Council Meeting Date: April 8, 2019 **Agenda Item:** 9(a)

CITY COUNCIL AGENDA ITEM

CITY OF SHORELINE, WASHINGTON

AGENDA TITLE:	Discussing Salmon-Safe Certification
DEPARTMENT:	Planning & Community Development
PRESENTED BY:	Miranda Redinger, AICP, Senior Planner
ACTION:	___ Ordinance ____ Resolution ___Motion
	__X_ Discussion ____ Public Hearing

PROBLEM/ISSUE STATEMENT:

On November 5, 2018, Council adopted the 2019-2020 Biennial Budget which included $80,000 for Shoreline to become the first Salmon-Safe certified city in Washington State. This certification represents a unique opportunity to view the City's operations through the lens of an iconic Pacific Northwest species. The City has long examined operations through a financial lens, and periodically through a lens of greenhouse gas emissions or other factors, but never from the perspective of non-human residents.

Tonight, Council will discuss the two (2) pre-conditions and twelve (12) conditions required to become a Salmon-Safe certified city. If the Council is willing to authorize the City Manager to commit to the two pre-conditions, the City would then have five (5) years to implement the 12 conditions outlined in this staff report and described in greater detail in the Salmon-Safe Certification Report (Attachment A). The City would also complete an annual verification form to report on progress in meeting conditions.

Tonight's meeting provides an opportunity for Council to learn about the conditions for certification, ask questions, discuss implications and concerns, and potentially propose amendments. If Council is comfortable authorizing the City Manager to agree to the pre-conditions for certification, this could be scheduled for action on April 22, with a presentation of the certificate by Salmon-Safe at the May 6 Council meeting. If Council has questions that will require further research and analysis, then staff will determine the timeline for bringing this item back for potential authorization.

RESOURCE/FINANCIAL IMPACT:

Potential costs associated with Salmon-Safe certification are not clearly defined at this stage. Over the course of the certification period (from Council agreement to pre-conditions and acceptance of a conditional certification to five years from that date), staff will evaluate financial impacts. At this time staff assumes that implementing conditions of certification will increase costs for the 2023 update of the Surface Water Plan, snow removal and deicing, and likely certain capital projects, as described later in this staff report. A table in the Summary section of this report combines this information for a high-level snapshot of potential cost increases for full certification. It is also possible that becoming the first Salmon-Safe certified City in Washington will make

stormwater and habitat restoration projects in Shoreline more competitive for grant funding.

RECOMMENDATION

No action is required at this time. Staff is interested in Council's direction to be able to schedule action on this item and in their preference regarding the bookended options in Condition 5. Tonight's meeting is an opportunity for Council to learn about the conditions for certification, ask questions, discuss implications and concerns, and potentially propose amendments.

Approved By: City Manager ***DT*** City Attorney ***MK***

BACKGROUND

On April 17, 2017, Council adopted Ordinance No. 760 creating the Deep Green Incentive Program (DGIP). During Planning Commission deliberations of the DGIP, Ellen Southard gave a presentation on behalf of Salmon-Safe. Ms. Southard also gave a Speakers Series presentation to the public on June 8, 2017. That presentation is available here: https://www.youtube.com/watch?v=iUPayuj9v4Y&feature=youtu.be. This presentation includes information about how the City of Portland certified their entire park system and other municipal operations to become the first Salmon-Safe City.

The Planning Commission was particularly intrigued by this option and recommended that Shoreline consider citywide Salmon-Safe certification. Staff from the Planning, Public Works, and Parks Departments met with Salmon-Safe staff to learn more about what certification would entail with regard to the City's parks system, trail projects, the removal of the Hidden Lake dam, and other options. Salmon-Safe outlined options for certification of individual projects, certification of the parks system, or citywide certification.

On October 30, 2017, Council identified achieving citywide Salmon-Safe certification as a Priority Environmental Strategy for 2018-2020. The staff report for the October 30, 2017 Council meeting is available here: http://cosweb.ci.shoreline.wa.us/uploads/attachments/cck/council/staffreports/2017/staffreport103017-8c.pdf.

This was supported by Council during their 2018 Strategic Planning Workshop on March 16-17, 2018, when the Council amended Goal #2, Action Step #4 to account for this new priority (**emphasis** added):

> *Goal #2- Improve Shoreline's infrastructure to continue the delivery of highly-valued public services:*
>
> - *Action Step #4- Implement the 2018-2020 Priority Environmental Strategies, including achievement of **citywide Salmon-Safe certification**, consideration of expanding green building mandates, and appointment of a stakeholder committee to evaluate and develop a recommendation on the implementation of recommendations from the Climate Action Analysis for the 185th Street Station Subarea.*

On November 5, 2018, Council adopted the 2019-2020 Biennial Budget, which included $80,000 for Shoreline to become the first Salmon-Safe certified city in Washington State. This certification represents a unique opportunity to view the City's operations through the lens of an iconic Pacific Northwest species. The City has long examined operations through a financial lens, and periodically through a lens of greenhouse gas emissions or other factors, but never from the perspective of non-human residents.

Salmon-Safe Adopted as a Companion Certification through the DGIP

Salmon-Safe offers a series of peer-reviewed certification and accreditation programs linking site development land management practices with the protection of agricultural and urban watersheds. Through the DGIP, it was adopted as a companion certification

for the International Living Future Institute's Zero Energy program. This dual certification would require a project to consider both energy and stormwater solutions that would make it equivalent to other Tier 3 DGIP certification options. The proposed expansion of the DGIP, which was discussed by Council on April 1, 2019, recommends pairing Salmon-Safe with Passive House Institute US's net zero energy option (PHIUS+ Source Zero) for the same reason.

Salmon-Safe Certification Process in Shoreline

The assessment process to date is described in greater detail in the *Report of the Evaluation Team Regarding Salmon-Safe Certification of the City of Shoreline, Washington* (Certification Report) contained in Attachment A. Below are some highlights of this process:

- A Science Team consisting of an Environmental Scientist, a Storm-water Management Expert, an Aquatic Ecologist and Salmon Biologist, and an Urban Integrated Pest Management Director reviewed City documents, conducted interviews with City staff, toured a variety of sites within the city, authored a Gap Analysis, and compiled the conditions in the Certification Report.
- The Science Team reviewed the City's 2009 Bio-assessment Report; 2012 Comprehensive Plan; 2016 Echo Lake Aquatic Vegetation Report; 2016 Freshwater Assessment Report; 2018 Surface Water Master Plan; 2018 Stormwater Management Program; Boeing Creek Basin Plan; Carbon Wedge Analysis; Climate Action Plan; Complete Streets Ordinance; Critical Areas Regulations; Engineering Development Manual; Environmental Sustainability Strategy; Environmentally Preferred Purchasing Guidelines; Green Stormwater Infrastructure capital projects; Greenworks Brochure; Lyon Creek Basin Plan; McAleer Creek Basin Plan; NPDES Permit and 2016 Annual Report; Parks, Recreation, and Open Space (PROS) Plan; Pesticide-free Parks Brochure; Puget Sound Basin Plan; *Soak It Up* Rain Garden Incentive Program; Shoreline Master Program; Snow Removal and Ice Control Plan; Storm Creek Basin Plan; Thornton Creek Basin Plan; Trail Along the Rail Feasibility Study; Tri-County Integrated Pest & Vegetation Management Model Policy; Urban Forest Strategic Plan; and Washington State Department of Ecology Low-Impact Development Stormwater Manual.
- The Science Team interviewed the City's Parks Department Director, Park Maintenance Superintendent, Surface Water Engineer, Senior Transportation Planner, Surface Water Quality Specialist, Fleet and Facilities Manager, Development Review Engineer, Utilities Manager, and Wastewater Utility Specialist. In addition to these staff, the Science Team also talked with the City's Senior Planner, Senior Park Maintenance Worker, and Wastewater Manager on site visits.
- The Science Team toured the 25th Avenue NE Flood Reduction Project, Boeing Creek Park, Brugger's Bog Park, Cromwell Park, the 17th Avenue Green Street Demonstration Project, Hamlin Park, Hamlin Yard, the Hidden Lake Dam Removal site, Hillwood Park, Kayu Ac Park, Kruckeberg Botanic Garden, Ronald Wastewater District Lift Station 1, North City Park, North Maintenance Facility/Fueling Depot, Paramount School Park, Richmond Beach Community Park, Richmond Beach Saltwater Park, Ronald Bog Park, Shoreview Park, South

Woods Park, Sunset Park and Community Garden, the potential Trail Along the Rail site, Twin Ponds Park, and City Hall.

- The Gap Analysis (included in Attachment A, Appendix B) identified many areas of consistency with Salmon-Safe standards as well as concerns and opportunities to improve environmental performance across City operations.
    - *Areas of Alignment included:*
        - Natural resource-related policies and activities are largely consistent with Salmon-Safe standards. The City has done a good job inventorying its resources and have some clearly stated policies about preserving and restoring natural resources.
        - Excellent information has been collected and collated in the City's basin plans.
        - The Pesticide-Free Parks Initiative and strategic planning for parks and open spaces are commendable and highly consistent with Salmon-Safe standards.
        - The Climate Action Plan (CAP) and Environmental Sustainability Strategy include a commitment to investigate opportunities for rainwater harvesting and greywater reuse, as well as high-efficiency irrigation controls.
        - The City is using the latest editions of the Department of Ecology's *Stormwater Manual for Western Washington* and Puget Sound *Low Impact Development Manual* (LID Manual) with modifications for increased stringency as outlined in Shoreline's *Engineering Development Manual* (EDM).
        - The Green Stormwater Infrastructure (GSI) Program has facilitated valuable outreach to residents and a number of commendable projects between 2011-2017, including twelve neighborhood bioretention facilities plus two more awaiting grant funding, and a system of bioretention units of various configurations installed during the Aurora Avenue Corridor Project.
    - *Opportunities for Improvement included:*
        - Demonstrate that the capital projects underway are part of a comprehensive approach that is effectively reducing watershed impacts over time, taking into account continued development within the city.
        - Increase the frequency of water quality monitoring efforts to effectively gauge success in meeting objectives and overall goals. In tandem, assess overall water quality trends since the start of data collection began in 2003 along with genetic testing to determine the source(s) of fecal coliform bacteria.
        - Conduct a riparian habitat condition survey as well as fish surveys to document distribution of species during all life stages.
        - Connect stormwater management policies to specific goals related to watershed impact.

DISCUSSION

If the Council is willing to authorize the City Manager to commit to the two (2) pre-conditions below, action on Salmon-Safe certification could be taken on April 22. Salmon-Safe staff would then present the official certification to the City during the May 6 Council meeting. If Council would like to discuss conditions further, this could be scheduled as an Action Item on the May 6 agenda, and Salmon-Safe could present the certification at another meeting in May.

The City would then have five (5) years (until May 6 or 13, 2024) to implement the twelve (12) conditions outlined below and described in greater detail in Attachment A. The City would also complete an annual verification form to report on progress in meeting conditions.

It is typical for certification systems to evolve and become more stringent over time, so staff asked Salmon-Safe about potential conditions for re-certification. They replied that Salmon-Safe standards do evolve over time to reflect advancements in related research and incremental changes in standards over time (for example, new pesticides listed as High Hazard based on new NOAA research). However, scope and scale of core requirements to achieve certification will not change. So, for example, expansion of Shoreline's mandate from public development to private development would not ever be required by Salmon-Safe. As part of a commitment to continuous improvement, Salmon-Safe will look for ongoing progress in water conservation, for example, but simply as a continuation of the goals already outlined in the initial conditions.

The two pre-conditions and 12 conditions for Salmon-Safe Certification are as follows:

Pre-Conditions

PRE-CONDITION 1: ENSURE ENVIRONMENTAL REGULATORY COMPLIANCE

Summary: The City of Shoreline shall provide a signed statement to Salmon-Safe stating that it is not in violation of national, state, or local environmental laws, or associated administrative rules or requirements as determined by a regulatory agency in an enforcement action.

Staff Analysis: The City is not in violation of environmental laws, rules, or requirements so there should be no issue providing a signed statement for this pre-condition.

PRE-CONDITION 2: COMMITMENT TO ADHERE TO SALMON-SAFE STANDARDS FOR EXPANSION OR REDEVELOPMENT

Summary: The City of Shoreline shall provide a signed statement to Salmon-Safe confirming that it will develop a mechanism to ensure that all new, expanded, and redeveloped City facilities shall meet Salmon-Safe standards for urban development, including model permanent (see Attachment A, Appendix C) and construction-phase stormwater guidelines (see Attachment B, Appendix F), or a comparable LEED standard related to stormwater performance. Included in this commitment is an agreement to avoid the use of uncoated zinc and copper for any new building cladding.

Staff Analysis: The Timelines for Conditions 1 and 6 (below and in Attachment A) state that the City will develop a companion checklist for projects on City property to meet the more stringent standards described above. These shall be submitted for Salmon-Safe review within three (3) years and applied to new City facilities within five (5) years. It is important to note that Conditions 1 and 6 (and therefore this pre-condition) apply only to *new, expanded, or redeveloped facilities on City property*, not to private development projects throughout the city or existing City facilities.

In addition to the City commitment to avoid use of uncoated zinc and copper for any new building cladding, the Planning & Community Development Director supports adding a regulation prohibiting these materials as part of the Development Code, which would apply to construction citywide.

Conditions

CONDITION 1: APPLY SALMON-SAFE MODEL STORMWATER GUIDELINES TO NEW, EXPANDED, OR REDEVELOPED CITY FACILITIES

Summary: The City of Shoreline has incorporated amendments to the Department of Ecology's Stormwater Manual for Western Washington in the City's Engineering Development Manual. These amendments effectively increase the stringency by which the City manages stormwater for all new developments, both City-owned and private development. Salmon-Safe has developed model stormwater management guidelines for urban development or redevelopment, which are more stringent than the Department of Ecology's manual (see Attachment A, Appendix C) and differ from that manual by the inclusion of the goal of restoring the predevelopment hydrology at a given project site.

The City shall create a checklist based on Salmon-Safe's *Model Stormwater Management Guidelines* to supplement the EDM for application to City projects that incorporates Salmon-Safe guidelines for stormwater management. By doing so, the City will create a mechanism for leading the private sector by example over time.

Staff Analysis: This condition will create stricter standards on stormwater flow control for smaller City projects. Large City projects like the Community and Aquatics Center will already trigger flow control facilities, so this condition wouldn't impact those projects. Smaller projects, like redevelopment of the City Maintenance Facility or development of a tennis/sport court in a park, are projects that are currently likely to be able to avoid triggering flow control facilities if they stay under 10,000 square feet of new/replaced hard surface *and* stay below the 0.15-cubic feet per second increase in the 100-year peak flow standard. This flexibility would be removed with this condition, potentially increasing costs in design, construction, and maintenance of these smaller-type facilities.

No notable broad additional staff effort is needed to meet this condition in and of itself; this condition will be implemented with individual City projects. Timing will occur with the project development and cost increases will depend on the project and are too early to be determined, but could be significant.

With this stated, in developing the checklist to apply more strict flow control standards to new and expanded City projects, the City may rely on Alternative Objectives 2A and 2B as described in Attachment A, Appendix C so it is not a foregone conclusion that this condition will increase costs on every small project.

Objective 2A states, *"To the extent that (LID practices) cannot prevent the generation of stormwater runoff peak flow rates and volumes greater than in the predeveloped condition, implement effective alternative measures to diminish and/or slow the release of runoff to the maximum extent technically feasible, with the minimum objective of reducing the quantity discharged to comply with any applicable water quantity control requirement and, in any case, below the amount released in the preceding developed condition*."

The important distinction here is between “pre-development hydrology” and “preceding developed conditions.” In other words, Salmon-Safe recognizes that zero run-off is not always feasible.

CONDITION 2: INCORPORATE GREEN STORMWATER INFRASTRUCTURE (GSI) INTO THE STANDARD ROADWAY CROSS-SECTION TO IDENTIFY PREFERRED LOW IMPACT DEVELOPMENT (LID)TECHNIQUES IN RIGHT-OF-WAY

Summary: The City of Shoreline has adopted a *Complete Streets* policy that requires development of a transportation system that allows for safe and convenient travel for all users. The City has also completed pilot projects that included vegetation in the amenity zone, which provided stormwater management and urban habitat. Although the original *Complete Streets* concept is focused on facilitating multi-modal transportation, there is an opportunity for the City to incorporate green stormwater infrastructure elements into City standards for use in the rights-of-way (ROW).

Therefore, the EDM shall be revised to reflect this expanded use of the ROW to include green stormwater infrastructure. In addition, the City shall incorporate such green stormwater infrastructure elements into all newly constructed sidewalks, as feasible.

Staff Analysis: This will fit with the ongoing development of LID guidelines for streets and would apply to both City and private development as it will be in the EDM. It builds upon planned work with the University of Washington Evans School of Public Affairs graduate student work and stormwater regulation work.

No notable additional staff effort is needed beyond the ongoing work. Timing is with the 2021 EDM update, then implemented with individual project development. Cost increases depend on the project and it is too early to determine.

Additionally, the City recently developed a Complete Streets checklist to be used for capital projects. The checklist could be revised to account for green stormwater infrastructure. The City is also undergoing a process to update the *Master Street Plan*, which details cross-section elements for various street classifications and is housed in the EDM, so the timing of implementing this condition aligns well with on-going work mentioned above.

CONDITION 3: IMPROVE STORMWATER MANAGEMENT AT THE NORTH MAINTENANCE FACILITY

Summary: The stormwater management facilities and practices at the City's North Maintenance Facility (NMF) do not appear to have been modified since the facility was acquired from King County in 2013 and do not currently meet Salmon-Safe standards. Stormwater from the facility is collected in a series of catch basins, which then ultimately discharge untreated to Ballinger Creek. Galvanized metal parts are stored in the open, as are bark, sand, and gravel. Stormwater that comes into contact with these materials is likely to include substances that are detrimental to aquatic life in the creek.

Salmon-Safe understands that this property is undergoing a planned multi-phase redevelopment and repurposing over a several year period in the future, which will include improved stormwater management. The City will take steps to have the existing facilities operated, and the proposed new facilities designed and built in alignment with Salmon-Safe guidelines.

Specifically, the City will improve its material storage and handling practices at the site, including covering erodible and potentially turbidity-causing material (e.g. bark, sand, and gravel) and galvanized metal pipes and parts, by placing them under tarps in the short term. New facilities will meet the Salmon-Safe guidelines that are incorporated in the design and construction requirements in place at the time of design and construction.

Staff Analysis: City crews have covered uncovered erodible and galvanized materials. Condition 1 above will guide Salmon-Safe interest regarding stormwater in redevelopment of the property.

No notable additional staff effort is needed for covering materials. Solutions and costs for long term stormwater management depend on decisions regarding the NMF project design, and therefore, it is too early to determine the approach and associated costs. In the same way that Condition 11 below requires that design documents be submitted to Salmon-Safe for review as soon as they are available, the City would provide design documents for the NMF for Salmon-Safe review.

CONDITION 4: IMPROVE INVENTORY OF STORMWATER INFRASTRUCTURE

Summary: The City has done a good job creating a GIS inventory of stormwater infrastructure, including hard structures, such as catch basins and manholes, but also green stormwater infrastructure features such as bioswales, rain gardens, and permeable pavement. However, it does not appear that this GIS layer includes data for a drainage area assessment that would allow calculations of the drainage areas being managed by various stormwater management techniques. The collection and analysis of such data is important for tracking improvements in stormwater management and prioritizing stormwater management projects.

Per one of the performance requirements of Standard U.1.1 (See Attachment B), the City shall incorporate a drainage area assessment into the existing GIS layer of stormwater infrastructure that would enable a demonstration of reduction of watershed impacts over time.

Staff Analysis: The mapping and analysis identified in this condition will be incorporated in the 2023 SWMP update. The staff effort will be identified in scoping of the 2023 SWMP update. Cost increases for staff and consultants identified in the efforts will also be included in the implementation of the 2023 SWMP update, as it is too early to determine those exact costs. The timing of this condition is with the start of the 2023 SWMP update, which may be as early as 2021.

CONDITION 5: OPTION A- ASSESS WATER CONSERVATION EFFORTS; *OR* OPTION B- DEVELOP WATER CONSERVATION PLAN

This condition is unique in that it presents bookends, either of which would fulfill the guiding standards for Salmon-Safe. Which option is included in the final certification will be based on Council preference and willingness to dedicate requisite resources.

Summary: *Option A*- The City has done a good job at reducing the amount of water used for irrigation. Shoreline shall continue its annual review and assessment of its efforts at conserving water and identify targets for additional water conservation in the Parks system.

The City will expand this annual review, assessment, and identification of targets for additional water conservation practices to include the Public Works- and Facilities-managed properties. Included in this expansion will be documentation of existing water use trends across City properties, areas targeted for water use reduction and methods, and identification and explanation of areas where water use has significantly increased. This effort will be conducted every two (2) years in conjunction with the City's biannual budget development process.

Option B- The City of Shoreline has done a good job at reducing the amount of water used for irrigation, as described above under General Observations.[1] However, to ensure that Salmon-Safe practices are maintained over time, The City of Shoreline shall prepare a water conservation plan in accordance with Standard U.2.9 and Appendix G of the Urban Standards (see Attachment B), which is focused on reducing the use of potable water for irrigation. The plan shall include a description of the existing site water infrastructure inventory (Standard U.2.1), an evaluation of the feasibility of various water use reduction strategies (Standard U.2.3) and documentation of water conservation practices used during site maintenance (Standard U.2.6). The plan should also describe water conservation strategies that will be implemented under drought conditions.

Staff Analysis: *Option A*- Water conservation assessment and tracking are currently performed by Parks Department staff and requires no additional effort. Initiating it for Public Works (ROW landscaping) and Facilities (City Hall) properties will require annual

1 Salmon-Safe noted that water conservation has been set as Priority Recommendation for the City, with multiple initiatives in the works related to rainwater harvesting, Brightwater Treatment Plant, incorporating use of recycled water, and use of non-potable water for toilet flushing.

effort beyond current work. Additional staff effort is needed to start and then maintain the annual assessment and tracking. This is estimated to be 120 hours in 2020 (startup time) and 40 hours on an annual basis afterward. The timing for this condition is in 2020 in advance of the 2021 biennium, and then annually afterward. Costs beyond the staff time (above) are not anticipated.

Option B- If Council is interested in setting a more ambitious goal than assessing current conservation efforts, developing a water conservation plan would allow Shoreline to distinguish itself as a statewide leader in water efficiency.

In order to outline what a more ambitious effort could entail, staff requested scopes from two consulting firms that specialize in this type of work to understand potential tasks and budgets for such a project. One of the firms, Paladino, imagined a *Water Savings Action Plan* that would:

- Set strategy and guidance for watershed stewardship at the city-scale;
- Identify opportunities and best practices for water reclamation in municipal and private projects; i.e. preserve clean water for drinking and prioritize practices that align water quality with highest and best use;
- Work with King County to tap the effluent water resource that is currently piped from the county's Brightwater Treatment Plant and discharged to Puget Sound via a pipe under 205th Street in Shoreline;
- Integrate with North City Water District and Seattle Public Utilities plans for water conservation;
- Develop incentives for developers and residents to implement said best practices;
- Reduce City expenditures by using non-potable water where appropriate and available in City buildings and facilities; and
- Engage adjacent public and private stakeholders to ensure a healthy watershed across borders.

Their Project Philosophy and Methods states, "The purpose of the water savings action plan is to achieve actionable stewardship practice that brings water use and the resource base into a sustainable balance, consistent with a healthy marine temperate ecotone. Methods envisioned include: science-based targets; community engagement of opposing and supportive stakeholders; garnering support from elected officials; and modeling best practice and transparent results. The target result is per capita demand for potable water in the bottom quartile for the state of Washington. A secondary result is leadership recognition for the City of Shoreline by peer cities."

Their proposed scope outlines the project based on the following steps: set the baseline, community outreach, build a program, deliver the action plan, and scale the plan. Their proposed budget is $144,000, but also offers an alternate approach that relies more heavily on staff management of the project, with coaching from the consultant, estimated to double the time but halve the budget.

The other firm, Herrera, imagined a *Water Stewardship Strategy* that could position Shoreline as the most progressive water and wastewater City in Washington State. Their proposed scope identified three (3) levels of effort:

1. This level would review the existing water conservation programs and policies of the City and the water purveyors serving the City and identify conceptual opportunities to increase the water conservation performance of the Shoreline municipal operations and the residential and commercial customers in Shoreline. This plan will also assess the technical feasibility of bringing reclaimed water to the City of Shoreline. This analysis will build on the "Potential Opportunities and Constraints for Utilizing Recycled/Reclaimed Water in Shoreline" memo prepared for Council Consideration at their Goal-setting retreat on March 16-17, 2018.
2. This level would complete everything in Level 1 and would examine the feasibility of bringing reclaimed water to Shoreline in greater detail and provide a concept design for the conveyance, treatment, and storage necessary to provide the reclaimed water. This evaluation would also identify initial and future customers, the distribution network, and outline the economics, operating agreements, and policies of the system. Next the project would convene the necessary stakeholders to develop a vision and goals for the plan. Based on these goals water stewardship opportunities would be developed, assessed for feasibility, and recommended for further evaluation. These opportunities may include capital projects, policies, or incentives.
3. The level would include all the work described in the previous levels and investigate the barriers to, synergies between, and economics of the opportunities. Based on the result of this analysis the opportunities would be bundled into portfolios, with a recommended portfolio to advance to implementation. To support the implementation of the selected portfolio the opportunities would be advanced into conceptual designs and their cost estimated. Next, a conceptual funding plan would be developed to implement the plan and the supporting policy and utility integration issues investigated and recommendations made. Throughout, there would be a public outreach effort undertaken to inform the community and allow them to learn about the effort and provide input.

The proposed budget for this scope ranged from $100,000 to $350,000, depending on the level selected.

Staff believes that either of the above approaches would align well with current State and County legislative efforts to remove barriers for green building, identify funding or on-going cost-saving strategies for a new Community and Aquatics Center or other capital projects, support conservation plans of local purveyors, identify water saving tips for residents and businesses, implement recommendations in the Climate Action Plan and other guiding documents, and provide a regional model for such work.

CONDITION 6: ADOPT SALMON-SAFE CONSTRUCTION STANDARDS

Summary: The City's EDM specifies elements to be included in the Stormwater Pollution Prevention Plan. The requirements are generally protective of water quality, but improvements are warranted. Specifically, a checklist for projects on City property should be developed to specifically state a goal of avoiding the discharge of sediments and other pollutants and to provide a hierarchy of practices as a means to pursue the goal.

Staff Analysis: This condition relates to stormwater pollution prevention during construction (mostly erosion control) on City facility projects. The Salmon-Safe standards have minor differences from the current state/National Pollutant Discharge Elimination System (NPDES) standards that are applied and tracked to City projects. This requires development of a process/checklist that supports the EDM and improved construction inspection practices.

A consultant will be retained to develop a process/checklist that supports Salmon- Safe guidance to augment the EDM and NPDES requirements, which is estimated to cost $8,000. Additional staff effort, estimated at 40 hours, is needed beyond the ongoing work to manage the consultant work, provide training, and implement the new process. Additional design, construction, and inspection costs will also be incurred on City projects. Although the amount cannot be estimated at this time, it is anticipated to be relatively minor. The timing of this condition is to perform work in 2020 for use in 2021.

CONDITION 7: IMPROVE WATER QUALITY MONITORING PROGRAM

Summary: The City has established a long-term water quality monitoring program at specific locations in Shoreline streams and lakes. Samples collected from these locations are measured for conventional parameters such as pH, temperature, and dissolved oxygen. However, these parameters are not measured frequently enough to provide a reliable basis for assessing changes in water quality over time. Additionally, the City conducted benthic invertebrate monitoring in several Shoreline streams in 2003 and 2007 to assess temporal changes in water quality and overall stream health. The 2003 results indicated all sample sites were degraded. The 2007 results differed little from those reported in 2003. Although these parameters can provide some indication of waterbody health, by themselves they are insufficient for documenting the impacts from stormwater runoff, which is likely the most significant stressor to water quality within Shoreline streams.

In addition, since it has been over ten years since the last benthic invertebrate monitoring, the City shall re-establish the monitoring program to determine whether the significant capital investments the City has made in the last ten years have improved stream health and to provide a long-term foundation for monitoring potential future improvements in water quality citywide. The City shall modify its water quality monitoring program to provide a solid base for long-term monitoring and better characterize the impact from stormwater runoff. Suggested changes include:

- Analytes—include metals, particularly zinc, copper, and lead, which are often associated with stormwater runoff;
- Benthic invertebrate monitoring—include sample collection methods, the qualifications of the personnel who will perform the sampling, taxonomic identifications, and data analysis;
- Sample locations—include specific sampling locations that may receive significant amounts of runoff during storm events; and
- Timing—include sampling events during both storm and non-storm events and conduct more frequent sampling using automated sampling systems for conventional and additional parameters, as feasible.

Enhancing the water quality monitoring program in this way would enable an analysis of the effectiveness of green stormwater infrastructure on stream water quality.

The City shall prepare or modify an existing Sampling and Analysis Plan (SAP) for water quality monitoring. The SAP should describe the study design, methods and analytes. The plan shall be developed through the next SWMP update, with results provided to Salmon-Safe for review after completion of each monitoring round.

Staff Analysis: The consideration of expanding the water quality monitoring program identified in this condition was not included in the 2018 SWMP and will be incorporated in the 2023 Plan update. The staff effort will be identified in scoping of the 2023 Plan update. An assessment of storm data and stormwater runoff to determine sampling locations and timing during storm and non-storm events will also be included in the scoping of the 2023 Plan update.

Cost increases for staff and consultant support identified in the efforts will be included in the implementation of the 2023 Plan, as it is too early to determine those exact costs. As a point of reference, estimated lab costs for adding metals and analytes to the current sampling regime is about $10,500 annually, and in 2013 an estimate of $22,000 (one-time costs) to perform a Biological and Physical Assessment of Streams was provided**.** After development of a plan with updated locations and frequency/timing, these costs will be higher in 2023 and beyond. The timing is with the start of the 2023 SWMP Update, which could be as early as 2021.

Council may recall that during the most recent update to the SWMP, three alternative management strategies were considered:

- Minimum: meet the minimum in terms of existing system needs and anticipated new regulatory requirements;
- Proactive: minimum management strategy plus new high-priority projects and new/enhanced programs that address high-priority, long-term needs; or
- Optimum: proactive management strategy plus additional recommendations to enhance water quality and aquatic habitat.

At the time, Council selected the Proactive approach. Some of the strategies to implement this condition may represent an Optimum approach, and as such, will require additional analysis to determine implications for staffing resources and the utility rate structure needed to support them. This is why implementation of this condition is tied to the next update of the SWMP. Staff agreed that it would be beneficial to have Salmon-Safe review the proposed scope of work for the 2023 SWMP update to ensure all elements of this condition (and Conditions 4 and 12, which will also be examined through the 2023 SWMP) are sufficiently analyzed during the update process.

CONDITION 8: ASSESS SNOW REMOVAL AND ICE CONTROL PLAN

Summary: The City's Snow Removal and Ice Control Plan (2016) is not fully in alignment with Salmon-Safe standards. The City will conduct an investigation into snow and ice control operational practices that take into consideration impacts on aquatic life. The investigation shall seek information on best industry practices including:

- Snowfighters *(http://pnsassociation.org)* or Clear Roads *(http://clearroads.org)* to develop best practice snow and ice control operations joining or participating in regional or national associations, like the Pacific Northwest; and
- Other agencies' experiences and programs that provide snow and ice control services in the temperate and wet climate of the Pacific Northwest, such as the City of Portland, Oregon, and its Bureau of Transportation, a Salmon-Safe certified municipality.

The investigation will include, but not be limited to, consideration of the following activities:

- Assessing existing or potential salmon habitat in relation to snow and ice control routes;
- Assessing operational practices that balance environmental impacts of snow and ice control with agency and community;
- Economic and life safety factors with a view toward using the minimum amounts of anti-icing and deicing agents near water bodies or groundwater recharge areas; and
- Reviewing the current use of anti-icing and de-icing equipment and products by:
    1) Evaluating the ability to avoid use of chloride-based deicers where runoff can flow to a headwater (third-order or smaller) salmon spawning or rearing stream;
    2) Assessing use of highly targeted application of non-chloride-based deicers, such as calcium magnesium acetate, where runoff can flow to a headwater (third- order or smaller) salmon spawning or rearing stream. Areas where runoff passes through green stormwater infrastructure (GSI treatment) do not need considerations of this activity (see Attachment A, Appendix D for Salmon-Safe comparison of alternative road deicers); and
    3) Assessing equipment and material storage needs for inclusion of road deicing equipment in development of the City Maintenance Facility where snow and ice operations are staged.

The investigation will inform operational aspects of the 2022/23 update of the City Snow and Ice Plan and will inform equipment choices in the proposed City Maintenance Facility where snow and ice operations are staged.

Staff Analysis: The investigation into snow and ice control operational practices and the possible resulting equipment needs and changes in operations practices are not included in the Public Works Department work plan or budget. The level of effort by staff and a consultant in collecting information and making recommendations, and the costs associated with new or updated facilities, equipment, materials, and different operational practices, can be significant depending on the decisions made to alter current practices. These costs are impossible to accurately estimate ahead of research and decisions made, but some orders of magnitude for initial consideration are below:

- 2020 - staff needed to understand best practices and manage consultant is estimated to be on the order of 0.2 FTE.
- 2020 - consultant effort to identify salmon habitat streams and map drainage effect areas, assist in alternative treatment and operational changes, develop

equipment recommendations, and identify possible roadside treatment locations is estimated to be $60,000.

- The 2020 work needs to be completed in time to inform decisions on equipment and facility needs in the design and construction of the City Maintenance Facility at the Brightwater property (tentative construction start in 2021) as well as fleet equipment needs. The recommendations of this work will be shared with Council as the project develops.
- 2021 and 2022 - costs depend on the facility and equipment decisions, which are too early to determine at this time but may be significant depending on the decisions made.
- The estimated timing is
    - 2020 work informs facility and equipment decisions;
    - 2021/2022, facility design and construction;
    - 2022 fleet equipment purchases; and
    - 2022/2023 snow and ice plan update with new operations practices.

The City will update the Snow Removal and Ice Control Plan by 2021 to maintain American Public Works Association (APWA) certification. Conducting the investigation into resource implications of an approach that is better for salmon would inform this update. This effort would also require detailed mapping to assess drainage and identify sensitive areas that should potentially receive different treatments. As the draft scope of work to update the Snow Removal and Ice Control Plan is developed, it would be beneficial to have Salmon-Safe review it. Conversations with Public Works departments in cities that have adopted innovative solutions, like the use of beet juice in Bellingham, could also be informative.

CONDITION 9: UPDATE THE INTEGRATED PEST MANAGEMENT (IPM) PLAN

Summary: The City's IPM plan requires an update to be fully consistent with Salmon-Safe standards. The City will develop a pest management and pesticide use policy that encompasses all City properties. This policy or another document should document fertilization practices. The City's desire to be largely pesticide-free should be documented in the policy, along with any allowable exceptions.

Staff Analysis: This condition would require developing/updating a pest management and pesticide use policy and a fertilization procedure/practice for both the Parks and Public Works Departments. A consultant will be required to support the development of an IPM at an estimated cost of $30,000. An additional staff effort requiring 40 hours of work is needed to manage the consultant and participate in the IPM development. The timing is to have the work done in advance of or with the 2021 Parks Operations and Maintenance Standards Manual update.

CONDITION 10: ENHANCE BIODIVERSITY IN PARKS WHEN CONVERTING TURF OR LANDSCAPED AREAS

Summary: The City of Shoreline has an extensive park system that provides a wide variety of ecological and human services. Periodically, Parks Department staff alter the landscaping at specific locations within their parks to reduce maintenance costs (e.g., removing a landscaped bed) and/or to enhance the ecological functioning of an area

that is otherwise underutilized. The City of Portland is also engaged in improving the habitat in their parks through the concept of a "nature patch."

The City of Shoreline shall look for opportunities to create nature patches within their park systems. The City shall prepare a memorandum that identifies potential nature patch opportunities for each park in their system. Although not required for certification, the City shall attempt to create nature patches as funds allow.

Staff Analysis: This work involves finding areas to create nature patches in parks and developing a memorandum documenting the review. This will be an ongoing effort by City staff, and the timing is to document the work completed and prepare a report in 2021. No noticeable cost increases are anticipated as implementation of nature areas is recommended, not required.

CONDITION 11 COMPLETE SUBSTANTIAL DESIGN OF STORMWATER MANAGEMENT PROJECTS WITH HABITAT RESTORATION ELEMENTS

Summary: The City of Shoreline has demonstrated a commitment to completing projects that improve stormwater management and habitat. Salmon-Safe applauds this commitment and would like to see it continue. Accordingly, the City shall complete at least three (3) stormwater management projects that also include habitat restoration features, such as the stormwater detention facility at Cromwell Park.

The specific projects to be completed are at the discretion of the City. Candidate projects that are already underway or are partially completed include:

- **Hidden Lake Dam Removal**—includes restoration of Boeing Creek within the lake area and replacement of culverts crossing below NW Innis Arden Way;
- **25th Avenue NE Flood Reduction Project**—includes habitat restoration elements at Brugger's Bog Park and Ballinger Creek;
- **Ronald Bog**—a Sound Transit funded and implemented project that includes a wetland restoration at Ronald Bog Park to replace wetlands affected by Sound Transit's Lynnwood Link light rail project;
- **Brugger's Bog Park Expansion**—after completion of the City Maintenance Facility and after or coincidentally with the 25th Avenue NE Flood Reduction Project, expansion of the park into remnant North Maintenance Facility property may occur; and
- **Ballinger Open Space Restoration**—environmental restoration project at Ballinger Open Space will remove invasive plants and install native vegetation.

Staff Analysis: The projects identified with stormwater management and habitat restoration elements are in the Capital Improvement Plan or other planning documents. As the projects are in planned work, no additional staff effort is needed beyond sharing plans and documenting project completions with Salmon-Safe. Timing follows each project development, and no noticeable cost increases are anticipated. Including these projects as conditions of Salmon-Safe certification may make them more competitive for potential funding opportunities described in that section of this staff report, below.

CONDITION 12: INCORPORATE HABITAT AND FISH USE INFORMATION INTO SURFACE WATER MASTER PLAN (SWMP)

Summary: The SWMP discusses stream geomorphic and water quality characteristics, but there is no mention of present or historic salmon use, habitat features supportive of salmon, impediments to salmon functioning, salmon restoration potential, or actions needed to protect existing and increase future salmon populations. Accordingly, the City of Shoreline shall make a stronger and stream- or watershed-specific connection to salmon by including these elements in the update of the SWMP.

Specifically, the Plan shall include a prioritized list of potential instream, riparian, and upland water management plus monitoring projects that benefit salmon. Much of this information is already contained in other documents prepared for the City, including the various basin plans.

Staff Analysis: The habitat and fish use analysis identified in this condition will be incorporated in the 2023 SWMP update. The staff effort will be identified in the scoping of the 2023 Plan update, and cost increases for the staff and consultants identified in the efforts will be included in the implementation of the 2023 Plan, as it is too early to determine those exact costs. Timing is with the start of the 2023 Plan Update, which could be as early as 2021.

Continued Improvement Recommendations

In addition to the conditions listed above, Salmon-Safe offers the following continuing improvement recommendations, the adoption of which is not mandatory to achieve certification but is considered Salmon-Safe best practice. These are described in detail in Attachment A. Staff has not analyzed potential implications of most of these additional items. If Council would like to consider any or all of these items at this time, staff can provide analysis.

1) Apply Salmon-Safe model stormwater guidelines to private developments.
2) Develop a priority point system for Salmon-Safe accredited contractors.
3) Look for opportunities to incorporate pollinator habitat for the Trail Along the Rail project.
4) Restore all Hidden-Lake bottom land.
5) Expand riparian forest at Brugger's Bog Park.
6) Create educational signage.
7) Create stewardship staff positions to coordinate volunteers for natural area restoration projects.

Potential Funding Opportunities

Much of the analysis of conditions above focused on potential increases to costs of capital projects and additional staffing or consultant resources. It is also important to consider that including Salmon-Safe conditions, best practices, and other habitat restoration and water quality elements in the City's operations and facility development could increase the potential for funding from a variety of outside sources.

Potential State Funding

Governor Inslee has requested over a billion dollars in the State budget to assist in recovery of the Southern Resident Orcas. This is significant because 92% of the orca's

diet is Chinook and Sockeye salmon, so any efforts to restore robust salmon populations will support survival of the orcas. The full policy brief outlining the Governor's proposal is available at the following link: https://www.governor.wa.gov/sites/default/files/documents/SRKW-policy-brief_Jan2019.pdf.

At this time, staff does not know how the proposal will fare in the State Legislature, but it is possible that there will be an increase in funding available to local governments for habitat restoration projects; transportation improvements, including culvert replacement; and toxics cleanup and stormwater. At this time, staff also does not know how these funds could be distributed, but it is likely that much of it could be passed through the Department of Ecology, WRIA agencies, or other entities.

King Conservation District
Shoreline is already paying into this fund. It's just a matter of identifying interdepartmental priorities to utilize this funding. More information is available at the following link: http://kingcd.org/tools-resources/grants/member-jurisdiction-grant-program/.

WRIA 8
Water Resource Inventory Area 8 gives more to restoration than anything else. More information is available at the following link: https://www.govlink.org/watersheds/8/funding/default.aspx.

Waterworks
The City could be eligible for 2021 grant cycle. More information is available at the following link: https://www.kingcounty.gov/services/environment/grants-and-awards/waterworks.aspx.

Puget Sound Partnership
The City could be eligible for the 2022 grant cycle. More information is available at the following link: http://www.psp.wa.gov/action_agenda_center.php.

Department of Ecology (DOE) Stormwater Grants
There are a host of grants through DOE for stormwater, restoration projects, etc. It is important to align the grant request with the schedule and demonstrate some match on the part of the City, but staff time does count towards matching funds. More information is available at the following link: https://ecology.wa.gov/About-us/How-we-operate/Grants-loans/Find-a-grant-or-loan/Grants-of-regional-or-statewide-significance.

National Fish and Wildlife Foundation Five Star and Urban Waters Restoration Program
These tend to be smaller grants. More information is available at the following link: https://www.nfwf.org/fivestar/Pages/2019rfp.aspx.

Private Foundations
More and more private national and regional foundations are investing in public projects. Successful funding applications rely on aligning the work with the foundation's mission. It also can come down to partnering with non-profits. The Bullitt Foundation has supported innovation projects with cities, as does the Russell Family Foundation,

the Rose Foundation, and others. The Tulalip and other tribal foundations may also support this work, especially when it comes to facilitating salmon recovery.

SUMMARY

Salmon-Safe has identified and organized the 12 conditions for certification according to their guiding standards. One way to consider cumulative implications of all conditions is to organize them into different "buckets", according to the mechanisms by which they would be implemented. Staff identified four different condition buckets:

Checklist Conditions

Conditions that could be implemented by creating a checklist to be used for City projects include:

- 1- Apply Salmon-Safe Modal Stormwater Guidelines to New, Expanded, and Redeveloped City Facilities
- 2- Incorporate Green Stormwater Infrastructure into Standard Roadway Cross-Sections to Identify Preferred LID Techniques in the ROW
- 6- Adopt Salmon-Safe Construction Standards

Surface Water Master Plan Conditions

Conditions that could be implemented through the next update of the SWMP include:

- 4- Improve Inventory of Stormwater Infrastructure
- 7- Improve Water Quality Monitoring Program
- 12- Incorporate Habitat and Fish Use Information into SWMP

Existing Design Project Conditions

Conditions that could be implemented through design projects, which are already on existing work plans, include:

- 3- Improve Stormwater Management at the North Maintenance Facility
- 11- Complete Substantial Design of Stormwater Management Projects with Habitat Restoration Elements

Project Conditions

Conditions that could be implemented through additional consideration during an existing process or through a separate project include:

- 5- Assess Water Conservation Efforts (or Develop Water Conservation Plan)
- 8- Assess Snow Removal and Ice Control Plan
- 9- Update the Integrated Pest Management Plan
- 10- Enhance Biodiversity in Parks when Converting Turf or Landscaped Area

Another way to consider cumulative implications of all conditions is to look at potential costs. The following table summarizes any estimated costs contained in the analysis of individual conditions. It is important to note that most costs cannot be known at this time and will be determined through a project-specific scoping process.

Condition	Potential Cost
1- Apply Salmon-Safe Stormwater Guidelines to City Facilities	No additional costs are anticipated for larger projects. Additional costs for stormwater detention on smaller projects will be determined on a per project basis but are anticipated to increase.
2- Incorporate GSI into Cross-Sections	Checklists and cross-sections can be developed by existing staff and integrated into the EDM, costs to incorporate GSI into capital projects will vary by project.
3- Improve Stormwater Management at NMF	Costs for long-term stormwater management will depend on decisions made during project design.
4- Improve Inventory of Stormwater Infrastructure	This task may increase the budget for the update of the SWMP, but a specific dollar amount will be identified during scoping for that project.
5- Option A- Assess Water Conservation Efforts Option B- Develop Water Conservation Plan	A- Staff may need to spend around 120 hours to expand existing conservation and monitoring efforts to Public Works and Facilities and around 40 hours annually to track and report. Costs beyond staff time are not anticipated, although conservation efforts may have an up-front cost, hopefully balanced by long-term savings. B- Potential scopes for plan options submitted ranged from $100,000-$300,000.
6- Adopt Salmon-Safe Construction Standards	Public Works (PW) anticipates hiring a consultant to develop a process/checklist and potentially augment the EDM and NPDES requirements for around $8,000. Potential staff time to manage consultant and implement changes is estimated to be around 40 hours. City project costs could increase.
7- Improve Water Quality Monitoring Program	This task may increase the budget for the update of the SWMP, but a specific dollar amount will be identified during scoping for that project. Estimated lab costs for adding metals and analytes to the current sampling regime could be about $10,500 annually. A 2013 estimate to perform a Biological and Physical Assessment of Streams was $22,000.
8- Assess Snow Removal and Ice Control Plan	Initial (2020) staff costs to manage consultant to analyze treatment options and potential impacts to salmon and operations are estimated at 0.2 FTE, potential scope for consultant could be $60,000. Impacts to CMF design and equipment needs may be significant.
9- Update the IPM Plan	Staff time to manage consultant to update IPM for Parks and PW is estimated to be 40 hours, potential scope for consultant could be $30,000.
10- Enhance Biodiversity in Parks when Converting to Turf or Landscaped Areas	Staff time will need to be allocated to prepare a memo identifying potential nature patch opportunities. Costs to incorporate improvements will depend on project elements.

11- Complete Substantial Design of Stormwater Management Projects	Since this work is already programmed, no additional staff effort is needed beyond sharing plans and documenting completion with Salmon-Safe.
12- Incorporate Habitat and Fish Use Info into SWMP	This task may increase the budget for the update of the SWMP, but a specific dollar amount will be identified during scoping for that project.

RESOURCE/FINANCIAL IMPACT

Potential costs associated with Salmon-Safe certification are not clearly defined at this stage. Over the course of the certification period (from Council agreement to pre-conditions and acceptance of a conditional certification to five years from that date), staff will evaluate financial impacts. At this time staff assumes that implementing conditions of certification will increase costs for the 2023 update of the Surface Water Plan, snow removal and deicing, and likely certain capital projects, as described earlier in this staff report. A table in the Summary section of this report combines this information for a high-level snapshot of potential cost increases for full certification. It is also possible that becoming the first Salmon-Safe certified City in Washington will make stormwater and habitat restoration projects in Shoreline more competitive for grant funding.

RECOMMENDATION

No action is required at this time. Staff is interested in Council's direction to be able to schedule action on this item and in their preference regarding the bookended options in Condition 5. Tonight's meeting is an opportunity for Council to learn about the conditions for certification, ask questions, discuss implications and concerns, and potentially propose amendments.

ATTACHMENTS

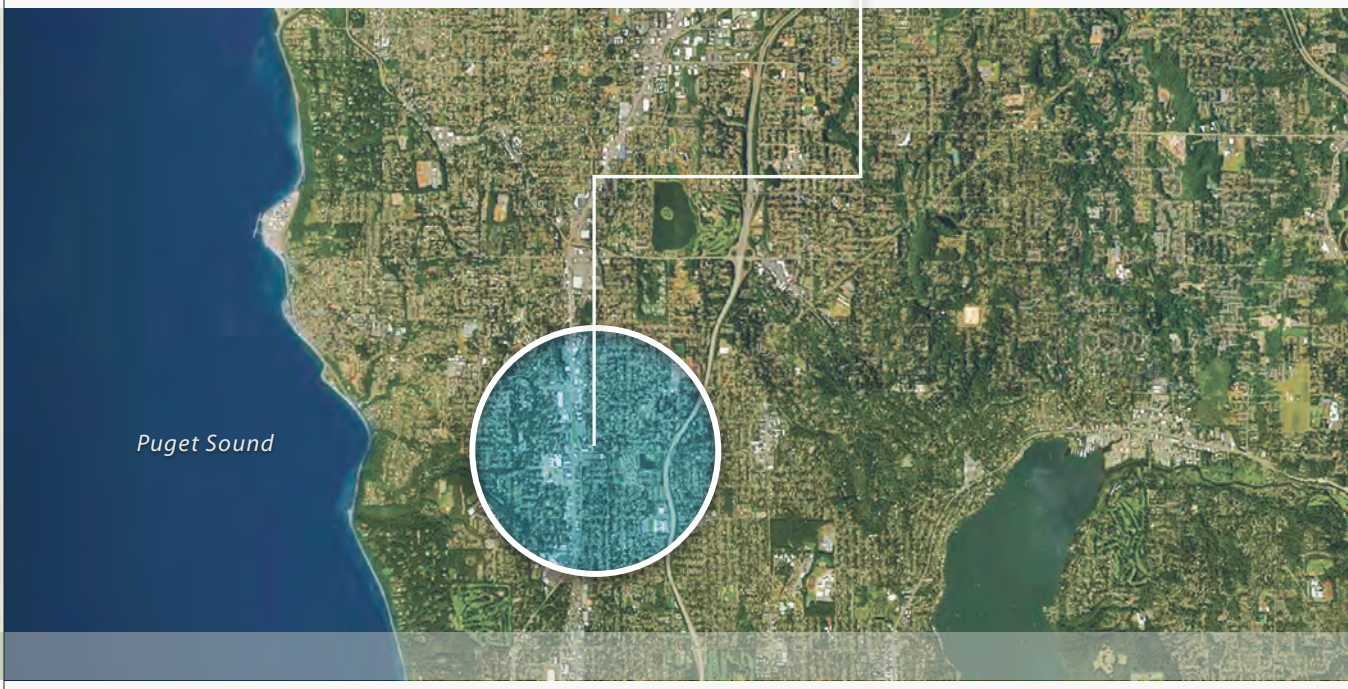
Attachment A: Report of the Evaluation Team Regarding Salmon-Safe Certification of the City of Shoreline, Washington
Attachment B: Salmon-Safe Certification Report references

SALMON-SAFE INC.

REPORT OF THE EVALUATION TEAM REGARDING SALMON-SAFE CERTIFICATION OF THE CITY OF SHORELINE, WASHINGTON

June 13, 2018

revised March 6, 2019



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RECOMMENDATION SUMMARY

The Salmon-Safe science team is pleased to recommend that the City of Shoreline, Washington, be certified Salmon-Safe, subject to the conditions detailed in this report. The City has demonstrated a commitment to environmental sustainability and stewardship through its *Environmental Sustainability Strategy*, *Climate Action Plan*, and *Deep Green Incentive Program*, thereby serving as a regional and national example of environmental innovation by a municipality.

Background

In 2000, Salmon-Safe expanded beyond agricultural land certification to apply the Salmon-Safe assessment and certification process to land and water management within the urban realm. This initiative significantly advanced restoration efforts in urbanized watersheds by developing urban aquatic protection guidelines and a citizen education campaign throughout the Pacific Northwest. Working closely with independent scientists and technical experts, Salmon-Safe developed a comprehensive certification framework oriented towards reducing impacts on water quality and fish habitat from urban land and water management practices. Since 2005, more than 50 urban sites have received Salmon-Safe certification in Oregon, Washington, and British Columbia.

In 2016, Salmon-Safe completed a three-year, phased assessment of the key City of Portland operations and facilities that impact the urban Willamette River watershed. Following on more than a decade of Salmon-Safe certification from Portland's 10,000 acre system of parks and natural areas, the citywide Salmon-Safe project included Bureau of Environmental Services, Water Bureau, Bureau of Transportation, Fire and Rescue, Fleet Services, Procurement and Facilities Services. In October 2016, Portland's Mayor and City Council formally committed to certification conditions, resulting in the first Salmon-Safe city.

The City of Shoreline is the first Washington city to seek Salmon-Safe certification. To evaluate watershed impacts from Shoreline's facilities, infrastructure and operations, Salmon-Safe convened the same independent science team that evaluated the City of Portland. Beginning in spring 2018, the science team conducted a comprehensive analysis of the City's environmental programs and policies.

The City's *Climate Action Plan* (CAP), adopted in 2013, established a commitment to reduce community greenhouse gas emissions. To fulfill one of the priority recommendations of the CAP, the City adopted the *Deep Green Incentive Program* (DGIP) in 2017 to encourage the highest standard for green building within the city to address greenhouse gas emissions from new buildings. During the development of the DGIP, the City adopted Salmon-Safe as a companion certification for the International Living Future Institute's *Net Zero Energy Building Program*. This dual certification will require projects to consider both innovative energy and stormwater solutions. The City also decided to pursue city-wide Salmon-Safe certification and to demonstrate commitment to environmental stewardship, providing leadership to the building development community in implementing environmentally sustainable practices.

OVERVIEW OF CITY OF SHORELINE FACILITIES AND POLICIES

The City of Shoreline covers 11.74 square miles at the northwestern edge of King County and includes more than 53,000 residents. Before becoming a city in 1995, The City of Shoreline was part of unincorporated King County. Shoreline is generally bounded by the City of Lake Forest Park to the east, the City of Seattle to the south, Puget Sound to the west, and Snohomish County to the north (including the Cities of Mountlake Terrace and Edmonds, and the Town of Woodway). It is primarily residential with more than 70 percent of the households being single-family residences.

City Hall
City of Shoreline, Washington
(architectural rendering, courtesy OPUS Northwest, LLC)

Shoreline has more than 400 acres of park land and open space, arrayed over 34 properties, nine of which also include athletic fields. The City has placed a high priority on preserving trees, which cover approximately 31% of the city surface area. Outside of the parks, other recreational activities take place primarily in two recreation centers, a community pool and a dedicated bike/pedestrian Interurban Trail that traverses the city in a north-south direction. Other municipal properties include City Hall and five fire stations.

In addition to Puget Sound, waterbodies in the City of Shoreline include nine streams, two lakes and two wetlands that include standing water for the majority of the year. Watersheds in the western half of the city (Middle Puget Sound and Boeing Creek basins) drain to Puget Sound while watersheds in the eastern half of the city (McAleer Creek, Thornton Creek, Lyons Creek, and West Lake Washington basins) drain to Lake Washington, through either Lake Forest Park or Seattle. All the streams include one or more barriers to fish passage, but salmonid use has been documented on McAleer Creek and, to a much lesser extent, on short reaches of other streams as well.

The City of Shoreline follows a council-manager form of governance whereby seven elected City Council Members determine policies that are responsive to

citizens' needs and wishes and the City Manager that is hired by the City Council implements those policies and oversees all City departments. Departments that oversee activities and facilities that pertain to Salmon-Safe include Parks, Recreation & Cultural Services; Planning & Community Development; Administrative Services; and Public Works. The Shoreline Surface Water Utility is responsible for managing stormwater drainage and protecting surface water quality. Drinking water is provided by Seattle Public Utilities in the western half of the city (generally west of Interstate 5) and by the North City Water District in the eastern half of the city. Wastewater services are provided by the Ronald Wastewater District. The City has established goals to assume and/or acquire the assets of these utilities in the future.

The City of Shoreline adopted an *Environmental Sustainability Strategy* in 2008. Of the 10 key program strategies, five are particularly relevant to Salmon-Safe, including:

(1) develop and integrate the sustainability program into all city functions;

(2) develop a residential green building program;

(3) build and support a sustainability leadership structure;

(4) adopt a clear and aggressive green building policy; and

(5) structure and prioritize natural resources enhancement.

An interdepartmental Green Team was tasked with implementing the *Sustainability Strategy*. By 2013, when Shoreline's *Climate Action Plan* was completed, the Green Team had completed 42 of the 50 recommendations from the *Sustainability Strategy*.

THE ASSESSMENT PROCESS

The Salmon-Safe assessment process consisted of a gap analysis and field reviews, culminating in a certification report (this document). These tasks were conducted by Salmon-Safe staff and an interdisciplinary team of scientists (the Science Team) with expertise in aquatic ecosystems, innovative stormwater management, land management, and integrated pest management (IPM), as summarized below.

Science Team

The Science Team for this project was composed of Tad Deshler, Dr. Richard Horner, Peter Bahls, and Carrie Foss. This same team conducted the citywide assessment for the City of Portland.

Tad Deshler: *Environmental Scientist, Coho Environmental*

Mr. Deshler's practice focuses on environmental assessment and impact analysis, with particular focus on the interaction between built and natural environments. Much of his project work has centered around aquatic sites, or at the interface between aquatic sites and the adjacent upland environments, where understanding the transport mechanisms that connect upland and inwater environments is paramount. Tad earned a BA degree in Aquatic Biology from the University of California at Santa Barbara and an MS degree in Animal Science from the University of California at Davis. Tad also has specialized expertise in sediment assessment and management, risk assessment, and chemical transport and fate studies.

Dr. Richard Horner: *Stormwater Management Expert, University of Washington*

Dr. Horner received engineering BS and MS degrees from the University of Pennsylvania, and a PhD in civil and environmental engineering from the University of Washington in 1978. Following 13 years of college teaching and professional practice, he joined the University of Washington research faculty in 1981, where he held appointments in Civil and Environmental Engineering, Landscape Architecture, and the Center for Urban Horticulture. His principal research interests involve analyzing the effects of human activities, especially in urban areas, on freshwater ecosystems and solutions that protect these resources. Dr. Horner founded the Center for Urban Water Resources Management in 1990 to advance applied research and education in these areas. He is now emeritus research associate professor and splits his time between private practice and some continuing university research.

Peter Bahls: *Aquatic Ecologist and Salmon Biologist, Northwest Watershed Institute*

Mr. Bahls received an MS in Fisheries Science and Aquatic Ecology from Oregon State University and a BS in Environmental Studies-Biology from Middlebury College, Vermont. He worked for six years as the salmon habitat biologist for the Port Gamble S'Klallam Tribe followed by three years as the principal fish biologist for David Evans and Associates. In 2001, he founded Northwest Watershed Institute, a non-profit organization that provides scientific and technical assistance in watershed assessment and restoration.

Carrie Foss: *Urban IPM Director, Washington State University (WSU) Puyallup*

Ms. Foss manages the WSU IPM Certification Program and the Pesticide Safety Education Program in Western Washington. Landscape maintenance personnel are trained in plant problem diagnosis, integrated pest management, personal safety and environmental protection through lectures and workshops. Carrie earned a BS degree in Botany from the University of Washington and

an MS degree in Plant Pathology from the University of Hawaii. Her background includes plant problem diagnosis, research on beneficial microorganisms and management strategies for turf and ornamental diseases.

Kirk Petersen, City of Shoreline Parks Superintendent, leads the Salmon-Safe science team through Kruckeberg Botanic Garden.

Gap Analysis

The gap analysis was conducted from February to March 2018 and consisted of interviews with key staff identified by the City's Green Team, followed by a review by the Science Team of City policies and documents for consistency with relevant Salmon-Safe standards. A memorandum was prepared that summarized the findings. See Appendix A for a list of staff interviewed, documents reviewed, and Appendix B for the full gap analysis memo. The gap analysis review identified many areas of consistency with Salmon-Safe standards as well as concerns and opportunities to improve environmental performance across City operations, as summarized below:

Areas of alignment with Salmon-Safe

- Natural resource-related policies and activities are largely consistent with Salmon-Safe standards. The City has done a good job inventorying its resources and have some clearly stated policies about preserving and restoring natural resources.

- Excellent information has been collected and collated in the City's basin plans.
- The *Pesticide-Free Parks Initiative* and strategic planning for parks and open spaces are commendable and highly consistent with Salmon-Safe standards.
- The *CAP* and *Environmental Sustainability Strategy* include a commitment to investigate opportunities for rainwater harvesting and greywater reuse, as well as high-efficiency irrigation controls.
- The City is using the latest editions of the Department of Ecology's *Stormwater Manual for Western Washington* and *Puget Sound Low Impact Development Manual* with modifications for increased stringency as outlined in Shoreline's Engineering Development Manual.
- The *Green Stormwater Infrastructure Program* has facilitated valuable outreach to residents and a number of commendable projects between 2011–2017, including twelve neighborhood bioretention facilities plus two more awaiting grant funding, and a system of bioretention units of various configurations installed during the Aurora Avenue Corridor Project.

Opportunities for improvement

- Demonstrate that the capital projects underway are part of a comprehensive approach that is effectively reducing watershed impacts over time, taking into account continued development within the city.
- Increase the frequency of water quality monitoring efforts needs to effectively gauge success in meeting objectives and overall goals. In tandem, assess overall water quality trends since the start of data collection began in 2003 along with genetic testing to determine the source(s) of fecal coliform bacteria.
- Conduct a riparian habitat condition survey as well as fish surveys to document distribution of species during all life stages.
- Connect stormwater management policies to specific goals related to watershed impact.
- City staff provided responses and additional information related to topics raised in Salmon-Safe's memo in April 2018.

Field Reviews

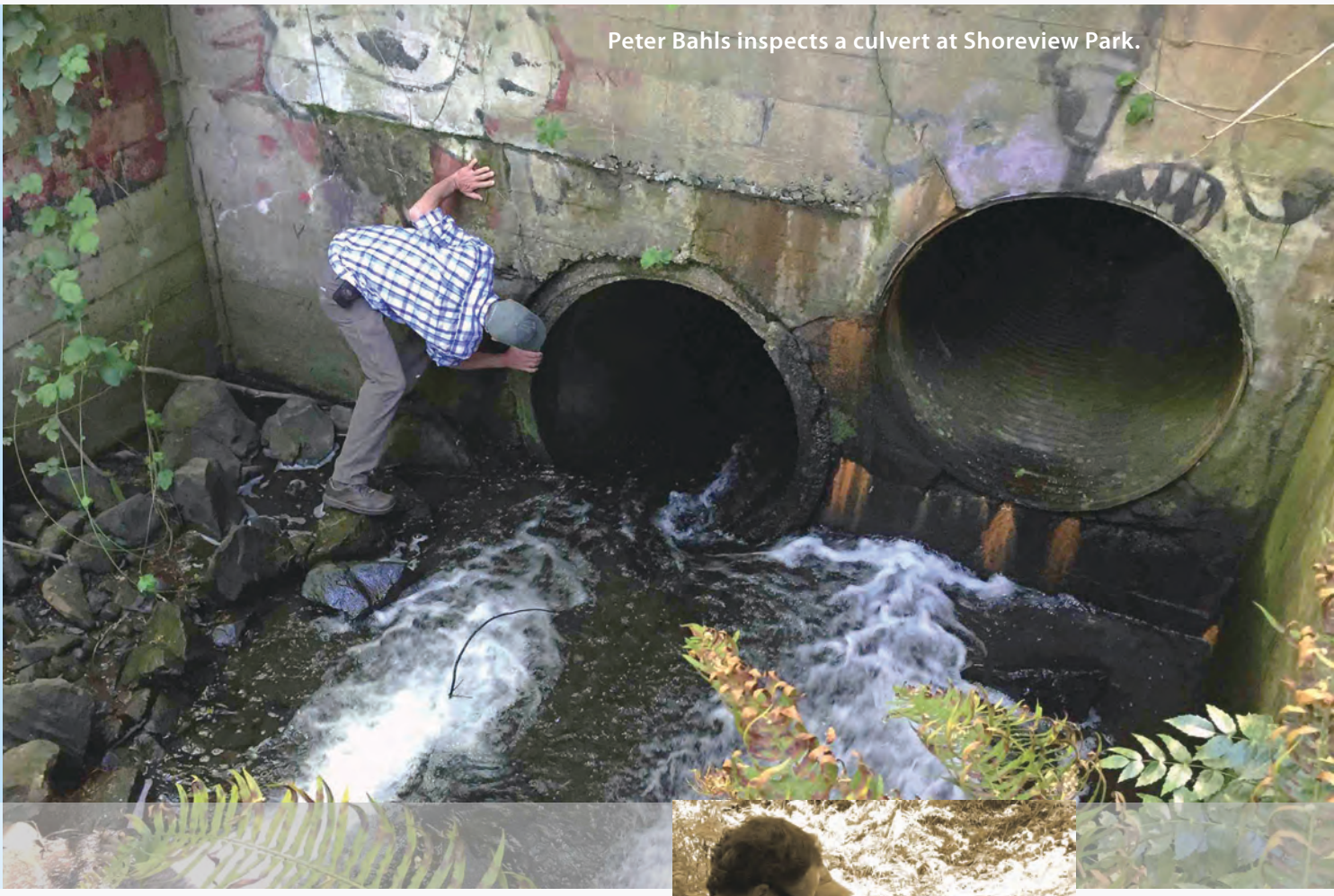
The Science Team conducted field reviews of a representative selection of sites and facilities on May 14–15, 2018, accompanied by key City staff on a rotating basis, including:

Kirk Peterson, *Park Maintenance Superintendent*
John Featherstone, *Surface Water Engineer*
Miranda Redinger, *Senior Planner*
Nora Daley-Peng, *Senior Transportation Planner*
Tony Colinas, *Senior Park Maintenance Staff*
Melissa Ivancevich, *Surface Water Quality Specialist*
Jesse Peterson, *Wastewater Manager*
Brent Proffitt, *Wastewater Utility Specialist*

Above: John Featherstone (left) and Nora Daley-Peng (right) of City of Shoreline Public Works lead the Salmon-Safe science team on a walking tour of a green street demonstration project on 17th Avenue NE.

Above: The Salmon-Safe science team visits Richmond Beach Saltwater Park, one of the few locations in the city with public access to Puget Sound shoreline.

Multiple natural areas were visited and multiple examples of green stormwater infrastructure were observed (see Table 1, page 9). Additionally, maintenance practices and equipment were observed and discussed while visiting Hamlin Yard, a facility shared by Parks and Public Works departments and the North Maintenance Facility, which is under consideration for expansion to consolidate all Public Works operation at a single location. A representative wastewater lift station in the Innis Arden neighborhood was also visited. Throughout the site visits, the Science Team asked many questions about specific locations and also about citywide practices of the City staff accompanying them.



Peter Bahls inspects a culvert at Shoreview Park.

John Featherstone (right) gives the Science Team an overview of the Hidden Lake Dam Removal project.

Table 1. Sites Visited during Field Review

Site Name	Site Type	Visit Type
25th Avenue NE Flood Reduction Project	Stormwater Infrastructure	Comprehensive
Boeing Creek Park	Park	Comprehensive
Brugger's Bog Park	Park	Comprehensive
Cromwell Park	Park	Comprehensive
Green Streets Demonstration Project (17th Ave NE between NE 145th-150th Streets)	Stormwater Infrastructure	Comprehensive
Hamlin Park	Park	Visual inspection
Hamlin Yard	Operations	Comprehensive
Hidden Lake Dam Removal	Natural Area	Comprehensive
Hillwood Park	Park	Visual inspection
Kayu Kayu Ac Park	Park	Visual inspection
Kruckeberg Botanic Garden	Natural Area	Comprehensive
Lift Station 1	Operations	Comprehensive
North City Park	Park	Visual inspection
North Maintenance Facility / Fueling Depot	Operations	Comprehensive
Paramount School Park	Park	Visual inspection
Richmond Beach Community Park	Park	Visual inspection
Richmond Beach Saltwater Park	Park	Comprehensive
Ronald Bog Park	Park	Comprehensive
Shoreview Park	Park	Comprehensive
South Woods Park	Park	Comprehensive
Sunset Park (with Community Garden)	Park	Visual inspection
Trail Along the Rail	Natural Area	Comprehensive
Twin Ponds Park	Park	Comprehensive

At the end of the field review, the Science Team, supported by Salmon-Safe staff, met to review the certification criteria against notes taken during the process. On June 13, 2018, the team and Salmon-Safe staff finalized conditions for certification and reached a final unanimous decision on certification.

GENERAL OBSERVATIONS AND CONCLUSIONS

The Science Team took note of a strong organizational motivation and enthusiasm for environmentally sustainable policies and practices, as evidenced by their *Environmental Sustainability Strategy* (2008), *Climate Action Plan* (2013) and the *Deep Green Incentive Program* (2017). The latter program encourages the highest standards for green building and site ecological function, including LEED® and Salmon-Safe. The City Hall building, completed in 2009, was awarded LEED® Gold status.

The City's natural resource-related policies and activities are largely consistent with Salmon-Safe standards. The City has done a good job inventorying its resources, particularly in the numerous basin plans that have been completed. It has also clearly stated policies related to preserving and restoring natural resources. Some improvements should be made in organizing the existing inventory information to make a stronger and stream- or watershed-specific connection to salmon. This will facilitate the prioritization of capital projects through the lens of salmon protection.

The City has an ongoing water quality monitoring program and conducted stream monitoring for benthic invertebrates in 2003 and 2007. The conclusions from the most recent water quality assessment report indicate that the city's waterbodies are moderately to severely impacted by stormwater. While this may be a valid conclusion, the water quality monitoring program is not specifically designed to evaluate the impacts from stormwater input or provide an adequate basis for assessing potential changes in water quality over time. Improvements to the water quality monitoring program should be made, as discussed in more detail in the Certification Conditions section below. In addition, the biological monitoring program should be restarted.

The *Pesticide-Free Parks Program* is commendable and highly consistent with Salmon-Safe goals, as is the strategic planning in the *Parks, Recreation and Open Space Master Plan*. Some clarification on exceptions to the pesticide-free practices should be made in the updated IPM plan.

The *Climate Action Plan* and *Environmental Sustainability Strategy* include a commitment to investigate opportunities for rainwater harvesting and greywater reuse. The *Climate Action Plan* also indicates that high-efficiency irrigation controls are used routinely, particularly in the Aurora corridor and in right-of-ways (ROWs). The City has made large reductions in the amount of water being used for irrigation, resulting in significant cost savings. Additional planning to achieve further reductions is warranted.

The City is using the latest editions of the Department of Ecology's *Stormwater Manual for Western Washington* and *Puget Sound Low Impact Development Manual* with modifications for increased stringency as outlined in Shoreline's *Engineering Development Manual*, including:

- requiring infiltration where conditions are appropriate, with thorough investigation of soil and subsurface properties
- list of numerous criteria to be addressed in project layout and site design based on solid low-impact design principles
- requiring a stormwater pollution prevention plan for construction projects of any type and size
- more control of construction exits
- seasonal (wet season) Suspension Plans for some larger construction projects
- all runoff treatment at least at the level of the Enhanced Treatment Menu
- rescinds allowing existing land cover as the basis for stormwater management design where there has been at least 40 percent impervious land cover since 1985 and instead requires historic cover as the basis

It is recommended that the City create a checklist to be used for new, expanded, and redeveloped City facilities that reflects more stringent stormwater guidelines, as discussed below in the Recommendations section.

The *Green Stormwater Infrastructure Program* has facilitated valuable outreach to residents. A number of commendable projects have been completed between 2011–2017, including twelve neighborhood bioretention facilities plus two more awaiting grant funding, and a system of bioretention units of various configurations were installed during the Aurora Avenue Corridor Project. The *Soak it Up* rebate program being implemented by the Surface Water Utility should also incentivize green stormwater infrastructure on the scale of individual residences.

The City's *Snow Removal and Ice Control Plan* is not currently consistent with Salmon-Safe standards and should be updated. Specific recommendations are discussed below in the Certification Conditions section.

The City is making plans to double the miles of sidewalk within the city and recently completed the *Sidewalk Prioritization Plan* to evaluate alternative sidewalk designs, including incorporation of green stormwater infrastructure. The Science Team is highly supportive of alternatives that include features such as the complete street pilot project on 17th Avenue NE.

The Hamlin Yard appears well-organized and follows practices that are consistent with Salmon-Safe standards. The North Maintenance Facility, which was acquired by the City from King County in 2013, includes acceptable facilities related to fueling, but is in need of upgrades related to stormwater management, as discussed below in the Certification Conditions section.

RECOMMENDATIONS AND DISCUSSION

Certification Recommendation: The Science Team recommends that the City of Shoreline be certified as Salmon-Safe subject to two pre-conditions and 12 conditions listed below. The conditions are organized by certification standard categories. All conditions are subject to annual verification by Salmon-Safe. Timelines for accomplishing objectives are measured from the official date of this Salmon-Safe conditional certification.

Pre-Condition 1: *Ensure environmental regulatory compliance*

The City of Shoreline shall provide a signed statement to Salmon-Safe stating that it is not in violation of national, state or local environmental laws, or associated administrative rules or requirements as determined by a regulatory agency in an enforcement action, per General Standard A.1.

TIMELINE

Compliance is a pre-condition of certification, then subject to annual verification by Salmon-Safe.

Pre-Condition 2: *Commitment to adhere to Salmon-Safe standards for expansion or redevelopment*

The City of Shoreline shall provide a signed statement to Salmon-Safe confirming that it **will develop** a mechanism to ensure that all new, expanded, and redeveloped City facilities shall meet Salmon-Safe standards for urban development, including model permanent (see Appendix B) and construction-phase (see Appendix F of the Urban Standards) stormwater guidelines or a comparable LEED standard related to stormwater performance. Included in this commitment is an agreement to avoid the use of uncoated zinc and copper for any new building cladding.

TIMELINE

Compliance is a pre-condition of certification, then subject to annual verification by Salmon-Safe.

Condition 1: *Apply Salmon-Safe model stormwater guidelines to new, expanded, and redeveloped City facilities*[1]

The City of Shoreline has incorporated amendments to the Department of Ecology's *Stormwater Manual for Western Washington* in their *Engineering Development Manual*. These amendments effectively increase the stringency by which the City manages stormwater for all new developments, both City-owned and private. Salmon-Safe has developed model stormwater management guidelines for urban development or redevelopment, which are more stringent than Ecology's manual (see Appendix B) and differ from that manual by the inclusion of the goal of restoring the predevelopment hydrology at a given project site.

The City of Shoreline shall create a checklist based on Salmon-Safe's *Model Stormwater Management Guidelines* to supplement the *Engineering Development Manual* for application to City projects that incorporates Salmon-Safe guidelines for stormwater management (Appendix B). By doing so, the City will create a mechanism for leading the private sector by example over time.

TIMELINE

The companion checklist shall be created and provided to Salmon-Safe for review within three years. The guidelines and procedures included in the document should be implemented on new and redeveloped City facilities within five years.

[1] For the purposes of this Condition, Salmon-Safe refers to the same project size thresholds as the Department of Ecology's *Stormwater Manual for Western Washington*.

Condition 2: *Incorporate green stormwater infrastructure into the standard roadway cross-section to identify preferred low-impact development techniques for Right-of-Ways (ROWs)*

The City of Shoreline has adopted a *Complete Streets* policy that requires development of a transportation system that allows for safe and convenient travel for all users. The City has completed pilot projects that included vegetation in the amenity zone that provided stormwater management and urban habitat. Although the original *Complete Streets* concept is focused on facilitating multi-modal transportation, there is an opportunity for the City to incorporate green stormwater infrastructure elements into City standards for use in the rights-of-way (ROW).[2]

Therefore, the *Engineering Development Manual* shall be revised to reflect this expanded use of the ROW to include green stormwater infrastructure. In addition, the City shall incorporate such green stormwater infrastructure elements into all newly constructed sidewalks, as feasible.

TIMELINE

The City shall, within two years of certification, revise the *Engineering Development Manual*.

[2] Other national organizations, such as the National Association of City Transportation Officials *https://nacto.org/ publication/urban-street-stormwater-guide/streets-are-ecosystems/complete-streets-green-streets/* share this viewpoint.

Condition 3: *Improve stormwater management at North Maintenance Facility*

The stormwater management facilities and practices at the City's North Maintenance Facility do not appear to have been modified since the facility was acquired from King County in 2013 and do not currently meet Salmon-Safe standards. Stormwater from the facility is collected in a series of catch basins, which then ultimately discharge untreated to Ballinger Creek. Galvanized metal parts are stored in the open, as are bark, sand and gravel. Stormwater that comes into contact with these materials is likely to include substances that are detrimental to aquatic life in the creek.

Salmon-Safe understands that this property is undergoing a planned multi-phase redevelopment and repurposing over a several year period in the future, which will include improved stormwater management. The City will take steps to have the existing facilities operated, and the proposed new facilities designed and built in alignment with Salmon-Safe guidelines.

Specifically, the City will improve its material storage and handling practices at the site, including covering erodible and potentially turbidity causing material (e.g. bark, sand, and gravel) and galvanized metal pipes and parts, by placing them under tarps in the short term. New facilities will meet the Salmon-Safe guidelines that are incorporated in the design and construction requirements in place at the time of design and construction.

TIMELINE

The improvements to the current site facilities related to preventing the introduction of pollutants to stormwater through uncovered bulk materials and metal parts shall be implemented within one year of certification. Design documents for the first project of the permanent improvements to the North Maintenance property shall be provided to Salmon-Safe for review as soon as they are available.

Condition 4: *Improve inventory of stormwater infrastructure*

The City has done a good job creating a GIS inventory of stormwater infrastructure, including hard structures, such as catch basins and manholes, but also green stormwater infrastructure features such as bioswales, rain gardens, and permeable pavement. However, it does not appear that this GIS layer includes data for a drainage area assessment that would allow calculations of the drainage areas being managed by various stormwater management techniques. The collection and analysis of such data is important for tracking improvements in stormwater management and prioritizing stormwater management projects.

Per one of the performance requirements of Standard U.1.1, the City shall incorporate a drainage area assessment into the existing GIS layer of stormwater infrastructure that would enable a demonstration of reduction of watershed impacts over time.

TIMELINE

The City shall update the existing GIS layer in the next *Surface Water Master Plan* update and submit it to Salmon-Safe for review as soon as it is available.

Condition 5: *Assess water conservation efforts*

The City of Shoreline has done a good job at reducing the amount of water used for irrigation, as described above under General Observations.[3] The City of Shoreline shall continue its annual review and assessment of its efforts at conserving water and identify targets for additional water conservation in the Park system.

The City will expand this annual review, assessment, and identification of targets for additional water conservation practices to include the Public Works and Facility managed properties. Included in this expansion will be documentation of existing water use trends across City properties, areas targeted for water use reduction and methods, and identification and explanation of areas where water use has significantly increased. This effort will be conducted every two years in conjunction with the City's biannual budget development process.

TIMELINE

Within two years of certification, the City will provide an assessment of water use and documented water savings associated with recent water conservation efforts for Parks Department properties and a plan for implementing the expanded practice to Public Works and Facility properties.

[3] Salmon-Safe noted that water conservation has been set as Priority Recommendation for the City, with multiple initiatives in the works related to rainwater harvesting, Brightwater Treatment Plant, incorporating use of recycled water, and use of non-potable water for toilet flushing.

Erosion Prevention and Sediment Control

Condition 6: *Adopt Salmon-Safe construction standards*

The City's *Engineering Development Manual* specifies elements to be included in the Stormwater Pollution Prevention Plan. The requirements are generally protective of water quality, but improvements are warranted. Specifically, **a checklist for projects on City property** should be **developed** to specifically state a goal of avoiding the discharge of sediments and other pollutants and to provide a hierarchy of practices as a means to pursue the goal (see Appendix F of the Urban Standards).[4]

TIMELINE

The companion checklist shall be created and provided to Salmon-Safe for review within three years. The guidelines and procedures included in the document should be implemented on new and redeveloped City facilities within five years.

[4] This condition does not require the use of Salmon-Safe accredited contractors to demonstrate compliance.

Condition 7: *Improve water quality monitoring program*

The City has established a long-term water quality monitoring program at specific locations in Shoreline streams and lakes. Samples collected from these locations are measured for conventional parameters such as pH, temperature and dissolved oxygen. However, these parameters are not measured frequently enough to provide a reliable basis for assessing changes in water quality over time. Additionally, the City conducted benthic invertebrate monitoring in several Shoreline streams in 2003 and 2007 to assess temporal changes in water quality and overall stream health. The 2003 results indicated all sample sites were degraded. The 2017 results differed little from those reported in 2003. Although these parameters can provide some indication of waterbody health, by themselves they are insufficient for documenting the impacts from stormwater runoff, which is likely the most significant stressor to water quality within Shoreline streams.

In addition, since it has been over ten years since the last benthic invertebrate monitoring, the City shall re-establish the monitoring program to determine whether the significant capital investments the City has made in the last ten years have improved stream health and to provide a long-term foundation for monitoring potential future improvements in water quality citywide. The City shall modify its water quality monitoring program to provide a solid base for long-term monitoring and better characterize the impact from stormwater runoff. Suggested changes include:

- Analytes—include metals, particularly zinc, copper and lead, which are often associated with stormwater runoff;
- Benthic invertebrate monitoring—include sample collection methods, the qualifications of the personnel who will perform the sampling, taxonomic identifications, and data analysis;
- Sample locations—include specific sampling locations that may receive significant amounts of runoff during storm events; and
- Timing—include sampling events during both storm and non-storm events and conduct more frequent sampling using automated sampling systems for conventional and additional parameters, as feasible.

Enhancing the water quality monitoring program in this way would enable an analysis of the effectiveness of green stormwater infrastructure on stream water quality.

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The City shall prepare or modify an existing *Sampling and Analysis Plan (SAP)* for water quality monitoring. The SAP should describe the study design, methods and analytes. The plan shall be developed through the next *Surface Water Master Plan* update, with results provided to Salmon-Safe for review after completion of each monitoring round.

TIMELINE

Scoping for the *Surface Water Master Plan* update shall be developed and submitted for Salmon-Safe review when available, in 2021/2022. The draft Sampling and Analysis Plan shall be developed and submitted to Salmon-Safe for review during the 2023/2024 *Surface Water Master Plan* update.

Condition 8: *Improve Snow Removal and Ice Control Plan*

The City's *Snow Removal and Ice Control Plan* (2016) is not fully in alignment with Salmon-Safe standards. The City will conduct an investigation into snow and ice control operational practices that take into consideration impacts on aquatic life. The investigation shall seek information on best industry practices including:

- Snowfighters *(http://pnsassociation.org)* or Clear Roads *(http://clearroads.org)* to develop best practice snow and ice control operations joining or participating in regional or national associations, like the Pacific Northwest; and
- other agencies' experiences and programs that provide snow and ice control services in the temperate and wet climate of the Pacific Northwest, such as the City of Portland, Oregon, and its Bureau of Transportation, a Salmon-Safe certified municipality.

The investigation will include, but not be limited to, consideration of the following activities:

- assessing existing or potential salmon habitat in relation to snow and ice control routes;
- assessing operational practices that balance environmental impacts of snow and ice control with agency and community

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economic and life safety factors with a view toward using the minimum amounts of anti-icing and deicing agents near water bodies or groundwater recharge areas;

- reviewing the current use of anti-icing and de-icing equipment and products and

    1) *evaluating the ability to avoid use of chloride-based deicers where runoff can flow to a headwaters (third-order or smaller) salmon spawning or rearing stream;*

    2) *assessing use of highly targeted application of non-chloride-based deicers, such as calcium magnesium acetate, where runoff can flow to a headwater (third-order or smaller) salmon spawning or rearing stream. Areas where runoff passes through green stormwater infrastructure (GSI treatment) do not need considerations of this activity (see Appendix D for Salmon-Safe guidelines for alternative road deicers); and*

    3) *assessing equipment and material storage needs for inclusion of road deicing equipment in development of the City Maintenance Facility where snow and ice operations are staged.*

The investigation will inform operational aspects of the 2022/23 update of the City *Snow and Ice Plan*, and will inform equipment choices in the proposed City Maintenance Facility where snow and ice operations are staged.

TIMELINE

A draft update to the *Snow Removal and Ice Control Plan* shall be submitted to Salmon-Safe for review after completion, by 2021, with the final plan submitted to Salmon-Safe, when available, in 2022/2023.

Condition 9: *Update the Integrated Pest Management Plan*

The City's IPM plan requires an update to be fully consistent with Salmon-Safe standards. The City will develop a pest management and pesticide use policy that encompasses all City properties. This policy or another document should document fertilization practices. The City's desire to be largely pesticide-free should be documented in the policy, along with any allowable exceptions.

TIMELINE

The pest management and pesticide use policy and fertilization practices document shall be submitted to Salmon-Safe for review in conjunction with the next update of the *Parks Operations and Maintenance Standards Manual* in 2021. The policy may be incorporated into the manual by reference.

Condition 10: *Enhance biodiversity in parks when converting turf or landscaped areas*

The City of Shoreline has an extensive park system that provides a wide variety of ecological and human services. Periodically, Parks Department staff alter the landscaping at specific locations within their parks to reduce maintenance costs (e.g., removing a landscaped bed) and/or to enhance the ecological functioning of an area that is otherwise underutilized. The City of Portland, Oregon, is also engaged in improving the habitat in their parks through the concept of a "nature patch."[5]

Consistent with Standard U.5.4, the City of Shoreline shall look for opportunities to create nature patches within their park systems. The City shall prepare a memorandum that identifies potential nature patch opportunities for each park in their system. Although not required for certification, the City shall attempt to create nature patches as funds allow.

TIMELINE

The memorandum shall be completed and submitted to Salmon-Safe for review within two years.

[5] Spurred by their 2015 *Ecologically Sustainable Landscape Initiative* (https://www.portlandoregon.gov/parks/article/540631), the City of Portland identified ten park locations where nature patches can be created during a five-year pilot project. The goals of the program include:

- provide spaces for people to explore, play, and interact with nature;
- create ecologically robust landscapes that support native pollinators within developed parks;
- provide environmental education and stewardship opportunities;
- increase soil and plant health, and expand the diversity of natural landscapes within parks;
- foster community partnerships and Parks Department collaboration; and
- decrease maintenance costs over time.

Condition 11: *Complete substantial design of stormwater management projects with habitat restoration elements*

The City of Shoreline has demonstrated a commitment to completing projects that improve habitat and stormwater management. Salmon-Safe applauds this commitment and would like to see it continue. Accordingly, the City shall complete at least three **stormwater management** projects that also include **habitat restoration** features, such as the stormwater detention facility at Cromwell Park. Specific projects to be completed are at the discretion of the City, but candidate projects that are already underway or partially completed include:

- Hidden Lake dam removal—includes restoration of Boeing Creek within the lake area and replacement of culverts crossing below NW Innis Arden Way;
- 25th Avenue NE Flood Reduction Project—includes habitat restoration elements at Brugger's Bog Park and Ballinger Creek;
- Ronald Bog—a Sound Transit funded and implemented project that includes a wetland restoration at Ronald Bog Park to replace wetlands affected by Sound Transit's Lynnwood Link light rail project;
- Brugger's Bog Park Expansion—after completion of the City Maintenance Facility and after or coincidentally with the 25th Ave. NE Flood Reduction Project, expansion of the park into remnant North Maintenance Facility property may occur; and
- Ballinger Open Space Restoration—environmental restoration project at Ballinger Open Space will remove invasive plants and install native vegetation.

TIMELINE

Three projects with habitat restoration and stormwater management elements shall have substantial design completed within five years, assuming project funding is available. Design documents shall be submitted to Salmon-Safe for review as soon as they are available.

Condition 12: *Incorporate habitat and fish use information into Surface Water Master Plan*

The *Surface Water Master Plan* discusses stream geomorphic and water quality characteristics, but there is no mention of present or historic salmon use, habitat features supportive of salmon, impediments to salmon functioning, salmon restoration potential, or actions needed to protect existing and increase future salmon populations. Accordingly, the City of Shoreline shall make a stronger and stream- or watershed-specific connection to salmon by including these elements in the updated *Surface Water Master Plan*. Specifically, the Plan shall include a prioritized list of potential instream, riparian and upland water management plus monitoring projects that benefit salmon. Much of this information is already contained in other documents prepared for the City, including the various basin plans.

TIMELINE

The *Surface Water Master Plan* update (2023/2024) shall incorporate habitat and fish use information and be submitted to Salmon-Safe for review when available.

Continuing Improvement Recommendations

In addition to the conditions for certification listed above, Salmon-Safe offers the following continuing improvement recommendations, the adoption of which is not mandatory to achieve certification, but is considered Salmon-Safe best practice:

1. Apply Salmon-Safe model stormwater guidelines to private developments.

   As discussed above under Condition 1, the City has adopted more stringent requirements than Ecology for stormwater management. Although laudable, these requirements do not quite meet Salmon-Safe standards, hence the condition. That condition applies only to City-owned projects, which are admittedly a small fraction of the capital projects that occur in the City. It is hoped that the City can encourage private developers and the design community to follow their example. One recommended step beyond encouragement that the City could take would be to modify the *Engineering Development Manual* to incorporate Salmon-Safe's model guidelines. In addition, as commercial zone areas that are being redeveloped, consider requiring stormwater management to meet these standards.

2. Develop a priority point system for Salmon-Safe accredited contractors.

   Salmon-Safe's contractor accreditation program is the nation's first independent accreditation program to recognize construction professionals' excellence in water quality protection practices. Contractors accredited under this program have adopted a goal of zero sediment runoff across their entire operations. The City should consider adopting a priority point system that incentivizes Salmon-Safe contractors to bid on Shoreline projects, including capital projects and any public partnership investments such as future public housing and transportation-oriented developments.

3. Look for opportunities to incorporate pollinator habitat for the Trail Along the Rail project.

   The Trail Along the Rail project represents a unique opportunity to create a shared-use path running roughly parallel to the light rail alignment through Shoreline. While recognizing that there may be limited potential for creating large areas of habitat adjacent to such a trail, given its linear nature, we recommend the City explore opportunities for establishing vegetation that support pollinator species. Such pollinator pathways are well suited to such linear features, particularly when these features provide links to larger habitat patches.

4. Restore all Hidden-Lake bottom land.

   The Hidden Lake Dam Removal project is expected to remove what is now known as Hidden Lake, thereby creating a true riparian corridor formed by

Boeing Creek. Although some of the restoration alternatives considered for this project included the entirety of the former lake bed and valley bottom, the current conceptual design pushes the new stream channel close to the hillside to the southeast to avoid a significant portion the lake bed that is privately owned. We recommend that all the former lake bed be considered as part of the stream relocation and riparian and wetland riparian revegetation effort.

5. **Expand riparian forest at Brugger's Bog Park.**

   This park contains one of the few headwater streams in Shoreline that is not buried in an underground culvert. Given its high value for potential salmonid and riparian habitat, consider expanding the riparian buffer along this creek into the adjacent turf areas on both sides of the creek.

6. **Create educational signage.**

   The City of Shoreline contains many green stormwater infrastructure features and water use reduction elements that are consistent with Salmon-Safe standards. These elements should be highlighted and publicized to foster environmental stewardship among residents and visitors. Salmon-Safe can assist the City by providing examples of appropriate signage.

7. **Create stewardship staff positions to coordinate volunteers for natural area restoration projects.**

   The City has been largely successful in recruiting volunteers for habitat restoration projects, including projects facilitated by EarthCorps. However, the responsibility for coordinating these volunteer efforts has fallen to staff that have a wide array of other responsibilities. We recommend that a staff position be created to conduct outreach and coordinate volunteers for habitat restoration projects. The result of such a position would likely be increased participation.

CONCLUSIONS

Salmon-Safe and the science team commend the City of Shoreline for a commitment to implement the conditions listed in this report, and to continue to improve water quality and urban habitat over the next five years. We extend appreciation and congratulations to the City of Shoreline team for their work in preparing for the certification assessment and assisting the science team in its assessment.

APPENDIX A: GAP ANALYSIS COMPONENTS

Table A1. City of Shoreline Staff Interviewed

Interviewee	Title, Area of Expertise
Nora Daley-Peng	Senior Transportation Planner, Public Works
John Featherstone	Surface Water Engineer, Public Works
Eric Friedli	Director, Parks Department
Melissa Ivancevich	Water Quality Specialist, Public Works
Dan Johnson	Fleet and Facilities Manager, Administrative Services Division
Kevin Kinsella	Development Review Engineer, Public Works
Lance Newkirk	Utilities Manager, Public Works
Kirk Peterson	Superintendent, Parks
Brent Proffitt	Wastewater Utility Specialist, Ronald Wastewater District

Table A2. City of Shoreline Documents Reviewed

City of Shoreline Document Title
2009 Bio-assessment Report
2016 Echo Lake Aquatic Vegetation Report
2016 Freshwater Assessment Report
2017 Stormwater Management Program (SWMP) Plan
Boeing Creek Basin Plan
Carbon Wedge Analysis
Climate Action Plan
Complete Streets Ordinance
Comprehensive Plan
Critical Areas Regulations
Engineering Development Manual
Environmentally Preferred Purchasing Guide
Green Stormwater Infrastructure
Greenworks Brochure
Lyon Creek Basin Plan

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Table A2. *City of Shoreline Documents Reviewed, continued*

City of Shoreline Document Title
McAleer Creek Basin Plan
NPDES Permit and 2016 Annual Report
Parks, Recreation and Open Spaces Plan
Pesticide-free Parks Brochure
Puget Sound Basin Plan
Soak It Up Rain Garden Incentive Plan
Shoreline Master Program
Snow Removal and Ice Control Plan
Storm Creek Basin Plan
Stormwater Management Manual
Surface Water Master Plan
Sustainability Strategy
Thornton Creek Basin Plan
Train Along the Rail Feasibility Study
Tri-County Integrated Pest & Vegetation Management Model Policy
Urban Forest Strategic Plan
Washington Department of Ecology Low-impact Development (LID) Stormwater Manual

APPENDIX B

Salmon-Safe Gap Analysis Memo
to the City of Shoreline

April 4, 2018

317 SW Alder Street
Ste. 900
Portland, OR 97204
503.232.3750
f 503.228.3556

4 April 2018

Miranda Redinger
City of Shoreline
17500 Midvale Ave N
Shoreline, WA 98133

Dear Miranda:

As the first step in our third-party Salmon-Safe assessment of the City of Shoreline, the Salmon-Safe team has been working over the last two months on a gap analysis effort. Ellen Southard and I conducted interviews with nine staff members identified by the City's Green Team and yourself.(i) Subsequently, Salmon-Safe collected plans, policies, informational brochures and reports, etc. for expert review by our staff and independent Science Team.(ii) The gap analysis review identified many areas of consistency with Salmon-Safe standards as well as identified concerns and opportunities to improve environmental performance across City operations, and within specific division programs. Below you will find a summary of our findings. In general, the bulk of the City of Shoreline's policies and plans are largely consistent with Salmon-Safe principles for land management. Many of the gaps lie in adding greater specificity and enhancing watershed protection within existing programs.

Areas of alignment with Salmon-Safe standards:

- Natural resource-related policies and activities are largely consistent with the standards. The City has done a good job inventorying its resources and have some clearly stated policies about preserving and restoring natural resources.

- Shoreline has some excellent information in its basin plans and has probably completed, and is planning, a number of impressive capital projects, relative to other cities of similar scale.

- The Pesticide-Free Parks program is commendable and highly consistent with Salmon-Safe goals as is the strategic planning in the Parks, Recreation, and Open Space Master Plan.

- The Climate Action Plan (CAP) and Environmental Sustainability Strategy include a commitment to investigate opportunities for rainwater harvesting and greywater reuse. The CAP also indicates that high-efficiency irrigation controls are used routinely, particular in the Aurora corridor and in right-of-ways.

- The City is using the latest editions of the Department of Ecology's Stormwater Manual for Western Washington and Puget Sound Low Impact Development Manual with modifications for increased stringency as outlined in Shoreline's Engineering Development Manual, including:

    - (1) more control of construction exits; (2) Seasonal [wet season] Suspension Plans for some larger construction projects; (3) all runoff treatment at least at the level of the Enhanced Treatment Menu; (4) rescinds allowing existing land cover as the basis for stormwater management design where there has been at least 40 percent impervious land cover since 1985 and instead requires historic cover as the basis.

    - Requiring infiltration where conditions are appropriate, with thorough investigation of soil and subsurface properties

  - List of numerous criteria to be addressed in project layout and site design based on solid LID principles.

  - Requiring a stormwater pollution prevention plan for construction projects of any type and size.

- The Green Stormwater Infrastructure Program has facilitated valuable outreach to residents and a number of commendable projects between 2011-2017, including 12 neighborhood bioretention facilities plus two more awaiting grant funding, and a system of bioretention units of various configurations installed during the Aurora Avenue Corridor Project.

Questions for further investigation:

- Summary on progress in completing water quality and habitat projects – It would be very helpful to have a succinct table that lists the projects originally proposed in each basin plan (or for NPDES permitting), a short description of the project, priority, estimated cost, and current status (e.g., completed, seeking funding, not done yet)

- Summary of NPDES permit situation – Are requirements, plans be implemented? Are all streams now listed on Ecology's 303d and under NPDES permits?

- Was North Branch Thornton floodplain mapping completed in 2009 and how has this study been used?

- Summary table of *current* total impervious surface percentage in each basin, relative to 2007 data (as provided in bio-assessment report), and estimate of projected build out percentage.

- Explanation for no B-IBI monitoring since 2003 and 2007 studies and no use of 2003-2007 data in 2016 WQ assessment.

- Map and prioritized list of fish passage barriers in each basin.

- What city staffing and support is there for enforcement of Shoreline Master Program (SMP) and Critical Areas Ordinance regulations?

- What additional shoreline habitat impacts are being caused by SMP exemptions for building single-family residences, docks and bulkheads?

- If possible, please explain how water quality and habitat projects tie to basin wide objectives, such as percent of basin to be treated for stormwater.

Initial recommendations:

- Demonstrate that the capital projects underway are part of a comprehensive approach that is effectively reducing watershed impacts over time, taking into account continued development within the City. This could include basin wide quantitative goals, such as to meet water quality standards, and objectives, such as a specified percent of each basin to receive retrofit stormwater treatment. Then, the proposed projects need to clearly demonstrate how they will cumulatively meet the objectives.

- Frequency of water quality monitoring efforts needs to be increased to effectively gauge success in meeting objectives and overall goals. In tandem, an assessment of overall water quality trends since the start of data collection began in 2003 should be conducted along with genetic testing to determine the source(s) of fecal coliform.

- Conduct a riparian habitat condition survey as well as fish surveys to document distribution of species during all life stages.

- Connect stormwater management policies to specific goals related to watershed impact. For example,
    - Update the Engineering Development Manual to specifically state a goal to avoid the discharge of sediments and other pollutants from construction sites, and provide a hierarchy of practices as a means to pursue the goal.

    - Modify the Surface Water Master Plan to make a stronger and stream- or watershed-specific connection to salmon. Stream geomorphic and water quality characteristics are covered with no mention of present or historic salmon use, habitat features supportive of salmon, impediments to salmon functioning, salmon restoration potential, or actions needed to protect existing and increase future salmon populations.

    - Enhance the Snow Removal and Ice Control Plan to take into consideration impacts on aquatic life, such as mentioning existing or potential salmon habitat in relation to snow and ice control; encouraging caution to carefully use the minimum needed with any deicer in the drainage of any water body or groundwater recharge area; directing avoidance of all chloride-based deicers where runoff can flow to a headwaters (third-order or smaller) salmon spawning or rearing stream, unless runoff passes through green stormwater infrastructure (GSI); and directing use of highly targeted application of calcium magnesium acetate, if providing adequate GSI treatment is impossible and deicing is still essential (applying minimum amount, number of applications, and area covered necessary for safety).

Our overall impression is positive and we also see areas where the City of Shoreline may benefit from Salmon-Safe's expertise in utilizing a watershed-specific lens when carrying out its operations. The City is an excellent candidate for certification and we look forward to next month's site assessments and time in the field with staff.

Thank you!

Anna Huttel
Certification Manager

Cc: Dan Kent, Executive Director
Ellen Southard, Outreach Manager

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[i] City staff interviewed included the following individuals –
1. Nora Daley-Peng, Senior Transportation Planner, Public Works
2. John Featherstone, Surface Water Engineer, Public Works
3. Eric Friedli, Director, Parks Department
4. Kevin Kinsella, Development Review Engineer, Public Works
5. Kirk Peterson, Superintendent, Parks
6. Lance Newkirk, Utilities Manager, Public Works
7. Dan Johnson, Fleet and Facilities Manager, Administrative Services Division
8. Brent Proffitt, Wastewater Utility Specialist, Ronald Wastewater District
9. Melissa Ivancevich, Water Quality Specialist, Public Works

[ii] City documents reviewed included the following –
1. Comprehensive Plan, specifically the Natural Environment Plan, 185th Plan, and 145th Street Station Subarea Plan

2. Parks, Recreation, and Open Space Master Plan
3. Surface Water Master Plan
4. DOE LID Stormwater Manual
5. Stormwater Management Manual for Western Washington
6. Engineering Development Manual, specifically Division 3 – Surface Water and Development Code Regulations for Erosion Control
7. Critical Areas regulations
8. Pesticide-free Parks Brochure
9. Tri-County Integrated Pest and Vegetation Management Model Policy
10. Urban Forest Strategic Plan
11. Environmentally Preferred Purchasing Guidelines
12. Boeing Creek Basin Plan
13. Storm Creek Basin Plan
14. McAleer Creek Basin Plan
15. Lyon Creek Basin Plan
16. Thornton Creek Basin Plan
17. Puget Sound Basin Plan
18. 2016 Echo Lake Aquatic Vegetation Report
19. 2016 Freshwater Assessment Report
20. 2009 Bioassessment Report
21. NPDES Permit
22. NPDES Permit 2016 Annual Report
23. “Soak It Up” Rain Garden Incentive Program
24. Green Stormwater Infrastructure Program brochure
25. Greenworks brochure
26. Trail Along the Rail Feasibility Study
27. Complete Streets Ordinance
28. Shoreline Master Program (coastline regulations)
29. Sustainability Strategy
30. Climate Action Plan
31. Carbon Wedge Analysis
32. Snow Removal and Ice Control Plan
33. 2017 Stormwater Management Program (SWMP) Plan

APPENDIX C

Model Stormwater Management Guidelines
for Ultra-Urban Redevelopment

May 2018

SALMON-SAFE INC.

MODEL STORMWATER MANAGEMENT GUIDELINES FOR ULTRA-URBAN REDEVELOPMENT

MAY 2018

Introduction

Polluted stormwater is the largest threat to the health of the Pacific Northwest's urban watersheds. Pollutants targeted by Salmon-Safe's urban initiative such as heavy metals, petroleum products, pesticide runoff and construction sediment have an adverse impact on the watershed and severely compromise downstream marine health. With the goal of inspiring design that has a positive impact in our watersheds, Salmon-Safe offers stormwater design guidance for ultra-urban areas, which we define as typically those densely developed "downtown" locations mostly covered by structures and pavement. Generally first developed long ago, many such areas are brownfields now undergoing redevelopment, mostly for commercial and residential purposes.

The very extensive impervious surfaces in ultra-urban spaces create a hydrologic environment dominated by surface runoff, with little of the soil infiltration and evapotranspiration predominating in a natural landscape. Vehicle traffic drawn to such areas and the activities occurring there deposit contaminants like heavy metals, oils and other petroleum derivatives, pesticides and fertilizers (nutrients). These pollutants wash off of the surfaces with the stormwater runoff and drain into the piping typically installed to convey water away rapidly. If the piping network is a combined sanitary-storm sewer system, the large stormwater runoff volumes draining from an ultra-urban area exceed the capacity of the wastewater treatment plant at the end of the line in some storms, resulting in releases of untreated, mixed sewage and stormwater to a water body. If the piping network is a separated storm sewer system, the runoff and the pollutants it carries enter a receiving water body without treatment, to the detriment of water quality and the aquatic life there. Although salmon-spawning and rearing streams are rarely present in an ultra-urban location, if they are, the elevated runoff quantity itself is damaging to the downstream habitat that salmon and their food sources rely on and directly to the fish themselves.

Many of the pollutants conveyed by stormwater runoff are toxic to salmon and their invertebrate food sources. The toxicity of heavy metals like copper and zinc to aquatic life has been well studied. However, salmon face many more potentially toxic pollutants in both their freshwater and saltwater life stages. These contaminants include other heavy metals; petroleum products; combustion by-products; and industrial, commercial, and household chemicals. Emerging science from NOAA Fisheries shows that these agents collectively create both lethal and non-lethal impacts, the latter negatively affecting salmon life-sustaining functions to the detriment of their migration, reproduction, feeding, growth and avoidance of predators.

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Despite these challenges, an array of options exists to reduce, or even in the utmost application, eliminate the negative impacts of ultra-urban development stemming from the large quantities of contaminated stormwater runoff potentially generated there. This management category addresses practices to control ultra-urban stormwater runoff to reduce both water quantity and water quality impacts with the following goal.

Goal

Any development or redevelopment project with a footprint that exceeds 5,000 square feet shall use low-impact site planning, design, and operational strategies[1] for the property to maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the water quality, rate, volume, and duration of flow.

Objectives

1. Prime objective

   Implement low-impact practices, especially runoff retention[2] practices,addressing both water quantity and water quality control to the maximum extent technically feasible in redeveloping ultra-urban parcels to achieve the stated goal of restoring the predevelopment hydrology. Provide documentation of how the objective will be achieved. If full achievement of the goal is technically infeasible, assemble documentation demonstrating why it is not and proceed to consider Objective 2A and/or 2B, as appropriate to the site.

2. Alternative objectives

   Assess if achieving Objective 1 is documented to be technically infeasible.

   2A **Alternative water quantity control objective when the site discharges to a combined sanitary-storm sewer or a stream**—Start with the low-impact practices identified in the assessment pursuant to Objective 1. To the extent that they cannot prevent the generation of stormwater runoff peak flow rates and volumes greater than in the predeveloped condition[3,4], implement effective alternative measures to diminish and/or slow the release of runoff to the maximum extent technically feasible, with the minimum objective of reducing the quantity discharged to comply with any applicable water quantity control requirement[5] and, in any case, below the amount released in the preceding developed condition.[6]

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[1] Collectively termed "low-impact practices" in the following points.

[2] Retention means keeping runoff from flowing off the site on the surface by preventing its generation in the first place, capturing it for a water supply purpose, releasing it via infiltration to the soil or evapotranspiration to the atmosphere, or some combination of these mechanisms.

[3] A predeveloped condition is the natural state of the site as it typically would be for the area prior to any modification of vegetation or soil.

[4] As determined through hydrologic modeling of the previously developed and modified conditions.

[5] Specified for discharges to combined sewers by the municipal jurisdiction; specified for discharges to Western Washington streams by the Washington Department of Ecology's Stormwater Management Manual for Western Washington, Minimum Technical Requirement #7.

[6] As determined through hydrologic modeling of the previously developed and modified conditions.

2B **Alternative water quality control objective when the site discharges to a water body or a separate storm sewer leading to a water body**—Start with the low-impact practices identified in the assessment pursuant to Objective 1. To the extent that they cannot prevent the generation of stormwater runoff containing pollutants, implement alternative effective measures to reduce contaminants in stormwater to the maximum extent technically feasible, with the minimum objective of complying with the regulatory requirements for water quality control applying to the location.[7]

Plan Elements

1. **Inventory and analysis**—Narrative, mapping, data, and quantitative results that summarize: (1) site land uses and land covers in the redeveloped and preceding developed conditions; (2) results of hydrologic modeling of the undeveloped, previously developed and modified conditions, as the basis for pursuing quantity control objectives; and (3) stormwater drainage sub-basins, conveyance routes, and locations of receiving stormwater drains and natural water bodies in the redeveloped state.

2. **Low-impact practices—**Low-impact practices are systematic methods intended to reduce the quantity of stormwater runoff produced and improve the quality of the remaining runoff by controlling pollutants at their sources, collecting precipitation and putting it to a beneficial use, and utilizing or mimicking the hydrologic functioning of natural vegetation and soil in designing drainage systems.

   The following low-impact practices are particularly relevant to ultra-urban sites:

   - source control practices
     - √ minimizing pollutant introduction by building materials (especially zinc- and copper-bearing) and activities conducted on the site
     - √ isolating pollutants from contact with rainfall or runoff by segregating, covering, containing, and/or enclosing pollutant-generating materials, wastes and activities
     - √ conserving water to reduce non-stormwater discharges
   - constructing vehicle travel ways, sidewalks and uncovered parking lot aisles to the minimum widths necessary, provided that public safety and a walkable environment for pedestrians are not compromised
   - harvesting precipitation and putting it to a use such as irrigation, toilet flushing, vehicle or surface washing, or cooling system make-up water
   - constructing low-traffic areas with permeable surfaces, such as porous asphalt, open-graded Portland cement concrete, coarse granular materials, concrete or plastic unit pavers, and plastic grid systems (Areas particularly suited for permeable surfaces

[7] In Western Washington, specified by the Washington Department of Ecology's Stormwater Management Manual for Western Washington, Minimum Technical Requirement #6, which is equivalent to the City of Seattle's SMC, Section 22.805.090.B.1.a.

are driveways, walkways and sidewalks, alleys, and overflow or otherwise lightly-used uncovered parking lots not subject to much leaf fall or other deposition.)

- draining runoff from roofs, pavements, other impervious surfaces, and landscaped areas into one or more of the following green stormwater infrastructure (GSI) systems:

  √ bioretention area* (also known as a rain garden)[8]

  √ planter box*, tree pit* (bioretention areas on a relatively small scale)

  √ vegetated swale[9] *

  √ vegetated filter strip*

  √ infiltration trench

  √ green roof

  * *signifies compost-amended soils as needed to maximize soil storage and infiltration*

The following low-impact practices are of limited applicability to ultra-urban sites but may contribute to meeting objectives in some circumstances:

- conserving natural areas including existing trees, other vegetation and soils
- minimizing soil excavation and compaction and vegetation disturbance
- minimizing impervious rooftops and building footprints
- designing drainage paths to increase the time before runoff leaves the site by emphasizing sheet instead of concentrated flow, increasing the number and lengths of flow paths, maximizing non-hardened drainage conveyances and maximizing vegetation in areas that generate and convey runoff

3. Alternatives—When on-site low-impact practices alone cannot achieve Objectives 2A and/or 2B, implement one or more of the following strategies to meet at least the minimum water quantity and quality control objectives stated above:

   - For runoff quantity and/or quality control—

     √ contribute materially to a neighborhood project using low-impact practices and serving the stormwater control needs of multiple properties in the same receiving water drainage basin, with the contribution commensurate with the shortfall in meeting objectives on the site itself.

     √ implement low-impact practices on-site to manage the quantity and quality of stormwater generated in a location off the redevelopment site but in the same receiving water drainage basin, with the scope of the project commensurate with the shortfall in meeting objectives using practices applied to stormwater generated by the site itself.

[8,9] Preferably with an open bottom for the fullest infiltration, but with a liner and underdrain if the opportunity for deep infiltration is highly limited or prohibited for some specific reason, e.g., bedrock or seasonal high-water table near the surface, very restrictive soil (e.g., clay, silty clay) that cannot be adequately amended to permit effective infiltration, non-remediable contamination below ground in the percolating water pathway.

- **For runoff quantity control**—install a vault or tank[10] to store water for delayed release after storms to help avoid combined sewer overflows or high flows damaging to a stream.
- **For runoff quality control**—install an advanced engineered treatment system suitable for an ultra-urban site.[11]

Considerations for Salmon-Safe Certification

Fulfilling the stormwater component of the Salmon-Safe certification process requires submission of documentation of how Objective 1 will be achieved based on the inventory and analysis conducted for the site. On the other hand, if Objective 1 has been judged to be unachievable, pursuing certification requires documentation establishing the technical infeasibility of doing so. Relevant documentation includes, but is not necessarily limited to, site data, calculations, modeling results, and qualitative reasoning. If achieving Objective 1 is demonstrably technically infeasible, the certification process then requires similar documentation of how Objectives 2A and/or 2B, as appropriate to the site, will be achieved.

Prepared for Salmon-Safe Inc. by Dr. Richard Horner, et. al.

[10] While useful for runoff quantity control, passive vaults and tanks provide very little water quality benefit.

[11] The most effective candidate treatment systems now available are chitosan-enhanced sand filtration and advanced media filtration coupled with ion exchange and/or carbon adsorption. Basic sand filtration is another option suitable to an ultra-urban site but is less effective than the more advanced alternatives.

APPENDIX D

Salmon-Safe Information Sheet

A Comparison of Alternative Road Deicers

May 2018

(revised February 2019)

Attachment A

SALMON-SAFE INC.

SALMON-SAFE INFORMATION SHEET

A Comparison of Alternative Road Deicers

Salmon-Safe recognizes the wintertime balance between public safety on ice- or snow-covered roads and environmental protection. We seek to inform companies and institutions that have achieved Salmon-Safe accreditation and certification, including road maintenance departments, about options for reducing toxicity of road deicing chemicals and potential negative effects on salmon and other aquatic life in water bodies receiving road runoff.

From the salmon perspective, the specification of a deicer should be especially carefully evaluated when a road drains to any relatively small, salmon-supporting water body. If deicer use cannot be avoided in such cases, the best protection would be to channel runoff through an extensive vegetated area to capture and hold the potentially harmful deicer components.

Sodium chloride is by far the most common deicer for roads. Magnesium and calcium chlorides are in some use, being effective to lower temperatures although more expensive and requiring greater application mass because of decreased freezing point depression. All chloride-based deicers are potentially toxic to aquatic life, damage roadside vegetation, and corrode metals in bridge structures and concrete reinforcing bars. Sodium can diminish human cardiovascular health when contaminating wells and other water supplies. Chloride is usually not a threat to human health but can cause taste and odor problems in drinking water. Magnesium, especially, but also sodium, calcium and potassium damage concrete. All of these light metals can release potentially toxic heavy metals from contaminated soils through ion exchange reactions. Additives to counter corrosion, concrete damage, and the tendency of the products to cake can also be toxic to aquatic life. The potential impact of all of these negative effects is dependent on the concentration of the chemical, pointing out the importance of using the minimum needed. In proper use, elevated potential for aquatic toxicity problems should only occur in relatively small water bodies.

Exhaustive research on calcium magnesium acetate (CMA) has demonstrated the only potential environmental problems at any anticipated environmental concentration are aquatic dissolved oxygen reduction and soil metal release (Horner 1988).[1] The concentration necessary to depress oxygen, however, is sufficiently high that it would only be expected to occur in small, poorly flushed lakes and small, slowly flowing streams. Metals in soils were not mobilized in sufficient quantities to be a concern but could be if CMA meltwater flows over a highly contaminated soil, as with any deicing option other than urea. Because of its high cost, CMA use is mostly limited to locations sensitive to aquatic toxicity or corrosion. It has, for example, been the choice for new bridges to avoid the beginning of progressive chloride corrosion. The University of Oregon, a campus transitioning to Salmon-Safe certification, uses CMA exclusively for its deicing.

Road deicers on the market differ in their deicing ability, negative effects on the environment, price and secondary costs resulting from damage to roadway materials. The following table is a summary comparison of alternative

[1] Horner, R.R. 1988. "Environmental Monitoring and Evaluation of Calcium Magnesium Acetate (CMA)", *National Cooperative Highway Research Program Report 305*. Transportation Research Board, Washington, DC.

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road deicers with respect to these factors. In general, Salmon-Safe recommends avoiding all chloride-based deicers where the runoff can flow to a headwaters (third-order or smaller[2]) salmon spawning or rearing stream, unless it passes through green stormwater infrastructure (GSI) designed to reduce the discharge quantity through infiltration and evaporation and decreases chloride in the remaining runoff through plant and soil contact. If providing adequate GSI treatment is impossible and deicing is still essential, Salmon-Safe recommends highly targeted application of CMA, using the minimum amount, number of applications, and area coverage necessary for safety. With respect to any deicer involved in the drainage of any water body or groundwater recharge area, careful use of the minimum needed is the best rule.

A Comparison of Alternative Road Deicers[3]

Deicer	Aquatic Ecosystem Effects	Other Environmental Effects	Material Effects	Low Temperature Limit (°F)	Freezing Point Depression (°C/unit weight)	Usage Consistent with Salmon-Safe Certification	Cost Relative to Sodium Chloride
Sodium chloride (rock salt)	Chloride and additive toxicity	Sodium contamination of drinking water source; vegetation damage; mobilization of heavy metals in soil	Corrosive; concrete damage	20	1	Avoided in drainages to headwater streams unless adequate GSI treatment; used in minimum needed amounts in drainages to larger water bodies and groundwater recharge areas	1.0x
Magnesium chloride	Chloride and additive toxicity	Vegetation damage; mobilization of heavy metals in soil	Corrosive; concrete damage	5	0.29		2.5x
Calcium chloride	Chloride and additive toxicity	Vegetation damage; mobilization of heavy metals in soil	Corrosive; concrete damage	-25	0.53		5.5x
Potassium chloride	Chloride and additive toxicity	Vegetation damage; mobilization of heavy metals in soil	Corrosive; concrete damage	12	0.78		1.5x
Calcium magnesium acetate	Dissolved oxygen reduction	Mobilization of heavy metals in soil	Concrete damage	0	0.30	Targeted usage in minimum needed amounts in drainages to headwaters streams	20x
Potassium acetate	Dissolved oxygen reduction	Mobilization of heavy metals in soil	Concrete damage	-15	0.60		25x
Urea	Ammonia and additive toxicity; eutrophication			15	0.97	same as chloride deicers	1.5x

[2] When two first-order streams come together, they form a second-order stream. When two second-order streams come together, they form a third-order stream. Streams of lower order joining a higher order stream do not change the order of the higher stream.

[3] After: (1) Kelly, V.R., Findlay, S.E.G., Schlesinger, W.H., Chatrchyan, A.M., Menking, K. 2010. "Road Salt: Moving Toward the Solution", *The Cary Institute of Ecosystem Studies*, Milbrook, NY. (2) Public Sector Consultants, Inc. 1993. "The Use of Selected Deicing Materials on Michigan Roads: Environmental and Economic Impacts", Michigan Department of Transportation, Lansing, MI.

The Salmon-Safe Science Team: Peter Bahls, Tad Deshler, Rich Horner, Carrie Foss together with Miranda Redinger (City of Shoreline, Planning).

Additional Credits

Report design & production : *Jay Tracy Studios*
Team field photos © *Salmon-Safe 2018*

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Salmon-Safe Inc.

Report of the Science Team Regarding Salmon-Safe Certification of the City of Shoreline, Washington

REFERENCES

Salmon-Safe Urban Standards
Overview: https://salmonsafe.org/certification/urban-development/

Requirements: https://salmonsafe.org/wp-content/uploads/2018/03/Urban-Standards-Version-2.0-May-2018-2MB.pdf

Pre-condition 1: General Standard A.1

(1) R Development is not in violation of national, state, or local environmental laws or associated administrative rules or requirements, as determined by a regulatory agency in an enforcement action.

Pre-condition 2: Appendix F of the Urban Standards
(see following page)

APPENDIX F: Model Construction-Phase Stormwater Management Program

Contractor Accreditation

Salmon-Safe provides an accreditation program (AP) for General Contractors that provides guidance for construction management. Accredited contractors have been pre-certified to adhere to the following guidelines and can streamline documentation and certification processes. Contact Salmon-Safe for a list of accredited contractors and to find out more about the accreditation process.

Construction Phase Stormwater Management

Erosion and Sediment Transport

Manage the construction site to avoid, or minimize to the greatest extent operationally feasible, the release of sediments from the site through the use of the following measures:

i. As the top priority, emphasize construction management BMPs, such as:

- Maintain existing vegetation cover, if it exists, to the greatest extent technically feasible.
- Perform ground-disturbing work in the season with the smaller risk of erosion and work off disturbed ground in the higher risk season.
- Limit ground disturbance to the amount that can be effectively controlled temporarily in the event of rain.
- Use natural depressions and plan excavations to drain runoff internally and isolate areas of potential sediment and other pollutant generation from draining off the site, so long as safe in large storms.
- Schedule and coordinate rough grading, finish grading and erosion control applications to be completed in the shortest possible time overall and with the shortest possible lag between these work activities.

ii. Stabilize with a cover appropriate to the site conditions, season and future work plans; for example:

- Rapidly stabilize disturbed areas that could drain off the site and will not be worked again, with permanent vegetation supplemented with highly effective temporary erosion control measures until at least 90 percent vegetative soil cover is achieved.
- Rapidly stabilize disturbed areas that could drain off the site and will not be worked again for more than three days, with highly effective temporary erosion control measures.
- If 0.1 inch of rain or more is predicted with a probability of 40 percent or greater, before the rain falls, stabilize or isolate disturbed areas that could drain off the site, and that are being actively worked or will be

within three days, with measures that will prevent or minimize to the greatest extent technically feasible the transport of sediment off the property.

iii. As backup for cases where all of the above measures are used to the greatest extent technically feasible but sediments still could be released from the site, consider the need for sediment collection systems including, but not limited to, conventional settling ponds and advanced sediment collection devices such as polymer-assisted sedimentation and advanced sand filtration.

iv. Specify emergency stabilization and/or runoff collection procedures (e.g., using temporary depressions) for areas of active work when rain is forecast.

v. If runoff can enter storm drains, use a perimeter control strategy as a backup where some soil exposure will still occur, even with the best possible erosion control (the above measures) or when there is a discharge to a sensitive water body.

vi. Specify flow control BMPs to prevent or minimize to the greatest extent technically feasible the following:

- Flow of relatively clean off site water over bare soil or potentially contaminated areas;
- Flow of relatively clean intercepted groundwater over bare soil or potentially contaminated areas;
- High velocities of flow over relatively steep and/or long slopes, in excess of what erosion control coverings can withstand; and
- Erosion of channels by concentrated flows either by using channel lining, velocity control, or both.

vii. Minimize the number of construction entrances. Specify stabilization of construction entrance and exit areas, provision of a nearby tire and chassis wash for dirty vehicles leaving the site with a wash water sediment trap, and a sweeping plan.

viii. Specify construction road stabilization.

ix. Specify wind erosion control.

x. Manage the construction site to avoid the release of pollutants other than sediments by preventing contact between rainfall or runoff and potentially polluting construction materials, processes, wastes, and vehicle and equipment fluids by such measures as enclosures, covers, and containments, as well as berming to direct runoff.

- Construction vehicles larger than pick-up trucks parked for more than two days shall be located so that any fluid leaks cannot contaminate stormwater runoff. The best way of preventing contamination is to park in a location that cannot drain into any stormwater conveyance leaving

the site. If a selected location could drain away, it should be modified by slightly recessing the parking spots to prevent draining out. An alternative if such a location cannot be found, is to place leakage collection trays under the vehicles. Any vehicle observed to be leaking any significant quantity of a fluid should be repaired immediately.

Condition 4: Standard U.1.1

Standard U.1.1: Existing site improvements related to stormwater management have been inventoried.

Performance Requirements

i. Information on existing stormwater infrastructure, if any, has been collected from record drawings, site mapping, or field visits. This includes locations of stormwater conveyance channels, pipes, catch basins, outlets and low-impact development stormwater facilities. E

ii. Existing improvements contributing to stormwater runoff, including impervious and semi-pervious (e.g. gravel or pavers) surfaces, are mapped. E

iii. Site topography has been mapped and a drainage area assessment conducted. This information shows major stormwater catchments and locations of receiving stormwater drains or streams, if present.[1] E

iv. Areas suitable for low impact development stormwater facilities based in part on soil infiltration capacity (U.1.5.1) have been mapped. E

[1]An existing site stormwater management plan, if updated and available, is generally sufficient to meet performance requirements U.1.1 (i-iii), and can be provided to the Evaluation Team as a substitute for these requirements.

Condition 5: Standards U.2.3, U.2.6, U.2.9 and Appendix G of the Urban Standards

Standard U.2.3: Opportunities for stormwater harvest, water reuse and wastewater reclamation under municipal code have been investigated during the site inventory and assessment and are employed to the greatest extent operationally feasible. E

Standard U.2.6: Water conservation practices are used during site maintenance. E

Performance Requirements

i. Modern drip irrigation, automated soil moisture sensors and other water-conserving techniques are part of the irrigation plan. Irrigation delivers water based on specific vegetation requirements, rate of infiltration, evapo-transpiration and other factors. Temporary irrigation systems are used for landscape vegetation that typically require water only during establishment periods.

ii. Stormwater reuse and gray water reuse systems, if compatible with code and regulatory requirements and investigated in Standard U.2.3, are used. Water may be reused within building water systems, irrigation or any water use that reduces consumption.

iii. For existing developments, an analysis is performed to identify and assess opportunities to retrofit existing water systems per the above performance requirements in U.2.6 (i-ii). A report is submitted to Salmon-Safe within one year presenting a plan and schedule for implementing technically feasible water conservation projects.

Standard U.2.9: The appropriate managing authority within the development has adopted a water conservation plan as a short written document and formalizes the existing conservation practices, as detailed in Appendix G (Water Conservation Plan Guidance). E

Performance Requirements

i. The plan lists activities to perform, provides a schedule for activities and identifies responsible parties. Adaptive management triggers actions that respond to changes in performance. The water conservation plan shall include a drought management plan that details how significant reductions will be achieved during a drought.

ii. This plan as a whole, or its elements therein, have been adopted into the development's guiding documentation that formalizes the appropriate managing authority's responsibility to implement and enforce all aspects of the plan on both private property or common property managed for the public good.

Condition 6: Appendix F of the Urban Standards
(see Pre-condition 2 above)

Condition 9: Salmon-Safe landscape management practices
(see next page, Appendices D & E of the Urban Standards)

APPENDIX D: IPM, Nutrient and Chemical Management Plan Guidance

Salmon depend on clean water free from harmful levels of fertilizers (nutrients), pesticides (herbicides and insecticides, fungicides and other biocides), stormwater runoff pollutants and organic waste. These contaminants can travel long distances in stormwater runoff from an urban development to receiving waters. The principal methods to avoid contamination of salmon-bearing waters are to minimize overall inputs of these contaminants, restrict the type of inputs and develop an acceptable method of application through a comprehensive management program, such as an integrated pest management (IPM) plan. The appropriate managing partner for the urban development shall require that guiding O&M documents for each eligible phase of the project incorporate a Salmon-Safe approved IPM, nutrient and chemical management plan to ensure maintenance of Salmon-Safe practices over time.

IPM Requirements within the Plan

An IPM plan or policies are developed to promote management practices that reduce the impact of, the unnecessary reliance upon, or eliminate the need for hazardous chemicals and pesticides. Hazardous chemicals and pesticide use on the development should not result in contamination of stormwater or streams with amounts of any chemical or pesticide harmful to salmon or aquatic ecosystems. These practices generally include careful monitoring and scouting of insects, weeds and disease; use of non-spray control methods (cultural practices and mechanical controls); use of reduced impact pesticide controls; and/or managing specific sites without the use of chemical or pesticides. In addition to the required elements of an IPM plan outlined in Appendix A, the IPM plan should comply with the following guidelines:

i. **Type of pesticides**—All use of pesticides within the development, including waterways, waterway buffers and uplands, is limited in an IPM program by the specific policies on the method of use, including application type, rate, frequency, location and amount. Managers and residents use only those pesticides that are on an approved list for the development (see Appendix E). These pesticides will only be used when there is no undue risk of harm to salmon and aquatic ecosystems. This limited use list is established and reviewed on an annual basis by development management to ensure that potential harm to salmon and aquatic ecosystems is minimized.

ii. **Minimize aquatic impacts from high-hazard pesticides**—The use of any pesticides on the Salmon-Safe Cautionary List of High Risk Pesticides requires written explanation for each pesticide used that details the methods of use, including timing and location that demonstrate that the risk to aquatic systems is negligible (Appendix E: Salmon-Safe High-Hazard Pesticide List).

iii. **Restricted use zones**—Pesticide use is specially managed within: (1) waterways; and (2) adjacent waterway buffer areas. For the purposes of pesticide application, the buffer zone is defined as a corridor of land that is 60 feet in width on each side of a stream or other body of water (no-development buffers may be wider). Measurement of this buffer zone begins at the edge of the water line at the time of application and is measured horizontally as if on a map. Anticipated seasonal or weather-related changes affecting water level will be included in the decision-making process when dealing with buffer zones.

iv. **Pesticide treatment of trees**—Within riparian buffer zones, pesticides are used only on rare occasion for treating tree pests or diseases. Injection of pesticides within tree tissues or paintbrush application are the only application methods for trees allowed in riparian buffer zones.

v. **Application equipment**—Within riparian buffers, pesticide application for vegetation other than trees is done by hand and using low-volume, low-pressure, single-wand sprayers, wiping, daubing and painting equipment or injection systems. The methods used minimize fine mists and ensure that the applied materials reach targeted plants or targeted soils surfaces.

vi. **Pesticide drift**—Great care is taken to ensure that pesticide drift does not reach nearby surface waters by using appropriate equipment and methods. Spray applications are not allowed in the buffer area when wind speed is above 5 mph or wind direction would carry pesticides toward open water. Also, no spraying is done during an inversion.

vii. **IPM program**—Pesticide applicators, whether employees or contractors, are trained in the IPM plan and implement it fully.

viii. **Pesticide applicator licensing**—All persons applying pesticides must be currently licensed as private pesticide applicators by the applicable state agency (Department of Agriculture). Licensed personnel must be specifically endorsed for any of the state-defined categories of pest control they undertake, such as aquatic endorsement for all aquatic pest control activities.

ix. **Chemical and pesticide storage, rinsates and disposal**—The managing partner of the development has rigorous policies in place to ensure that no contamination of stormwater or streams occurs due to the storage, cleaning of equipment or disposal of chemicals and pesticides. These policies are adhered to by maintenance personnel, contractors and residents.

x. **Pesticide tracking system**—Detailed records are maintained for all pesticide applications on the part of the managing partner, including applications to aquatic areas and buffer zones, consistent with state requirements.

xi. **Pesticide application timing**—Pesticides are not applied when it is raining (unless otherwise directed by label instructions) or when there is a potential

for transport by runoff to stormwater drains or streams. Decisions regarding scheduling of pesticide applications should account for the expected impacts of anticipated storm events.

Nutrient Management Requirements within the Plan

The potential for nutrient and lime use to contaminate stormwater and streams can be minimized through a program that uses alternative cultural and mechanical practices to maintain soil fertility, uses fertilizers with discretion based on soil fertility and plant needs, uses slow-reacting fertilizers and ensures proper application of fertilizer and lime in terms of amounts and timing. The nutrient management plan should comply with the following guidelines:

i. Types of fertilizers—Fertilizer types are tailored to the existing soil conditions and plant requirements. Slow release, organic fertilizers or compost are generally used. Fertilizers must be selected through a state-approved screening and approval process to ensure the fertilizer does not contain toxic contaminants. If soluble fertilizers are used, the timing and rate of application are carefully considered (see below).

ii. Fertilizer application amounts—In general turf and shrub bed areas, soluble fertilizer rates of application are limited to no more than 0.5 lb N/1,000 square feet with restraints on timing to minimize fertilizer in stormwater runoff.

iii. Low fertilizer landscaping—Plants with low-fertilizer requirements are used for landscaping to the greatest extent technically feasible.

iv. Focused use—Fertilizer is used only on high- and moderate-intensity use areas, such as flower beds, ball fields, golf courses, some turf areas and planting beds, and some plantings associated with construction and restoration projects, if at all. Lime is used to adjust pH to minimize fertilizer use where suitable, in a manner that does not pose impacts to water quality.

v. Buffer zone width—Fertilizer and lime use is highly restricted within a waterway (riparian or wetland) buffer zone.

vi. Use within watercourse buffers—Fertilizer use in buffer zones of waterways is restricted depending on the intensity of application and type of fertilizers. The allowable use of fertilizer also varies depending on whether it is being used for routine maintenance or for restoration and construction projects.

vii. Soil testing—Periodic soil testing is used to determine the need for fertilizer (phosphorus and potassium), compost and lime relative to appropriate benchmarks established by the development managing partner. Testing is conducted a minimum of twice per year and prior to fertilizer application.

viii. **Soil fertility**—Practices such as on-site mulching of leaf and grass clippings are used to reduce the need for fertilizer.

ix. **A summary report of annual fertilizer use** is provided that shows a stable or declining trend in synthetic fertilizer use development-wide, taking into account the changes in acreage managed, specific uses and other relevant factors.

Other Contaminant Management within the Plan

Other contaminants, such as animal and chemical waste, should not contaminate storm-water or streams leaving the urban development. Recognizing that the managing partner may have a limited ability to control residents, the public and actions of other agencies, the project should comply with the following guidelines:

i. **Chemical use control**—Eliminate or minimize the use of chemicals commonly used to maintain urban infrastructure that may cause undue risk of harm to salmon and aquatic species. Evaluate various solvents, deicers, sealants, etc., to choose the least toxic or harmful product to aquatic ecosystems without compromising the health, safety and welfare of the human environment.

ii. **Animal waste control**—The development managing partner fosters management and education policies regarding dog or other domestic animal waste control that are effective in minimizing the contamination of stormwater or streams.

iii. **Wildlife waste control program (geese, ducks)**—If necessary and the greatest extent technically feasible, a management program is implemented to ensure that duck and goose waste does not contaminate stormwater or streams.

APPENDIX E: Salmon-Safe's List of High Hazard Pesticides

Salmon-Safe Urban High Hazard List of Pesticides (UHHL)

High hazard pesticides are a serious threat to salmon and other aquatic life. Pesticide formulations can also contain other ingredients that are potentially more toxic than the active ingredients, such as non-ionic surfactants. In addition to killing fish, high hazard pesticides at sublethal concentrations can stress juveniles, alter swimming ability, interrupt schooling behavior, cause salmon to seek suboptimal water temperatures, inhibit seaward migration and delay spawning. All of these behavioral changes ultimately affect survival rates.

The table below lists many of the pesticides known to cause problems for salmon and other aquatic life. Use this list to identify pesticides that require special consideration.

Note: This table lists only some of the currently available and commonly used pesticides.

SALMON-SAFE URBAN HIGH HAZARD LIST OF PESTICIDES			
Insecticides / Miticides			
abamectin	chlorpyrifos[1,2] (2)	imidacloprid[2]	prallethrin[1,2]
acetamiprid	cyfluthrin[1,2]	indoxacarb[2]	spinosad[2]
alpha-cypermethrin[1]	cypermethrin[1,2]	lamda-cyhalothrin[1,2]	spiromesifen[1]
bifenthrin[1,2]	deltamethrin[1,2]	malathion[1,2] (1)	tralomethrin[1]
carbaryl[2] (2)	esfenvalerate[1,2]	naled[1] (3)	zeta-cypermethrin[1]
chlorantraniliprole[2]	etofenprox[1]	novaluron	
chlorfenapyr[1,2]	fipronil[1,2]	permethrin[1,2]	
Fungicides			
acequinocyl	cyazofamid	folpet	thiram
azoxystrobin[2]	cyprodinil	pentachlorophenol (PCP) wood treatment	trifloxystrobin[1]
captan (4)	difenoconazole	propiconazole[2]	
chlorothalonil[1,2] (4)	fluazinam[1]	pyraclostrobin[1,2]	
copper[1,2]	fludioxanil[2]	thiophanate methyl	
Herbicides			
2,4-D[2] (4)	dithiopyr[2]	linuron[2] (4)	prodiamine
atrazine[2]	diuron[2] (4)	oxadiazon[2]	triclopyr BEE[2] (4)
benefin	diquat dibromide[2]	oxyfluorfen[2]	trifluralin[2] (5)
diclofop-methyl	flumioxazin[2]	pendimethalin[2] (5)	

Very Highly Acutely Toxic and/or Highly Acutely Toxic[1] to fish and/or aquatic invertebrates.
Based on EPA's Aquatic Life Benchmarks[2].

Pesticide names followed by a number in parentheses indicates the specific NOAA /NMFS Biological Opinion where it was assessed for jeopardy and/or habitat destruction/modification to endangered salmonids in accordance with the Endangered Species Act (***https://www.epa.gov/endangered-species***), regarding the 37 pesticides listed in the Washington Toxics Coalition (WTC) court settlement. Completed BiOps listed below[3].

* Active ingredients being Very Highly Acutely Toxic (LC50 or EC50 <100 ug/L) to BOTH fish and aquatic invertebrates

+ Active ingredients determined to generally have very high potential for risk of off target movement through surface runoff, based on the pesticide's adsorption to soil/sediment and it's field dissipation half-life (persistence) ***http://ccpestmanagement.ucanr.edu/files/237465.pdf***

Salmon-Safe Urban High Hazard List of Pesticides | List and Table References with Additional Notes

1. US EPA Toxicity Classification	Acute Aquatic LC50 or EC50 (ug/L)
Practically Nontoxic	> 100,000
Slightly Nontoxic	> 10,000; <= 100,000
Moderately Toxic	> 1,000; <= 10,000
Highly Toxic	**> =100; <= 1,000**
Very Highly Toxic	**< 100**

These ratings are based on acute toxicity and do not account for chronic and/or possible sub-lethal effects:

- Fish acute toxicity is generally the lowest 96-hour LC50 or EC50 in a standardized test, commonly using rainbow trout, fathead minnow or bluegill.
- Acute invertebrate toxicity values are usually the lowest 48 or 96-hour LC50 or EC50 in a standardized test commonly using midge, scud or daphnia.

2. Both EPA-established acute and chronic aquatic benchmarks are available on the EPA website: *https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/aquatic-life-benchmarks-pesticide-registration*

In addition to inherent toxicity, the overall assessment of the risk of a specific pesticide to aquatic water quality should consider a number of other factors: Pesticide Properties (e.g., water solubility, soil adsorption, half-life), Environmental Properties (e.g., soil makeup, climate) and Management Practices (e.g., application methods, use rate, irrigation, no-till). These properties and their possible interactions are discussed in detail in the following UC publications: *http://anrcatalog.ucanr.edu/pdf/8119.pdf* and *http://ccpestmanagement.ucanr.edu/files/237465.pdf*

The 28 Threatened or Endangered species listed in the Biological Opinions (BiOps) are described as Evolutionarily Significant Units (ESU) and are species, location/habitat and temporally specific. For example, Chinook salmon are assessed as 9 separate ESU's in the BiOps: (1) Chinook salmon (Puget Sound); (2) Chinook salmon (Lower Columbia River); (3) Chinook salmon (Upper Columbia River Spring-run); (4) Chinook salmon (Snake River Fall-run); (5) Chinook salmon (Snake River Spring/Summer-run); (6) Chinook salmon (Upper Willamette River); (7) Chinook salmon (California Coastal); (8) Chinook salmon (Central Valley Spring-run); and (9) Chinook salmon (Sacramento River Winter-run).

Refer to the Biological Opinions for a detailed list and description of each ESU and their geographic range *http://www.nmfs.noaa.gov/pr/consultation/pesticides.htm*

Refer to the NOAA/NMFS Biological Opinion Schedule on the NOAA Fisheries website *http://www.nmfs.noaa.gov/pr/consultation/pesticide_schedule.htm*

Variances and Variance Requests

Urban sites or projects using any of the pesticides indicated as "High Hazard" may be certified only if written documentation is provided that demonstrates a clear need for use of the pesticide, that no safer alternatives exist and that the method of application (such as timing, location and amount used) represents a negligible hazard to water quality and fish habitat. All variances must be approved in advance by Salmon-Safe.

For more information about the variance process, or to request a variance form, please contact Salmon-Safe at *info@salmonsafe.org.*

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Condition 10: Standard U.5.4

Standard U.5.4: Using the analysis conducted in the previous standards, develop site strategies for creation and retention of habitat and landscape patches that provide for food, forage and refuge for a diversity of species, including key indicators of ecosystem health. Such strategies could include:

Performance Requirements

i. Creation of pollinator pathways of vegetation along roadways and through sites to attract bees, butterflies and other species of interest.

ii. Usage of street tree, shrub and groundcover species that provide biological diversity and consistent food, forage and refuge for a range of urban species.

iii. Extension of street planters and larger bulb-outs at corners to maximize street landscape coverage and diversity and incorporation of stormwater facilities to provide intermittent water, mud and nesting materials.

iv. Reduction of turf areas and strategic integration of large patches of green roof with specific habitat elements into designs, such as woody debris, gravel/cobble and other elements typically not found in urban settings.