering bag and mulch, and training in proper planting and care (City of Shoreline, 2023b). As a result of the programs independent prioritization efforts based on tree canopy needs, this program already prioritizes residents in Boeing Creek Watershed for participation. By providing free trees to residents, Boeing Creek is the beneficiary of incremental water quality and habitat benefits that a healthy urban forest offers, including runoff temperature reduction, food sources for wildlife, evapotranspiration, and water usage. This program is already being implemented and will continue with Boeing Creek watershed being a priority for new trees.

4.3.B Short-term Planned Actions

No new planned activities are proposed. Current operations will continue until the [Surface Water Master Plan \(SWMA10\)](#) is completed and resources have been assessed for potential new programs and expansions of existing programs.

4.3.C Short-term SWMP-Dependent Actions

A [watershed-focused community event \(SWMA11\)](#) will be considered in the Boeing Creek Watershed in the Surface Water Master Plan Update to increase general awareness about surface and stormwater management and opportunities for community members to get involved in volunteer efforts or learn about actions they can take on their properties to support improved water quality. The City will continue to pursue opportunities to engage with the active residents in this area as opportunities arise via the City’s Environmental Services division and/or Surface Water Program Specialist.

Program changes to benefit the priority watershed were identified, but generally appear to require new or additional resources and/or staff and, therefore, require additional planning effort prior to implementation. Due to planning needs and assumed ramp-up times, the actions are identified as potential long-term actions below.

Results of the community survey indicated that there is high support for education and outreach programs, including volunteer and stewardship opportunities. Continuation and potential enhancement of programs that engage the public is important, whether through private facility inspections and certification, business outreach, or ecological-oriented programming that focuses on improving the environment. All these touch points with the community serve as opportunities to engage with the people that live and work in the Boeing Creek Basin and to encourage stewardship and behaviors that are needed to meet water quality and habitat goals.

4.3.D Long-term SWMP-Dependent Actions

In 2023, the City began a new program to conduct [Source Control inspections for Existing Development \(SWMA17\)](#). Per Permit requirements the City has developed a site inventory for this program based on risk of pollution generation. The City is planning major updates to the Source Control program inventory and prioritization to occur roughly every five years, with the next update to be implemented by 2028. In this next Source Control program update, the City plans to add a prioritization criterion to place an emphasis on inspections for sites located within the Boeing Creek Watershed that are considered high risk for generating stormwater pollution. In 2022, the City piloted a [self-certification program for privately-owned stormwater facilities \(SWMA18\)](#) which are not subject to Permit-required private facility inspections (i.e., facilities which pre-date permit requirements and/or did not trigger permitting thresholds for required water quality treatment or flow control). The Boeing Creek watershed includes most of the Aurora Avenue N commercial corridor within the City, which constitutes both the bulk of commercial properties in the City as well as most of the City's older commercial developments. Accordingly, a high percentage of these private stormwater facilities not subject to Permit inspection requirements are located in the Boeing Creek Watershed, and Boeing Creek is the primary receiving water benefiting from the existing program. This program will be further evaluated in the [2024 Surface Water Master Plan Update \(SWMA10\)](#), with the intent to continue, improve, and emphasize inspection and maintenance of private facilities in Boeing Creek Watershed.

“Soak it Up” is a [City program which offers rebates \(SWMA19\)](#) to incentivize private property owners to install small-scale rain gardens and native vegetation plantings on their properties (City of Shoreline, 2023c). The program has been moderately successful, and the City continues to evaluate ways to expand program success, including offering rebates for larger-scale retrofits on private property. The success of the program and opportunities for improvement will be evaluated during the [2024 Surface Water Master Plan Update \(SWMA10\)](#), including methods to increase participation in the Boeing Creek watershed.

The City identified two additional actions which *could* be studied in future planning efforts. The first would be a [maintenance study \(SWMA20\)](#) to assess and direct City storm water maintenance efforts to be as effective and efficient as possible. Implementing findings from such a study would ensure the best protection of the priority watershed and may allow the City to redistribute resources to best benefit the watershed without sacrificing service elsewhere. Additionally, [outreach programs could be tailored to the priority watershed, or the issues impacting this specific watershed \(SWMA21\)](#). Again, evaluation of impacts to equity, other watersheds, and Permit requirements would all need to be factored and appropriately balanced in such effort.

Any potentially recommended actions identified during the planning process would be implemented as a long-term strategies in the Boeing Creek Watershed, subject to further professional evaluation, public input, City Council approval, and prioritization in competition for City resources, including funding and staff hours.

There are actions which were identified during this process, but which were not selected for inclusion in the final SMAP programs. Typically, these programs were either of minimal benefit to the priority watershed compared to effort of the action or were potentially detrimental to other receiving waters outside the priority watershed. See Appendix A for the complete list of actions considered.

4.4 Budget and Schedule

All proposed programs and projects are predominantly funded by the City's Surface Water Management (SWM) Fund, which receives revenue almost wholly from SWM Fees paid by property owners. For a few actions, grants funding may be mandatory to support the program or project. Grants are tracked separately in the utility's existing grant management program.

SWMAs identified as *planned* in this SMAP are typically fully funded under existing authorized budgets unless noted otherwise. Any project, short-term or long-term, which is listed as *SWMP-dependent* in this SMAP are reliant on future planning efforts under a SW Master Plan process; these SWMAs should be considered tentative only, until completion of that process.

The SW Master Planning effort determines overall Surface Water Utility priorities and requirements and allocates Surface Water Management (SWM) Fee funding by means of a SWM Fee Rate Study. The City's SW Master Planning interval is roughly six years: the previous SW Master Plan was finished in 2018; accordingly, the next SW Master Plan update is starting (as of early 2023) and expected to be completed by end of 2024 and cover a planning period through 2030. Short-term actions that are identified during the master plan update will be pursued during this period according to a funding schedule identified in the plan.

Because the present SMAP requirement arose between City SW Master Plans, the only Stormwater Management Actions that the City can propose are those which can be implemented under existing projects and programs and/or fit within discretionary spending allowed under previously authorized budgets as determined by the 2018 SW Master Plan.

4.5 Adaptive Management

This document outlines retrofit projects, land management and development strategies, and stormwater management strategies the City intends to implement to protect or enhance receiving waters in the Boeing Creek Watershed. The City is updating its Surface Water Master Plan (SWMA11) over the next one to two years and will be identifying and prioritizing projects in the Boeing Creek Watershed during that effort. It is anticipated that the City's Surface Water Master Plan updates roughly every six years and future Permit reissuances will provide ample future opportunities to clarify, refine, and expand the City's Stormwater Management Action Planning as required by Permit.

Retrofit projects identified in this plan and any new retrofit projects identified for the Boeing Creek Watershed will be identified, prioritized, funded, and implemented in the City's ongoing capital project planning and budgeting processes.

Development and stormwater management design standards are reviewed and updated concurrent with City-wide Surface Water Comprehensive Planning, and when new state-wide manuals are updated. This gives the City an opportunity to review and evaluate if additional requirements are having the intended outcome, or if modifications are needed.

The City has been monitoring water quality in Boeing Creek for many years and has a good baseline of data to draw upon to evaluate trends as additional stormwater management strategies are implemented and stormwater retrofits are constructed.

The City will track the various strategies that are being implemented to evaluate which strategies are most successful for (1) encouraging community engagement and action, (2) accelerate stormwater retrofits, and (3) preserve and protect the watershed.

This plan will be reviewed annually during Permit reporting to determine if shifts need to be made in program activities.

5.0 References

- Brown and Caldwell, 2018. Surface Water Master Plan Prepared for the City of Shoreline, Shoreline, Washington, October 29, 2018.
- City of Shoreline, 2021. Engineering Development Manual, effective 3/1/2021.
- City of Shoreline, 2022a. Stormwater Management Action Plan Receiving Water Characterization.
- City of Shoreline, 2022b. Stormwater Management Action Plan Watershed Prioritization.
- City of Shoreline, 2023a. City Plans. <https://www.shorelinewa.gov/government/departments/planning-community-development/city-plans>.
- City of Shoreline, 2023b. Trees for Shoreline. <https://www.shorelinewa.gov/our-city/environment/trees/trees-for-shoreline-4210>.
- City of Shoreline, 2023c. Soak it Up Rebate Program. <https://www.shorelinewa.gov/government/departments/public-works/surface-water-utility/get-involved/soak-it-up-rebate-program>.
- Ecology, 2019a. Western Washington Phase II Municipal Stormwater Permit, Effective August 1, 2019.
- Ecology, 2019b. 2019 Stormwater Management Manual for Western Washington (SWMMWW).

Appendix A
SMAP Projects and Programs Matrix

**City of Shoreline
SMAP Projects and Programs Matrix**

Project/Program Name	Schedule	Funding Source	Description of Potential Project or Program Changes	Anticipated Impact	Likelihood to proceed	Implementation Details/Challenges
Stormwater Projects & Retro-fits						
Hidden Lake Phase 1: Dam Removal	Constructed 2022	City SW Utility Funding (CIP) & Grant Funding	Remove existing dam which restricts fish movement, prohibits natural sediment transport, and causes flooding. Restore the creek with new stream channel habitat.	Reduced flooding, improved fish passage, improved nearshore habitat (restored natural sediment delivery), improve instream habitat, and reduced City maintenance.	Complete	Construction completed in 2022; dam no longer exists.
Hidden Lake Phase 2: NW Innis Arden Way Boeing Creek Culvert Replacement	Construction 2024	City SW Utility Funding (CIP) & Grant Funding	Replace existing fish barrier culvert which causes flooding at this location with new fish passage culvert.	Reduced flooding, improved fish passage, improved nearshore habitat (restored natural sediment delivery), improve instream habitat, and reduced City maintenance.	Planned	Planned 2024 construction.
Aurora Bioretention Improvements	Short-term	City SW Utility Funding (CIP)	Previously built bioretention facilities installed along Aurora Avenue are not functioning ideally. The City plans to re-design and restore the bioretention area to improve function. Work likely include infrastructure improvements to inlets, curb, gutter, and sidewalk.	Enhanced water quality treatment of roadway runoff, reduced flooding, and restored MS4 capacity.	Planned	This is a currently planned activity, which staff intend to roll out in small phases. A small handful of the individual facilities will be improved on a trial basis. Maintenance feedback and lessons learned will be gathered and incorporated in the next batch of improvements as needed.
Linden Ave. Flood Reduction/LID Retrofit	Budgeted for 2023	City SW Utility Funding (CIP)	Study to identify potential new retrofit facility locations to address existing flooding around Linden Ave.	Identify additional retrofit projects to be included in near-term future updates to the SMAP to reduce flooding and restore MS4 capacity.	Planned	This study was included in the previous stormwater master plan and is budgeted for a 2023 start date.
N 149th St. Bio-retention restoration and retrofit	Construction 2024	City SW Utility Funding (CIP) & Grant Funding	Rehabilitate existing impacted bioretention areas, and provide significant expansion of center island bioretention where current flooding occurs. (WO34297)	Restored and enhanced water quality treatment of roadway runoff, reduced flooding, and restored MS4 capacity.	Planned	Planned 2024 construction as part of storm drain small projects CIP project.
Strategic Opportunities Funding	Ad-hoc	City SW Utility Funding (CIP) & Grant Funding	Secured set aside funding which can be utilized to increase stormwater mitigation and effective management above minimum requirements on CIP projects led by other departments. This effort will be prioritized within Boeing Creek basin when feasible (based on CIP construction scheduling).	Enhanced water quality treatment of roadway runoff, reduced flooding, and restored MS4 capacity. Staff believe this type of opportunistic approach to stormwater results in exceptionally cost effective stormwater benefits.	Planned	Stormwater Utility staff already play an active role in reviewing all CIP projects for drainage needs and drainage mitigation requirements. Additional budget will allow staff to capitalize on opportunities and gain efficiencies by incorporating additional stormwater work into other CIP projects should be pursued as CIP project develop and opportunities are presented.
Study retrofit opportunities to enhance existing stormwater facilities	Short-term	City SW Utility Funding (CIP) & Grant Funding	Study of existing City stormwater facilities within basin (including M1 Dam, Boeing North Pond, and Pan Terra Pond/Pump Station) to evaluate for potential to improve treatment functions via operational changes and/or retrofits	Identify additional retrofit projects for <i>existing</i> facilities to be included in near-term future updates to the SMAP.	High	Inclusion of such a study should be considered further in the near term stormwater comprehensive plan update. Projects involving these facilities would be significant in cost, complications, and permitting requirements and would need to be identified sooner in order to be appropriate planned.
Study potential new SW retrofit opportunities	Short-term	City SW Utility Funding (CIP) & Grant Funding	Basin-wide study to consider optimal locations for stormwater BMP retrofits, to be completed after initial retrofit project list (resolving known issues) is completed.	Identify additional retrofit projects for <i>new</i> facilities to be included in near-term future updates to the SMAP.	High	Inclusion of such a study should be consider further in the near term stormwater comprehensive plan update. While the City has a backlog of potential retrofit opportunities that could eb pursued, they should eb evaluated and prioritized to ensure the most effective use of public monies.
Westminster Triangle Bioretention Conversion & Expansion	Long-term	City SW Utility Funding (CIP) & Grant Funding	Existing bioswale area which can be converted to bioretention and significantly expanded in its capacity to provide mitigation. (WO 52723)	Enhanced water quality treatment of roadway runoff, reduced flooding, and restored MS4 capacity.	Medium	Space, a typically limiting resource for public retrofit facilities, is available for this project to proceed as soon as funding can be secured. While it is not the a site of active flooding, erosion nuisances are impacting water quality and requiring above-average City resources to maintain the current facility. Needs to be prioritized with other known issues before implementation.

**City of Shoreline
SMAP Projects and Programs Matrix**

Project/Program Name	Schedule	Funding Source	Description of Potential Project or Program Changes	Anticipated Impact	Likelihood to proceed	Implementation Details/Challenges
Greenwood Ditch Conversion	Long-term	City SW Utility Funding (CIP) & Grant Funding	Use upstream bioretention to reduce flooding at shallow ditch near N 201st St. (WO47449)	Enhanced water quality treatment of roadway runoff, reduced flooding, and restored MS4 capacity.	Medium	Addresses known flooding issues and should be pursued as soon as funding can be secured. Needs to be prioritized with other known issues before implementation.
188th LID Retrofit	Long-term	City SW Utility Funding (CIP) & Grant Funding	Between Linden and Fremont, remove existing ditch and pipe system and replace with bioretention facilities. (WO22167)	Enhanced water quality treatment of roadway runoff, reduced flooding, and restored MS4 capacity.	Medium	Addresses known flooding issues and should be pursued as soon as funding can be secured. Needs to be prioritized with other known issues before implementation.
2nd Ave LID Retrofit	Long-term	City SW Utility Funding (CIP) & Grant Funding	Install multiple bioretention cells to replace intermittent drainage system between 195th and 193rd which can result in flooding. (WO5501)	Enhanced water quality treatment of roadway runoff, reduced flooding, and restored MS4 capacity.	Medium	Addresses known flooding issues and should be pursued as soon as funding can be secured. Needs to be prioritized with other known issues before implementation.
185th Place LID Retrofit	Long-term	City SW Utility Funding (CIP) & Grant Funding	Install multiple bioretention cells to replace intermittent and filled in drainage system around north curve connecting Dayton Place and Evanston Ave. (WO46262, WO46248, & WO47678)	Enhanced water quality treatment of roadway runoff, reduced flooding, and restored MS4 capacity.	Medium	Addresses known flooding issues and should be pursued as soon as funding can be secured. Needs to be prioritized with other known issues before implementation.
189th LID Retrofit	Long-term	City SW Utility Funding (CIP) & Grant Funding	Install multiple bioretention cells to replace intermittent and in-filled drainage system which drains to the south mid-block. (WO46261)	Enhanced water quality treatment of roadway runoff, reduced flooding, and restored MS4 capacity.	Medium	Addresses known flooding issues and should be pursued as soon as funding can be secured. Needs to be prioritized with other known issues before implementation.
Dayton Ave Shoulder Retrofit	Long-term	City SW Utility Funding (CIP) & Grant Funding	Install multiple bioretention cells and/or underground infiltration facilities to address existing ponding along Dayton between 150th and 155th. (WO39401)	Enhanced water quality treatment of roadway runoff, reduced flooding, and restored MS4 capacity.	Medium	Addresses known flooding issues and should be pursued as soon as funding can be secured. Needs to be prioritized with other known issues before implementation.
Study potential retrofit opportunities under CIP projects led by other departments	Short-term	City SW Utility Funding (CIP) & Grant Funding	Basin-wide study to consider stormwater BMP retrofit opportunities under transportation projects, including sidewalk projects. The City's Sidewalk Prioritization Plan has identified a number of high priority sidewalks within the Boeing Creek Basin, including on Dayton Ave N, Fremont Ave N, Linden Ave N, N 195th St, and 3rd Ave NW	Enhanced water quality treatment of roadway runoff, reduced flooding, and restored MS4 capacity.	Low	Staff believe a study to this effect would likely be too slow to keep pace with constantly evolving CIP program and projects list. Current operation likely best to continue, in which stormwater staff involved in CIP project development and review have a chance, and duty, to identify these potential opportunities where they arise. "Strategic Opportunity Funding" noted in this matrix is intended to serve a similar intent and will be used to implement the opportunities as they arise.
Interurban Trail Bioswales Implementation	Long-Term	City SW Utility Funding (CIP) & Grant Funding	Construct a series of bio-swales and bioretention facilities along the Interurban Trail	Enhanced water quality treatment of roadway runoff, reduced flooding, and restored MS4 capacity.	Low	Project requires coordination and permissions from Seattle City light as the owner of the trail right-of-way. These extra complications, likely limited benefit, and additional funding needed to perform the initial study, make the project not likely to rank high within a prioritization process which considers the City's limitation on resources.
Replacement of BNSF Culvert	Long-term	BNSF, City SW Utility Funding (CIP), & Grant Funding	Remove and replace culvert under BNSF tracks with updated culvert with improved fish passage, tidal exchange, and climate resiliency.	Improved fish passage, near-shore aquatic habitat, tidal exchange, and climate resiliency.	Low	This project is not currently within City control and would require participation from BNSF. City may consider attempting to gather stakeholders around this topic at some point in the future but additional funding from BNSF, and/or significant grant contributions would be needed to get the project completed and is likely beyond current stormwater utility capability to self-fund.
Freemont ROW/Regional Facility	Long-term	City SW Utility Funding (CIP) & Grant Funding	2019 study evaluated the potential for a large scale regional facility within the Boeing Creek Basin. The initial concept could be re-tooled as a smaller retrofit project.	Enhanced water quality treatment of roadway runoff, reduced flooding, and restored MS4 capacity.	Low	Initial study ultimately found this project to be infeasible. A limited version of the project could be considered, but would likely be evaluated under the new LID facilities study noted in this matrix.

**City of Shoreline
SMAP Projects and Programs Matrix**

Project/Program Name	Schedule	Funding Source	Description of Potential Project or Program Changes	Anticipated Impact	Likelihood to proceed	Implementation Details/Challenges
Removal of North Pond Dam	N/A	N/A	Remove and replace a City operated dam to re-establish fish passage.	Improved fish passage. Reduced water quality and flow control downstream of current dam. Reduced City maintenance.	N/A	This project would ultimately be a negative impact to the receiving waters (Puget Sound). While improved fish passage would extend potential new habitat to anadromous fish, the removal of water quality and flow control mitigations currently provided by the dam would significantly reduce the quality of stream and nearshore habitats. It would also generate significant new flood management risks for the City.
Removal of M1 Dam	N/A	N/A	Remove and replace a City operated dam to re-establish fish passage.	Reduced water quality and flow control downstream of current dam. Reduced City maintenance.	N/A	This project would ultimately be a negative impact to the receiving waters (Puget Sound). Seasonal flows at this location dry up in absence of rainfall and include predominately unmitigated stormwater flows from Highway 99/Aurora; fish access to this facility and upstream reach should not be promoted and could result in harm to fish life. Additionally, the removal of water quality and flow control mitigations currently provided by the dam would significantly reduce the quality of stream and nearshore habitats. It would also generate significant new flood management risks for the City.

Land Management or Development Strategies

Drainage Code: Flow Control (MR #7)	Short-term	City SW Utility Funding (Operations)	Decrease threshold for MR #7 within Boeing Creek Basin.	Enhanced control of flowrates from new and redevelopment. However, given that basin is already mostly developed this effort is anticipated to have minimal impacts on the waterway.	Complete	The City of Shoreline implements a City-wide additional threshold for requiring MR #7 (flow control) which applies to any site with greater than 50% effective impervious surfaces. This provision, or similar one, shall remain in the Shoreline-specific drainage code above the minimum requirements of Appendix 1.
Land-use Codes	Short-term	City General Fund	Develop land-use codes in a logical manner that centers around future anticipated uses and needs.	Reduce amount of potential pollution from commercial and industrial sites. However, given that basin is already mostly developed this effort is anticipated to have minimal impacts on the waterway.	Complete	The City has taken significant actions such as subarea planning and rezoning to focus the majority of new housing and employment growth into areas near high capacity transit. One of the primary goals of focusing growth to these areas is to encourage compact development that more efficiently uses infrastructure and supports transit use and less reliance on cars – reducing greenhouse gas emissions, surface water pollution, and stormwater runoff – and reducing some growth pressures in areas with more environmentally critical areas and less infrastructure capacity. Development regulations are one of the primary tools to implement the subarea plans and they take into consideration many variables such as transportation, utilities, stormwater, open space, etc. These plans have been adopted and are intended to be implemented over many decades as new development occurs. The performance of the development regulations will continue to be monitored and refined as needed to meet the goals of the plan.

**City of Shoreline
SMAP Projects and Programs Matrix**

Project/Program Name	Schedule	Funding Source	Description of Potential Project or Program Changes	Anticipated Impact	Likelihood to proceed	Implementation Details/Challenges
Re-zoning	N/A	N/A	Develop zoning codes in a logical manner that centers around future anticipated uses and needs.	Re-zoning by watershed would result in disconnected clusters of development, a continued dependency on cars, and a higher potential for resulting inequities. It is believed that re-zoning by watershed would ultimately be a negative impact on the environment compared to current City zoning plans.	Complete	The City has taken significant actions such as subarea planning and rezoning to focus the majority of new housing and employment growth into areas near high capacity transit. One of the primary goals of focusing growth to these areas is to encourage compact development that more efficiently uses infrastructure and supports transit use and less reliance on cars – reducing greenhouse gas emissions, surface water pollution, and stormwater runoff – and reducing some growth pressures in areas with more environmentally critical areas and less infrastructure capacity. Development regulations are one of the primary tools to implement the subarea plans and they take into consideration many variables such as transportation, utilities, stormwater, open space, etc. These plans have been adopted and are intended to be implemented over many decades as new development occurs. The performance of the development regulations will continue to be monitored and refined as needed to meet the goals of the plan.
Incentivize development stormwater treatment above minimums of NPDES Permit Appendix 1	Long-term	City SW Utility Funding (Operations)	Explore, evaluate, and consider additional benefits for developments which elect to voluntarily exceed minimum stormwater mitigation requirements. This effort would require council approval and inter-departmental cooperation to complete. Incentives could include reduced permit fees, additional units, parking reductions, and/or reduce SW fees/utility connection fees.	Enhanced water quality treatment and/or control of flowrates from new and redevelopment. However, given that the basin is already mostly developed this effort is anticipated to have minimal impacts on the waterway.	Medium	This program could be explored in further detail but would likely require additional study to understand the impacts that any concession may have on City resources. Such code changes would require City Council approval and would be dependent on a multitude of factors beyond the control of stormwater staff. The program would likely be applied City-wide for the most equitable distribution of impacts and benefits. Because facilities under this program are likely expansions of facilities already required of development and included in the City's private facility inspection program required for NPDES compliance, this program would have a relatively limited impact on existing City resources once established
Stormwater Utility Land Purchase	Ad-hoc	City SW Utility Funding (Operations)	No planned or identified purchases. Purchase opportunities to be case-by-case evaluation based on the property's ability to achieve a measurable surface water impact.	As planned, new properties would allow for construction of new stormwater facilities to enhance water quality treatment of roadway runoff, reduced flooding, and restore MS4 capacity.	Medium	The City stormwater department is not in a position to become significant agents of conservation. Funding has not been set aside nor are their maintenance resources available for property acquisitions purely for conservations sake. However, where stormwater benefits can be achieved, such as new facilities, new BMPs, and enhanced maintenance, such property's may be considered for purchase as current City budget allows and/or incorporated into future budgets for purchase as soon as funding can be secured.
Surface Water Fee restructuring and/or general facility connection charges	Long-term	City SW Utility Funding (Operations)	Explore, evaluate, and consider new connection charges to support surface water operations, and restructure surface water fee program to reward stormwater mitigation. Those without any stormwater treatment would pay higher fee with the hope of incentivizing private retrofits. This effort would require council approval and inter-departmental cooperation to complete.	Enhanced water quality treatment and/or control of flowrates from new and redevelopment.	Medium	This program could be explored in further detail but would likely require additional study to understand the impacts that any concession may have on City resources. This program would require an new enforcement arm, including a need to inspect new facilities which are not currently required for inspection under the NPDES permit; the additional need for City resources in order to manage this kind of program are anticipated to be significant. Such code changes would require City Council approval and would be dependent on a multitude of factors beyond the control of stormwater staff. The program would likely be applied City-wide for the most equitable distribution of impacts and benefits.

**City of Shoreline
SMAP Projects and Programs Matrix**

Project/Program Name	Schedule	Funding Source	Description of Potential Project or Program Changes	Anticipated Impact	Likelihood to proceed	Implementation Details/Challenges
Tree Retention Code	Ad-hoc	City General Fund	Increase the minimum amount of tree required to be retained for all, or select, zoning within the Boeing Creek Basin.	Preserve greater amounts of pervious area and canopy cover, reducing stormwater that reaches receiving waters. However, given that basin is already mostly developed this effort is anticipated to have minimal impacts on the waterway.	Medium	Stormwater staff will continue to coordinate with the planning department during future code updates and advocate for larger percentages of trees to be retained in all areas of the City. However, tree retention requirements are on par with neighboring jurisdictions and already include provisions for concessions to be granted in development requirements for projects with tree retention above code required minimums. Given that the basin is predominantly developed already and major portions of the basin are permanently preserved as open space, passive recreation tracts, or parks, the potential benefits to receiving waters appears relatively low and may conflict with other City goals, including meeting regional housing needs. Efforts to plant <i>new</i> trees, as with the City's free tree program, may be more appropriate for this basin. Such code changes would require City Council approval and would be dependent on a multitude of factors beyond the control of stormwater staff. The program would likely be applied City-wide for the most equitable distribution of impacts and benefits.
Drainage Code: LID (MR #5)	Short-term	City SW Utility Funding (Operations)	Decrease threshold for MR #5, or increase typical SWMMWW sizing of facilities within Boeing Creek Basin.	Enhanced water quality treatment and reduced nuisance erosion (i.e.. low-flows) from new and redevelopment. However, given that basin is already mostly developed this effort is anticipated to have minimal impacts on the waterway.	Low	Staff will consider appropriateness of this option and may present such a code change to City Council when the new Ecology <i>Stormwater Management Manual for Western Washington</i> (SWMMWW) is required to be incorporated into City codes during the next permit-cycle. However, most issues with Boeing Creek are during larger storm events; addressing MR #7 may be more appropriate. Such code changes would require City Council approval and would be dependent on a multitude of factors beyond the control of stormwater staff. The program would likely be applied City-wide for the most equitable distribution of impacts and benefits.
Drainage Code: Water Quality (MR #6)	Short-term	City SW Utility Funding (Operations)	Decrease threshold for MR #6, or increase typical SWMMWW sizing of facilities within Boeing Creek Basin.	Enhanced water quality treatment from new and redevelopment. However, given that basin is already mostly developed this effort is anticipated to have minimal impacts on the waterway.	Low	Staff will consider appropriateness of this option and may present such a code change to City Council when the new Ecology SWMMWW is required to be incorporated into City codes during the next permit-cycle. However, most issues with Boeing Creek are not water quality concerns; addressing MR #7 may be more appropriate. Such code changes would require City Council approval and would be dependent on a multitude of factors beyond the control of stormwater staff. The program would likely be applied City-wide for the most equitable distribution of impacts and benefits.
Land-use Codes	N/A	N/A	Restrict certain land uses specifically within the Boeing Creek Basin.	Reduce amount of potential pollution from commercial and industrial sites. However, given that basin is already mostly developed this effort is anticipated to have minimal impacts on the waterway.	N/A	The City has undergone a significant re-zoning effort to prepare for future projections of traffic, people, and development, including clustering development around logical hubs created by incoming Sound Transit light-rail stations. Land-uses along Highway 99 could be further restricted, however this may create additional inequities and would simply shift the water quality impacts to another, more impacted (as known from prioritization effort), receiving water. Treating these land-uses in the upper reaches of the basin with appropriate source controls, will be more effective at benefiting receiving waters. It is not recommended that Shoreline pursue basin-specific land-use restrictions.

**City of Shoreline
SMAP Projects and Programs Matrix**

Project/Program Name	Schedule	Funding Source	Description of Potential Project or Program Changes	Anticipated Impact	Likelihood to proceed	Implementation Details/Challenges
Re-zoning	N/A	N/A	Re-zone specifically within the Boeing Creek Basin for reduced maximum impervious coverages.	Re-zoning by watershed would result in disconnected clusters of development, a continued dependency on cars, and a higher potential for resulting inequities. It is believed that re-zoning by watershed would ultimately be a negative impact on the environment compared to current City zoning plans.	N/A	The City has undergone significant re-zoning effort to prepare for future projections of traffic, people, and development, including clustering development around logical hubs created by incoming Sound Transit light-rail stations. Nearly 47% of the basin is already low density residential and the high density areas are already clustered around logical hubs based on anticipated future needs. Re-zoning by watershed would ultimately create additional inequities, increase dependency on cars trips, and ultimately be a negative to all receiving waters. It is not recommended that Shoreline pursue basin-specific zoning restrictions.
Parks Department PROS Plan/Land Acquisition Plan	N/A	N/A	Revisit parks land acquisition plan to focus on conservation in Boeing Creek	Preserve greater amounts of pervious area and canopy cover, reducing and cooling stormwater that reaches receiving waters.	N/A	The City's PROS plan lays out park acquisition needs based on community demands, growth patterns, and existing gaps in service. Revising the plan solely for stormwater benefits would be counterproductive to the intent of the plan and result in additional inequities. Stormwater staff will continue to coordinate with the parks department during development of any future parks project and seek opportunities as they arise. However, revisiting the park planning documents solely for the Boeing Creek Basin is not recommended for implementation in the City of Shoreline.

Targeted Enhance Stormwater Management

Tree Planting Program	Short-term	General fund (Environmental Services Department) & City SW Utility Funding (Operations)	The City is piloting a program to provide free trees to resident who wish the plant and preserve the tree. Tree distribution could be prioritized within Boeing Creek Basin	Increased tree canopy cover, reducing and cooling stormwater that reaches receiving waters.	Complete	The program is already underway and includes a prioritization factor based on a "tree equity" score, for which the Boeing Creek Basin scores as a high priority area. The Boeing Creek Basin is already prioritized by the programs own goals.
Public Education & Outreach	Short-term	General fund (Environmental Services Department)	Host Boeing Creek watershed-specific community event.	Assumed improvements in the water quality of urban runoff and local streams	High	A community event in Boeing Creek was previously planned and supported by a mini-grant, but was not able to occur as planned in 2022. Staff will continue to seek opportunities for Boeing Creek basin specific outreach efforts.
Source Control Inspections	Long-term	City SW Utility Funding (Operations)	Prioritize new source control inspections within Boeing Creek Basin, but only within the current risk assessment prioritization.	Improved water quality in urban runoff and local streams.	Medium	This is a new program which will initially have a more businesses to inspect than is required each year. The City has already conducted a prioritization based on risk-assessment for pollution generating discharges; this prioritization should not be deviated from and will ultimately protect water quality better than basin-only prioritization. However, within the existing risk-based prioritization, Boeing Creek businesses can be selected as the first sites to be inspected.
Non- NPDES private facility inspections and maintenance	Long-term	City SW Utility Funding (Operations)	Prioritize the City's private facility self-certification efforts within Boeing Creek basin. This is the program which inspects and achieves maintenance of private stormwater facilities which pre-date the NPDES requirement for annual inspection.	Improved water quality and flow control in urban runoff and local streams. Because older facilities may not have been inspected or maintained for year or decades previously, this program can have relatively large impacts on the receiving waters.	Medium	In 2022 the City piloted a new program for the owners of non-NPDES required private facilities to self-certify inspection and maintenance. It is recommended that these efforts be prioritized within the Boeing Creek basin.

**City of Shoreline
SMAP Projects and Programs Matrix**

Project/Program Name	Schedule	Funding Source	Description of Potential Project or Program Changes	Anticipated Impact	Likelihood to proceed	Implementation Details/Challenges
LID Rebate Program	Short-term	City SW Utility Funding (Operations)	The City has an existing LID Rebate Program, called Soak It Up (SIU). SIU satisfies the City's E&O Stewardship requirements of the NPDES Permit and provides residential property owners with rebates up to \$2000 per property for City-approved raingarden and native vegetation landscaping retrofits on private properties. The City could consider expanding and/or prioritizing SIU activity within the Boeing Creek basin.	Improved water quality in urban runoff and local streams. However, the small-scale retrofits on individual private properties that characterize this program are of limited impact to the downstream receiving waters, and there are limited numbers of properties owners willing and able to take on such improvements.	Medium	This program is generally limited by the number of participating residents so that currently, no prioritization is needed. However, prioritization of Boeing Creek could and should be implemented if the program reaches that level of participation. Significant expansion of the program is estimated to require significant City resources to allow for expanded technical guidance, program management, and post installation inspections.
Maintenance Efficiency Study	Short-term	City SW Utility Funding (Operations)	Perform monitoring of BMP effectiveness and current maintenance operations to identify optimal frequency, methods, procedures, and/or modifications to current maintenance practices for certain facilities with Boeing Creek.	Improved water quality in urban runoff and local streams and or reduced City-maintenance needs (thus, freeing up resources for other projects/programs).	Medium	This should be considered in the future stormwater comprehensive plan update, as either specific to Boeing Creek or City-wide. The results could direct City maintenance across either scale. However, existing maintenance standards have generally built upon initial standards provided by the Department of Ecology and improved with lessons learned by staff; they are not assumed to be overly far from ideal as written.
Outreach Programs	Long-term	City SW Utility Funding (Operations)	The City could create focused outreach programs within the Boeing Creek basin intended to raise public awareness to improve water quality and reduce impacts to Boeing Creek. Some ideas include: pet waste management, downspout disconnection, vehicle maintenance, trip reduction, storm drain marking, etc.	Assumed improvements in the water quality of urban runoff and local streams	Medium	The City needs to evaluate potential benefits of implementing this program, resource limitations, and considerations for Citywide application of a program vs as prioritized within one basin. Requirements of the current NPDES permit have already required setting outreach goals and programs; accordingly this would likely not be implemented until the next NPDES permit cycle and is listed as a long-term action.
Enhanced maintenance	N/A	N/A	Prioritize pipe/ditch cleaning efforts within Boeing Creek Basin	Enhanced water quality treatment of roadway runoff, reduced flooding, and restored MS4 capacity.	N/A	The City currently operates a City-wide maintenance program for cleaning and maintaining the pipe and ditch drainage system and is generally of the option that this is not a program which should not be restricted or prioritized to a single basin. Any neglect of other basin puts those water at greater risk for WQ impairments, the MS4 at greater risk of failure, and the City at greater risk of liability. It is also doubtful such a program would provide significant credits under a future structural source control programs anticipated to prescribed by Ecology in future permit cycles. A basin-specific maintenance plan is not recommended for the City for Shoreline.
Enhanced street sweeping	N/A	N/A	Prioritize street sweeping efforts within Boeing Creek Basin	Enhanced water quality treatment of roadway runoff.	N/A	City currently operates a City-wide street sweeping program which operates at maximum capacity for current resources. Any enhanced effort would require neglecting another receiving water, significant amounts of new equipment, or additional contracts and budgets. Benefit gained from large amounts of additional funding needed are anticipated to be minimal. It is also doubtful such a program would provide significant credits under a future structural source control programs anticipated to prescribed by Ecology in future permit cycles. A basin-specific maintenance plan is not recommended for the City for Shoreline.

**City of Shoreline
SMAP Projects and Programs Matrix**

Project/Program Name	Schedule	Funding Source	Description of Potential Project or Program Changes	Anticipated Impact	Likelihood to proceed	Implementation Details/Challenges
IDDE Field Screening	N/A	N/A	Prioritize IDDE screening within Boeing Creek Basin	Enhanced water quality treatment of roadway runoff, reduced flooding, and restored MS4 capacity.	N/A	Current NPDES permit includes a requirement to screen the entire City over the permit term. The City is not able to focus on only one area and remain compliant with the permit without additional resources. Additional resources to enhance this program would be significant compared to limited benefits. It is also doubtful such a program would provide significant credits under a future structural source control programs anticipated to prescribed by Ecology in future permit cycles. A basin-specific maintenance plan is not recommended for the City for Shoreline.
CB Inspection Program	N/A	N/A	Prioritize catch basin inspections within Boeing Creek Basin	Enhanced water quality treatment of roadway runoff, reduced flooding, and restored MS4 capacity.	N/A	Current NPDES permit includes a requirement to inspect all catch basins on a prescribed schedule. The City is not able to focus on only one area and remain compliant with the permit without additional resources. Additional resources to enhance this program would be significant compared to limited benefits. It is also doubtful such a program would provide significant credits under a future structural source control programs anticipated to prescribed by Ecology in future permit cycles. A basin-specific maintenance plan is not recommended for the City for Shoreline.
Long Range Plan Changes						
Surface Water Master Plan	Short-term	City SW Utility Funding (Operations)	Incorporation of Boeing Creek as a priority basin in the upcoming plan update.	The City's Surface Water Comprehensive Plan provides guidance over all aspects of surface water and stormwater management in the City, including staffing, operational programs, capital projects, utility rates, and funding plan. Programs or projects carried into the comprehensive plan update will be more likely to be implemented in the short-term.	Planned	The City's Surface Water Comprehensive Plan update is planned to start by the end of 2022 and should be finished by 2024. It is recommended that updated plan and CIP list reflect Boeing Creek as a priority basin and consider all of the currently identified projects above in the larger context of balancing budgets and <i>all</i> City stormwater needs.

Appendix B
Receiving Water Characterization Results

City of Shoreline - Receiving Water Prioritization

Part 1- Prioritization Pinciples (per SMAP Guidance) plus Public Support

Weighting Priority (Change % Here)	WQ Impairment		20%	Jurisdictional control		25%	Overburdened community	15%	Salmonids Present		10%	Public Support		10%	
High Priority Basins	Receiving water impairment (water quality data, B-IBI, habitat surveys)	WQ Impairment (high scores mean less impairment- better chance of success)	Points for WQ impairment	% in City Control (Jurisdictional Influence)	Relative control (5 pts = 100% City control)	Points for Jurisdictional influence	Overburdened communities where WQ and human health impacts overlap	Points for overburdened communities	Per WDFW SalmonScape Fish Distribution: Anadromous species use?	Fish use pts	Points for salmonids (10 pts for In City, 5 pts for downstream of City, 0 pts for none)	Public Support (numbers from survey)	Relative Public Support Score (compared to highest basin, 5 pts max)	Public Support Prioritization Points	Characterization Sub-Total Prioritization
Boeing Creek/Puget Sound	Good	4	16	100	5	25	Yes	15	Yes - In City	10	10	67	5	10	76
McAler Creek/Lake Washington	Fair	3	12	28	2	10	Yes	15	Yes - In City	10	10	42	3	6	53
Thornton Creek/Lake Washington	Poor	2	8	32	2	10	Yes	15	Yes - Downstream	5	5	65	5	10	48
Storm Creek/Puget Sound	Poor	2	8	51	3	15	N/A	0	No	0	0	30	2	4	27
Lyon Creek/Lake Washington	No Data	1	4	6	1	5	N/A	0	Yes - Downstream	5	5	28	2	4	18

City of Shoreline - Receiving Water Prioritization

Part 2- Feasibility for benefit from SWM actions

Weighting Priority (Change % Here) 	Impervious in need of treatment		10%	Public Area Available for Treatment					10%	Sum
	% of Impervious Surfaces Treated (WQ, Flow Control, or Both)	Relative Treatment Score (compared to most treated basin, 5 pts max for least treatment)	Points for Potential Impervious Surface Treatment	% ROW	% Parks	Total % public land as ROW and Parks	Relative Public Land Score (compared to highest basin, 5 pts max)	Points for Potential Use of Public Land for Retrofit or SW Facilities	Feasibility Sub-total Prioritization	TOTAL PRIORITIZATION (Characterization + Feasibility)
High Priority Basins										
Boeing Creek/Puget Sound	29	1	2	17	6	23	4	8	10	86
McAler Creek/Lake Washington	13	3	6	25	1	26	5	10	16	69
Thornton Creek/Lake Washington	21	2	4	21	7	28	5	10	14	62
Storm Creek/Puget Sound	2	5	10	16	10	26	5	10	20	47
Lyon Creek/Lake Washington	31	1	2	15	4	19	4	8	10	28

Appendix C
Watershed Prioritization Methodology
and Results



Memorandum

DATE: June 30, 2022

TO: File

FROM: Zack Richardson, Surface Water Engineer II

RE: Watershed Prioritization - Stormwater Management Action Plan (NPDES Phase II Permit Compliance S5.C.1.d.ii)

The City of Shoreline (City) is required to conduct Stormwater Management Action Planning (SMAP) under its NPDES Phase II Municipal Separated Storm Sewer Permit (Permit). SMAP elements in the Permit (S5.C.1.d) include:

1. Receiving Water Assessment (S5.C.1.d.i): includes characterization of watershed conditions and identification of watersheds most likely to benefit from stormwater management planning.
2. Receiving Water Prioritization (S5.C.1.d.ii): includes ranking based on criteria used to differentiate watersheds that will benefit most from stormwater management actions.
3. Stormwater Management Action Plan (S5.C.1.d.iii): for a high priority watershed, identifies projects, strategies, and targeted operational and educational enhancements to improve water quality in the watershed, including a proposed short- and long-term implementation schedule and budget.

In addition to the requirements outlined in the Permit, Ecology issued a Stormwater Management Action Planning Guidance document in August 2019 (Ecology 2019). The guidance document provides supplemental information and specific steps that can be taken to accomplish permit compliance for SMAP.

This memo specifically documents the logic and process which was used by the City in developing the Receiving Water Prioritization, step #2 above.

Background: Receiving Water Assessment

The City conducted a Receiving Water Assessment of the eleven main watersheds within its jurisdictional boundaries, using existing water quality, habitat, land use, socioeconomic, and geographic data from City basin plans, water quality monitoring studies, GIS data, and online State and Federal socioeconomic indicator information.

This assessment was completed prior to the March 31, 2022, Permit deadline.

Five of the eleven watersheds evaluated were selected for inclusion in the receiving water prioritization because of the potential to benefit from stormwater management planning. The five watersheds and their ultimate receiving waters are:

- Storm Creek/Puget Sound
- Boeing Creek/Puget Sound
- McAleer Creek/Lake Washington
- Thornton Creek/Lake Washington
- Lyon Creek/Lake Washington

The six remaining watersheds (listed with their ultimate receiving waters) that were not selected for further evaluation and prioritization are:

- The Highlands/Puget Sound
- Richmond Beach/Puget Sound
- Bitter Lake/Lake Union
- Edmonds Way/Puget Sound
- Innis Arden/Puget Sound
- West Lake Washington/Lake Washington

The six watersheds that were not selected for further consideration had one or more of the following characteristics:

1. Entire watershed area is small or comprised of multiple very small individual catchments that are hydraulically independent of each other.
2. Very small percentage of watershed is located with Shoreline's jurisdiction.
3. Watershed drains directly to Puget Sound or Lake Washington and has little to no open stream channel, fish habitat, or water quality issues.

Prioritization Methodology

While the SMAP Guidance document recommends selecting a catchment area of approximately 400 to 600 acres, City staff elected to keep three larger key basins "whole" for the purposes of prioritization (in-City basin areas listed): McAleer Creek (1,400 acres), Boeing Creek (1,800 acres), and Thornton Creek (2,400 acres). The justifications for this decision included: (1) these basins are only roughly two to four times larger than the recommended catchment size, and (2) sub-dividing basins into smaller catchments could result in arbitrary limitations on the array of stormwater management action options available.

Prioritization criteria were developed to rank the five watersheds most likely to benefit from stormwater management actions.

In an attempt to comply with the Permit requirements and also meet the intent of the guidance document, two sets of criteria were developed - based, respectively, on the SMAP Guidance document and the Permit itself:

- Part 1 – “Prioritization Principles” criteria were based directly on the prioritization principles recommended in the SMAP Guidance document (Ecology 2019).
 - Part 1 criteria also included a Public Support metric based on survey data collected from the City’s public outreach efforts conducted for compliance with Permit section S5.C.3 related to public notice and involvement in the SMAP process.
- Part 2 – “Feasibility for benefit from SWM actions” criteria were based on Permit language (under S5.C.1.d.ii) that “*Permittees shall develop and implement a prioritization method and process to determine which receiving waters will receive the most benefit from implementation of stormwater facility retrofits, tailored implementation of SWMP actions, and other land/development management actions.*”

Data used in the criteria described below is taken from the receiving water characterization evaluation completed in the first phase of the Ecology SMAP process. City staff then weighted each criterion to result in a complete matrix which is reflective of Shoreline’s values, unique opportunities, and assessable resources.

The City used scoring to reflect quantifiable measures whenever possible, and preferred using relativistic scores whenever possible rather than ranking-based scores, which can tend to over-emphasize small differences and under-emphasize larger ones.

Table 1 lists the criteria, along with the method of measurement, relative weighting, and brief explanation of the staff logic for each. Criteria for “Part 1” Prioritization Principles per the SMAP Guidance document accounts for 80% of the total prioritization weight; the remaining 20% of the weighed criteria are “Part 2” criteria based on Permit language under S5.C.1.d.ii.

Table 1. Prioritization Criteria

Criteria	Description	How is it calculated?	Weight
Water Quality Impairment (Part 1)	Receiving water quality impairment based on water quality index, B-IBI, or habitat surveys.	Scale of poor (2) to excellent (5), no data = 1 point. After weighting, scoring is 20 points max.	20%
	SMAP Guidance Prioritization Principle #1 recommends higher priority to less impaired water bodies, since they are expected to benefit more quickly from stormwater management actions. Staff thought this criterion is highly applicable to the City’s watersheds and assigned an elevated weight of 20%. ¹		
Relative Control of Jurisdiction (Part 1)	% of the watershed in Shoreline’s control.	Relative % control on a scale of 1 to 5, with 5 being the maximum. After weighting, scoring is 25 points max.	25%

¹ Where water quality data existed, it often had similar results across all watersheds. So, the recreational use data (fecal coliform) was selected as the data point to provide the greatest distinction between the basins within the periodization effort.

	SMAP Guidance Prioritization Principle #2 recommends prioritizing basins where the municipality can exert greater influence. Staff interpreted this to refer to basins within this City’s influence and thought this was the most important since criteria. More of the basin being within City control, means the City is not dependent on other agencies’ participation in order to achieve recovery of the receiving water ^{2,3} . Accordingly, staff assigned a weight of 25%.		
Overburdened Communities (Part 1)	Watersheds with the presence of overburdened communities (relative to Shoreline city-wide demographics), defined per EJScreen’s Socioeconomic Indicators as: <ul style="list-style-type: none"> • Linguistically Isolated (80% or greater) • People of Color (60% or greater) • Low Income (70% or greater) See EPA EJScreen Environmental Justice Mapping Tool	If yes (for one or more of the listed indicators), full points (15); if no for any indicators, no points (0).	15%
	SMAP Guidance Prioritization Principle #5 recommends prioritizing basins with overburdened communities. The City is committed to social equity and environmental justice and has extensive internal non-discrimination and equal opportunities policies. Staff felt the overburdened community criteria weighting should reflect the City’s commitment to these values and assigned a weight of 15%.		
Salmonid Presence (Part 1)	Use WDFW SalmonScape Fish Distribution for anadromous species.	Yes in the City, full points (10); if yes but outside the City, half points (5); if no presence in receiving water, no points (0)	10%
	SMAP Guidance Prioritization Principle #3 recommends prioritizing basins involved in regional rehabilitation efforts, including salmon recovery. Staff developed this criteria to prioritize presence of salmonids within a watershed, differentiating in-City salmonid presence from downstream salmonid presence and from no salmonid presence, and assigned a “baseline” weight of 10%.		
Public Support (Part 1)	Numbers of survey results indicating watershed is a high priority.	Relative public support score compared to watershed with the highest support. After weighting, scoring is 10 points max.	10%

² As of this date, the City of Seattle has given no indication to City staff that Thornton Creek would be the focus of their SMAP, future SSC efforts, or any further recovery efforts.

³ Staff reached out to Ecology during the prioritization effort and the response indicated that there were no provisions for a shared SMAP between multiple jurisdictions. Ecology also could not commit to any future structural source control program (SSC) point-sharing between jurisdictions working in a regional manner (since the program has not yet been developed). Accordingly, it did not appear to benefit the City to focus on regional partnerships in selection of the priority basin.

	In early 2022, the City conducted an outreach campaign including a story map and a public survey to gather feedback on SMAP topics, and to comply with Permit section S5.C.3 requiring public notice and involvement for the SMAP process. Public response for preferred priority basins were used as the metric for this category. (Respondents were asked to indicate their top three basins.) This criterion was assigned a “baseline” weight of 10%.		
Impervious Areas in Need of Treatment (Part 2)	City GIS data showing approximate % impervious surfaces treated.	% treated compared to watershed w/ least treatment (5 points max). After weighting, scoring is 10 points max.	10%
	This criterion was developed to help evaluate which receiving waters will receive the most benefit from implementation of stormwater management actions per Permit S5.C.1.d.ii. Basins already having the highest percentages of existing stormwater treatment scored the lowest, and basins with less existing stormwater treatment scored highest. Basins with less currently treated impervious should have more opportunities for flow control or water quality benefit from retrofits and other targeted stormwater management actions ⁴ . This criterion was assigned a “baseline” weight of 10%.		
Public Land (Part 2)	City GIS data showing approximate ROW area plus City-owned parks areas, adjusted for % of watersheds.	Relative total public land available compared to watershed with the most public land (5 points max). After weighting, scoring is 10 points max.	10%
	This criterion was developed to help evaluate which receiving waters will receive the most benefit from implementation of stormwater management actions per Permit S5.C.1.d.ii. . Basins with higher percentages of City-owned public land (including rights-of-way and parks) should have more opportunities for flow control or water quality benefit from retrofits and other targeted stormwater management actions. Basins with higher percentages of public land scored higher. This criterion was assigned a “baseline” weight of 10%.		

Initial Results and Interim Analysis

After establishing the criteria, scoring, and weighting described in Table 1, initial prioritization results found Boeing Creek in an unambiguous #1 ranking, followed by McAleer Creek at #2, and Thornton Creek at #3, with Storm and Lyon Creeks more distantly behind at #4 and #5, respectively. These initial prioritization rankings based on quantitative scoring aligned well with staff opinions of and expectations for basin rankings based on a qualitative understanding of SMAP criteria.

⁴ The data for this analysis may not capture the full limits of the treated area but utilizes the amount of area dedicated for treatment facilities. While this may not be sufficient for Ecology prescribed equivalent area calculations, it still provided a relative metric for comparison between basins.

To ensure a robust validity and defensibility of the City’s prioritization process, staff conducted an informal “sensitivity analysis” of criteria weighting. Staff found that Boeing retained the #1 ranking for a wide variety of possible adjustments to criteria score weighting. This was due to Boeing Creek scoring highest among all City basins for Water Quality Impairment and Relative Control of Jurisdiction, and also being in the top tier of basins for Overburdened Communities, Salmonid Presence, and Public Support scoring.

The only criteria for which Boeing Creek scored lower than other basins were for the two “Part 2” criteria. Thus, if weights for Part 2 criteria are skewed significantly upward (to comprise about 45% or more of the weighting for all criteria), McAleer Creek could end up with a slightly higher total score than Boeing Creek. Further skewing of criteria weights into well-beyond-defensible ranges could bring Storm Creek (by very heavily overemphasizing “Part 2” weighting to 75% or more) or Thornton Creek (by heavily overemphasizing Public Support (~20%) and Public Land (~55%) criteria weightings) into the #1 rank. No set of heavily skewed weightings was found that could elevate Lyon Creek into the #1 ranking. While the results of the “sensitivity analysis” illustrated how different sets of “alternative” (extreme) weightings could elevate different basins to a #1 priority, staff did not find any such “alternative” weighting sets to be reasonable or defensible, and the weightings used for the initial prioritization were confirmed as optimal.

After reviewing the scoring and completing the scoring analysis exercises, staff concluded that the criteria, scoring, and weighting used were a valid and defensible representation of the City’s SMAP priorities. The SMAP prioritization process was concluded, and the resulting scores were considered finalized.

Final Results

When the SMAP prioritization criteria, scoring, and weighting that the City selected after thorough consideration are evaluated, a clear high priority watershed emerges: Boeing Creek. Table 2 shows the total final scores and rankings for the City of Shoreline’s Receiving Water Prioritization process (per Permit S5.C.1.d.ii):

Table 2. Rank of Priority Watersheds for SMAP

Watershed	Part 1 Score	Part 2 Score	Total	Rank
Boeing	76	10	86	1
McAleer	53	16	69	2
Thornton	48	14	62	3
Storm	27	20	47	4
Lyon	18	8	26	5

Recommendation

The City should **proceed with the Boeing Creek Basin as the #1 priority basin** for further development in the Stormwater Management Action Plan (SMAP) process. Next steps will include evaluating how to augment ongoing stormwater management actions within the basin and focusing projects within the basin where the need is most acute, and benefits will be more pronounced.

References

Ecology, 2019. Washington State Department of Ecology Stormwater Management Action Planning Guidance, Phase I and Western Washington Phase II Municipal Stormwater Permits, August 2019, Publication 19-10-010.

Appendix D

Survey Summary

Shoreline SMAP Survey Summary

Introduction

A survey was developed to provide information to Shoreline residents about the City’s watershed prioritization and stormwater action planning process and to solicit input on priority watersheds and potential actions the City could take to improve or protect water quality. An ArcGIS Online StoryMap was developed to convey information and allow users to interact with the data before filling out the on-line survey. A link to the StoryMap is [here](#).

Responses

There were a total of 94 responses received. Figure 1 shows the neighborhoods represented by the people that responded to the survey.

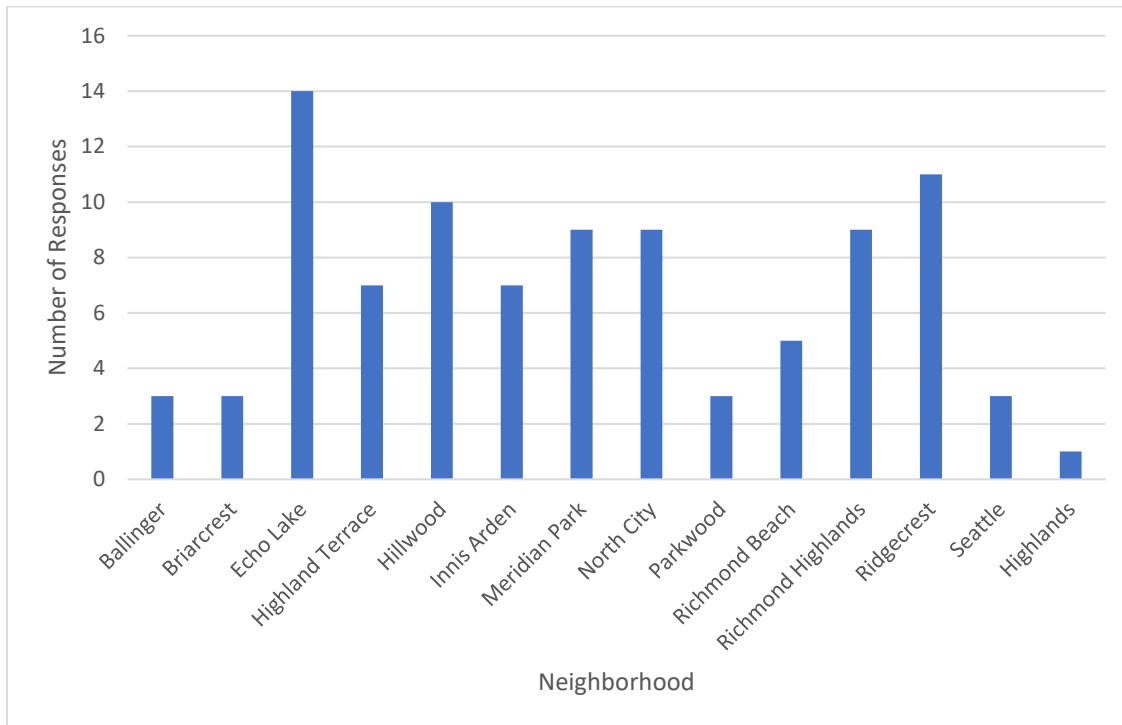


Figure 1. Breakdown of respondents by neighborhood

Watershed Priority

The survey requested that respondents list their top 3 priority watersheds for conducting stormwater management actions. The total number of times that a watershed was included in the top 3 list is shown in Figure 2, with Boeing, Thornton, and McAleer Creek watersheds being named most frequently.

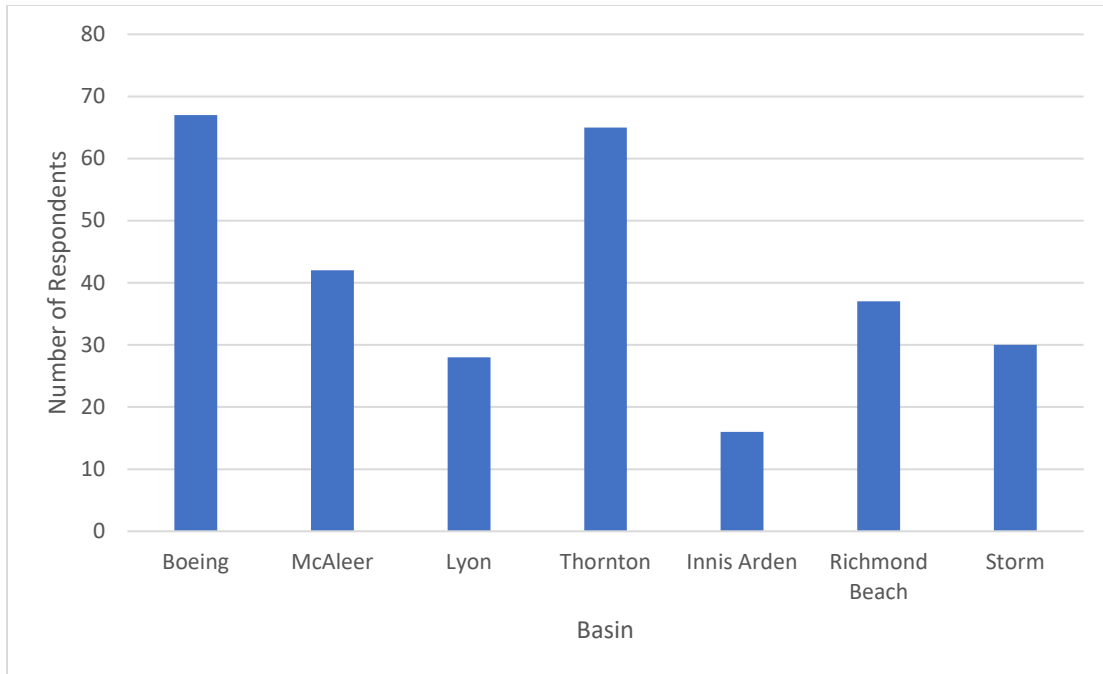


Figure 2. Number of times watershed was included in top 3 priority list.

Stormwater Actions

Several stormwater actions were described in the survey and respondents were asked to provide their interest in these potential actions, using qualitative terms including extremely interested, very interested, neutral, not very interested, or not at all interested. The relative cost of each action was provided for context.

There were no stormwater actions that a majority of respondents indicated a strong negative preference, however, there were several that had a very strong positive preference, indicated by over 75% of respondents selecting extremely or very interested in the action. Figure 3 shows respondents general opinions on different stormwater actions. Stormwater actions that had more than 75% extremely or very interested responses are color-coded green. The total number of responses are shown on each bar out of a total of 94.

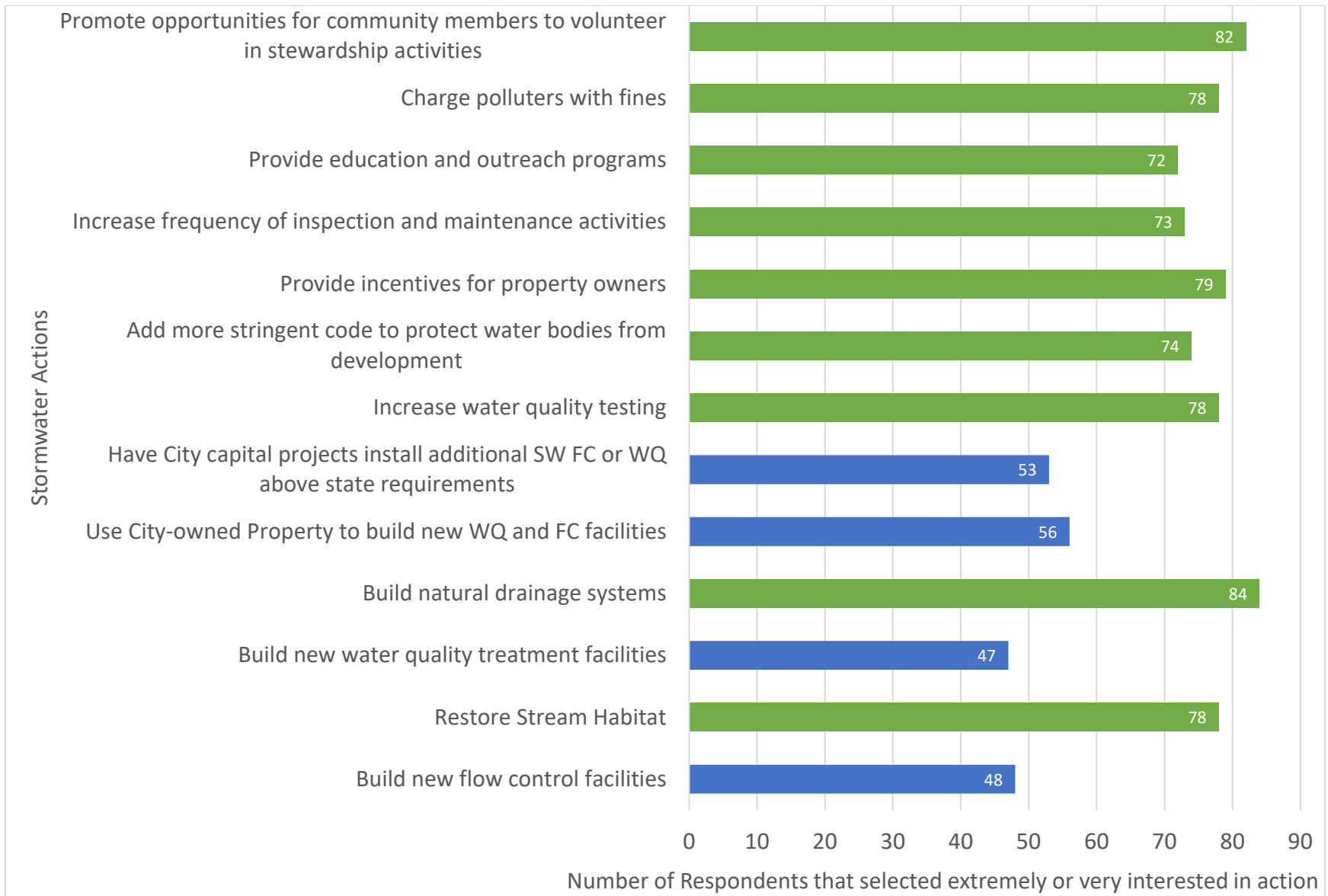


Figure 3. Respondent opinions on Stormwater Actions (most positive responses indicated by green bars)

Specific Ideas

Survey respondents were given an opportunity to provide input on their project ideas for stormwater management partnership.

Below are ideas provided by the respondents directly from the survey input, organized by general categories:

Volunteering

- *More **organized volunteers** for maintenance of native plants and removal of invasive in existing parks. I would happily join a team to help my local parks.*
- *Having regular opportunities for **community members to volunteer** to help with outdoor project (and publicizing them broadly) would attract a lot of Shoreline neighbors- especially if some of the projects could use help from families and older residents. The pandemic has motivated people to get outside in their neighborhood. And, people have! Harness that new interest and understanding of our neighborhood resources that rely on water quality and storm water management.*
- *Specific "StreamKeeper" group volunteers.*

Education and Outreach

- ***Tours of rain garden projects** that the city has funded. Love to see what my neighbors are doing with native plants and rain gardens.*
- *daylight little creek! - anywhere and everywhere in the basin. it yearns to be free of its ditch. a particularly good spot is on the ridgecrest elementary school property - with the school district as a partner. could serve as a **good demonstration project and educational opportunity** for the students who attend. my property abuts the school and there is a small portion of little creek on it that i would gladly daylight.*
- *More, **bigger, focused, articles in Currents.***

Trees and Native Vegetation

- *Not really, but I do think we should be **actively planting as many native trees and plants** to absorb runoff and prevent erosion.*
- *I would suggest that the city emphasize in its projects the importance of **native vegetation**, including **especially large native trees**, as a highly effective, holistic method of filtering groundwater while improving the natural environment.*
- *The City should strive to **retain large trees** in these areas. Root systems of large trees help filter water; their canopies store rainwater.*

Streams, Restoration, and Salmon Habitat

- *all stormwater should **flow naturally through creeks**. eliminate pipes except where it goes under a street.*

- *I could be wrong, but I believe years ago I stumbled upon a small dam on Boeing creek. Obviously water quality improvement is important but if **fish passage** is just as important. Not only should water quality be a focus but also fish passage in fish Bering streams*
- *I worry that the recreational use of Boeing Creek within Shorecrest/ Boeing Creek park boundaries has seriously degraded stream (and forest) habitat. more actions are needed to **restore and protect the stream** from recreational users, while still allowing the public to access this area. Specifically, a boardwalk trail should be constructed along the creek in the areas where currently there is significant erosion from human access. it would be great if the Parks department could collaborate with the Stormwater utility on this since it would benefit both.*
- *Anything and everything to help **restore salmon habitat and protect salmon**.*
- *The \$2 million system between Shorewood hills and highlands is an example of perfectly functioning system that **protects boeing creek***
- *McAleer basin could have streams uncovered (opened up to the open air, rather than in underground pipes), to **provide more stream reaches for fish and wildlife**. Even small streams can provide corridors for migrating fish such as cutthroat trout. Specifically, the outlet to Echo Lake could be uncovered to provide an open stream to Ballanger Lake.*
- *Lyons Creek where it flows through the old Cedarbrook school property would be an excellent property to create trails, install educational information, and **increase protection around the stream**. There is significant open greenspace there for a park.*
- ***Riparian habitat enhancements adjacent to heavily trafficked roads**. Storm water contaminated with 6PPD-quinone (tire contaminant) has known lethal effects to salmon. Improve riparian habitat!*
- *Thornton- There is a great community effort to **restore the riparian and wetland areas of Paramount Open Space**. Currently, the creek washes over the trail during heavy rain events. Trail improvements including culvert replacement at this park would improve this stream corridor. Additionally, enhancing the wetlands at this park would provide improved habitat as well as stormwater treatment and storage.*

Litter, Degradation of Parks

- *Area to the east of Aurora Village where day lighted McAleer Creek flows north from N 200th to county line . **Heavily exposed to waste and runoff from AVillage and transient use camping, littering, etc.***
- *It would help Thornton if restoration efforts in Twin Ponds Park were not vandalized due to lack of **signs to prevent people from destroying native plants/trees**. Also if yellow flag could be removed from the ponds. Also help private homeowners remove knotweed north of Ronald Bog.*
- *The **Echo Lake Park needs clean up and invasive weed removal**. It is so overgrown that the swimming beach has been taken over with cattails and the homeless.*

Stormwater Facilities, Drainage Issues, and Treatment

- ***Impervious sidewalks and "sea streets"** in briarcrest.*
- *How about focusing on the CAUSES instead of focusing on cleaning up the mess? Why not **prioritize trees and rain gardens**? Reroute stormwater pipes to rain gardens (on public land/parks), **create building codes what stress onsite rainwater retention**.*

- As density and construction increases on 185th it would be great to **explore permeable solutions for sidewalks/paved areas** so more water can be filtered into the ground before entering the water. This is one area where some public education on the options might be helpful so people will consider alternative paving options as they develop the area.
- Something **similar to the Thornton Creek Water Quality Channel near Northgate should be constructed around where the Sears is, for Boeing Creek.**
- Innis Arden - Blue Heron and Eagle Reserves: **build retention dams of existing material to slow flow during peak run-off** (which is dramatic during major storms).
- Build many more **rain gardens similar to 17th Ave NE at 146th-150th.**
- **All new or replacement streets should be porous** to allow water to be filtered by the earth.
- **Create more storm retention ponds.** This might entail the costs of eminent domain. I would rather spend tax dollars on permanent infrastructure that has a proven environmental benefit than on the PC projects of the moment.
- **storm basin at 15th Ave NE & NE 170th needs work!** It is simply a place for stormwater. It could be so much more! Like a demonstration site with decent native plants on the perimeter - signage explaining what it is and how it works.
- Yes, **cover the ditches or place grates over the ditches that run along 10th Ave NE on the West side of the street.** It is dangerous with an elementary school nearby.
- Yeah, if Littles Creek is known to be a polluted waterway, why not **inspect and pipe the entire course over to Thornton Creek?** It would save many residents in the Ridgecrest neighborhood from further flooding issues.
- The **Greenwood Trail needs water management.** It runs from the bus stop at 200th down to about 195th. There are community members who would help restructure the trail to control the water flow.

Codes, Lake Protection, Public and Partnerships

- Yes! our property runs next to a huge chunk of McAleer creek. I would LOVE to find a way to **work with the city for some blackberry removal and natural plant improvements.** Maybe even take a look at the stream bed/bank for salmon spawn seeding. It's a big, fairly natural area, but I'm pretty sure the creek is actually on city property, so I don't want to just go in and fix it myself, but holy crap does it need work. I mean, at least come over once a year and fish out the traffic cones and other construction garbage. This is next to 15th ave near 198th street.
- Thornton - and **work with Thornton Creek Alliance and the city of Seattle**
- I wish Shoreline would **adopt a Lake Protection Ordinance for Echo Lake.** In addition to the wetlands critical zone near the water, this would create a second ring of protection just outside the wetlands zone, where there would be limits on development, such as non permeable surfaces, loss of vegetation and tree canopy. Echo Lake will see a lot of new development in the upcoming years along Aurora Avenue. This will lead to increased run off and pollution into Echo Lake and the McAleer basin. If funding is needed to study and implement a Lake Protection Ordinance, perhaps an environmental grant from KC would be appropriate.
- More closely **monitor/control run-off from Aurora Ave. that ends up in Echo Lake.**