



RESTORATION PROJECTS AND GREEN STREETS:

Planning and evaluation needed
to confirm success

December 2018



P O R T L A N D
CITY AUDITOR

Audit Services



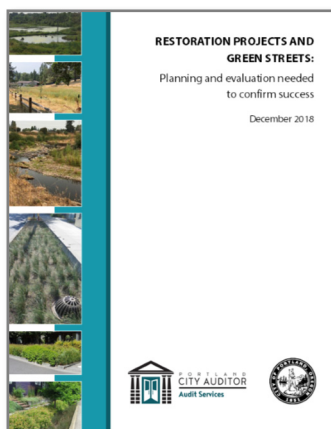
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Audit Team

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Cover photos

Audit Services / Restoration Projects and Green Streets



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Summary

Taking a swim at the downtown waterfront or seeing salmon spawn in an urban stream are unique Portland experiences that would have been unimaginable a few years ago. Today these activities are possible because of Bureau of Environmental Services' projects which invest millions of dollars each year to improve water quality.

Though some specific improvements are undeniable, the Bureau does not have a planning and evaluation framework to quantify and communicate where it has invested those millions and how successful it has been in achieving overall goals for improving environmental health.

We recommend that the Bureau implement a framework to prioritize restoration projects and green streets and to inventory, verify, and share data about outcomes.

Background

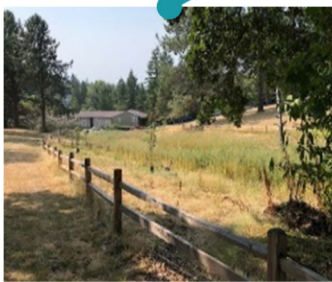
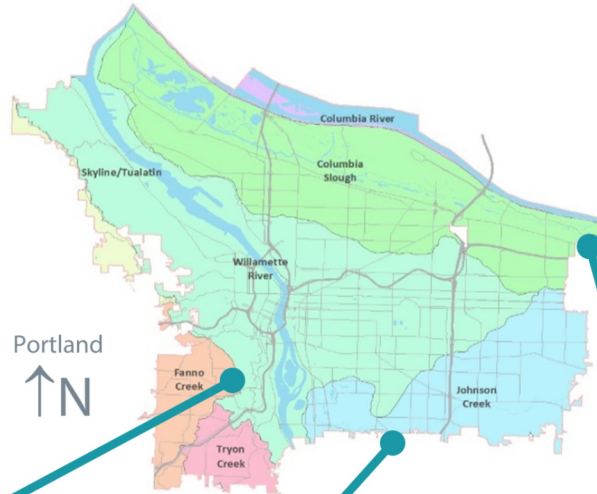
In the late 1990s, the federal government listed the steelhead trout and Chinook salmon under the Endangered Species Act. In response to the listing, and to address other environmental concerns, Portland adopted a Watershed Management Plan in 2005. The plan included watershed health objectives such as:

- Maintaining infrastructure for stormwater that runs-off hard urban surfaces.
- Protecting and restoring flow and retention in natural waterways.
- Improving habitat in water and on land to support native wildlife.
- Improving water quality.
- Maintaining sewers to prevent release of human pathogens.
- Managing pollutants to limit contamination to waterways, ground water, and soil.

Since then, the City has implemented strategies to achieve the goals and objectives outlined in the plan. In this report, we look at two of the Bureau's approaches: restoration projects and green streets.

The Bureau uses restoration projects to meet watershed health objectives, such as improving water quality and habitat. Restoration projects include planting native vegetation and land excavation to create stream meanders or wetlands. Projects can range widely in size, cost, and complexity. We looked at three projects based on input from staff: Albert Kelly Park, Luther Road, and Mason Flats.

We reviewed three restoration projects:



Albert Kelly Park

The Bureau uncovered a buried stream and restored native plants.

The project was completed in 2017.



Luther Road

The Bureau is repairing a former restoration site on Johnson Creek where erosion uncovered one of its main sewer pipes creating a risk of failure.

The project is just outside of city limits.



Mason Flats

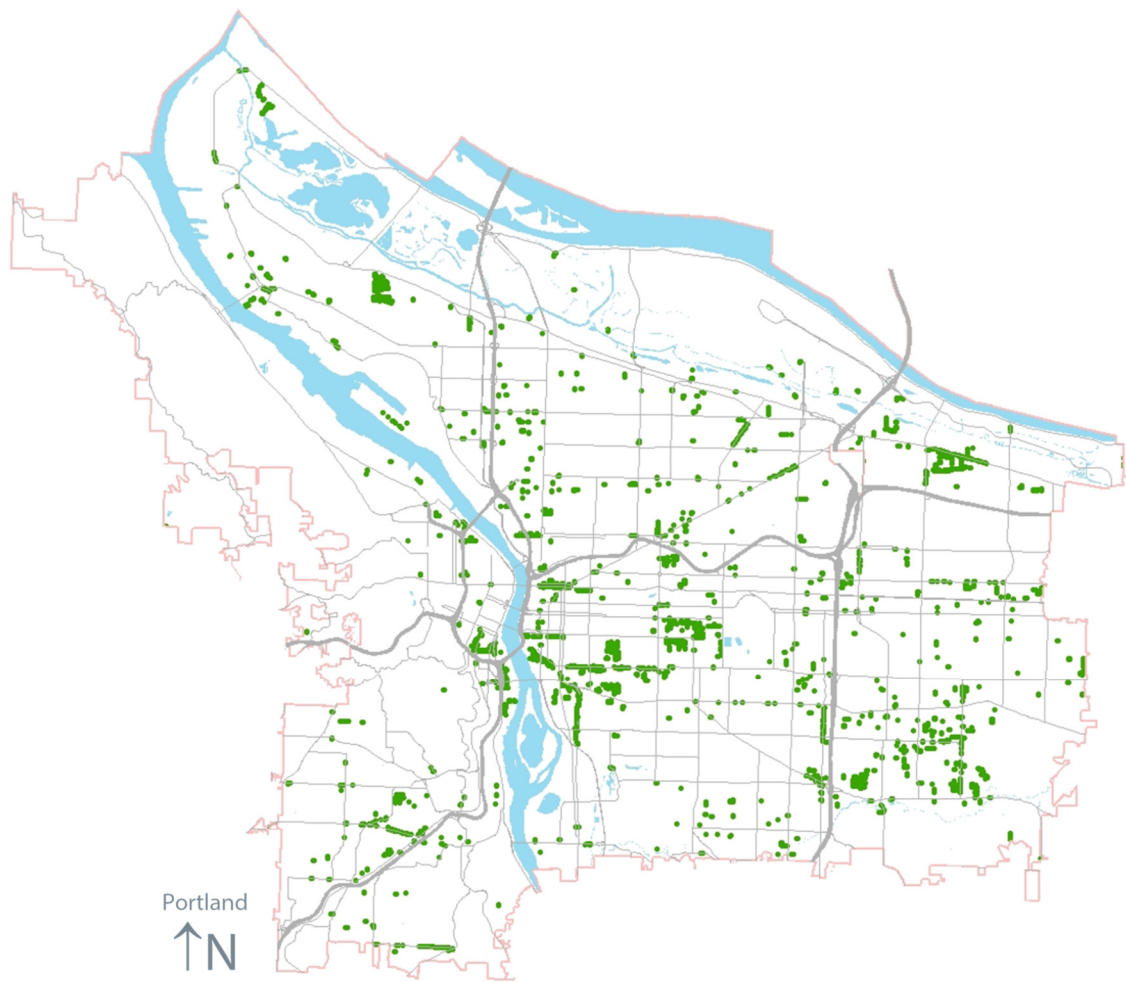
The Bureau restored a wetland at a former farm located near the Columbia Slough to treat stormwater from 162nd Ave and improve habitat.

The project was completed in 2012.



The Bureau uses green streets, which include recessed planting strips extended from roadside curbs, to treat and slow water run-off. These channels are planted with vegetation to filter pollution and slow and absorb stormwater.

There are more than 2,000 green streets in Portland.



Audit Results

It has been 13 years since the adoption of the Portland Watershed Management Plan, which set goals for watershed health. Although the plan outlined Bureau commitments to prioritize projects and to evaluate outcomes, the Bureau has not done so.

Portland residents rely on the Bureau's restoration projects and green streets to improve water quality, restore wildlife habitat, and prevent flooding. However, without formal methods to select projects and document outcomes, the City risks not meeting those goals.

We conducted this audit to make sure that the Bureau had the planning and evaluation tools needed to confirm that restoration projects and green streets achieved their goals.

We found that the Bureau did not:

- Have a system in place to ensure that restoration projects and green streets were placed in the highest-needs areas.
- Consistently report outcomes of restoration projects.
- Provide reports to ratepayers and regulators about green street condition.

Restoration projects and green streets may not address highest needs

The Bureau spends millions annually on watershed protection projects but does not have a plan in place to prioritize them. In 2018 the Bureau spent nearly \$13 million in construction and maintenance costs for watershed protection including restoration projects and green streets.

The Bureau has been working for eight years to develop a Stormwater System Plan to prioritize projects to manage stormwater. The Stormwater System Plan will integrate the Bureau's asset management approach to prioritizing projects with the goals of the Portland Watershed Management Plan.

Meanwhile, existing plans are not enough. The Portland Watershed Management Plan outlines broad strategies but does not define specific projects. The system plan for the sewer system defines risk as the dollar cost for property damage related to sewer pipes condition and capacity. Watershed-level plans define watershed risks, but do not apply city-wide. Only the Stormwater System Plan will assist the Bureau with defining the areas of the City that are at the greatest risk for threats such as pollution, habitat loss, or local flooding.

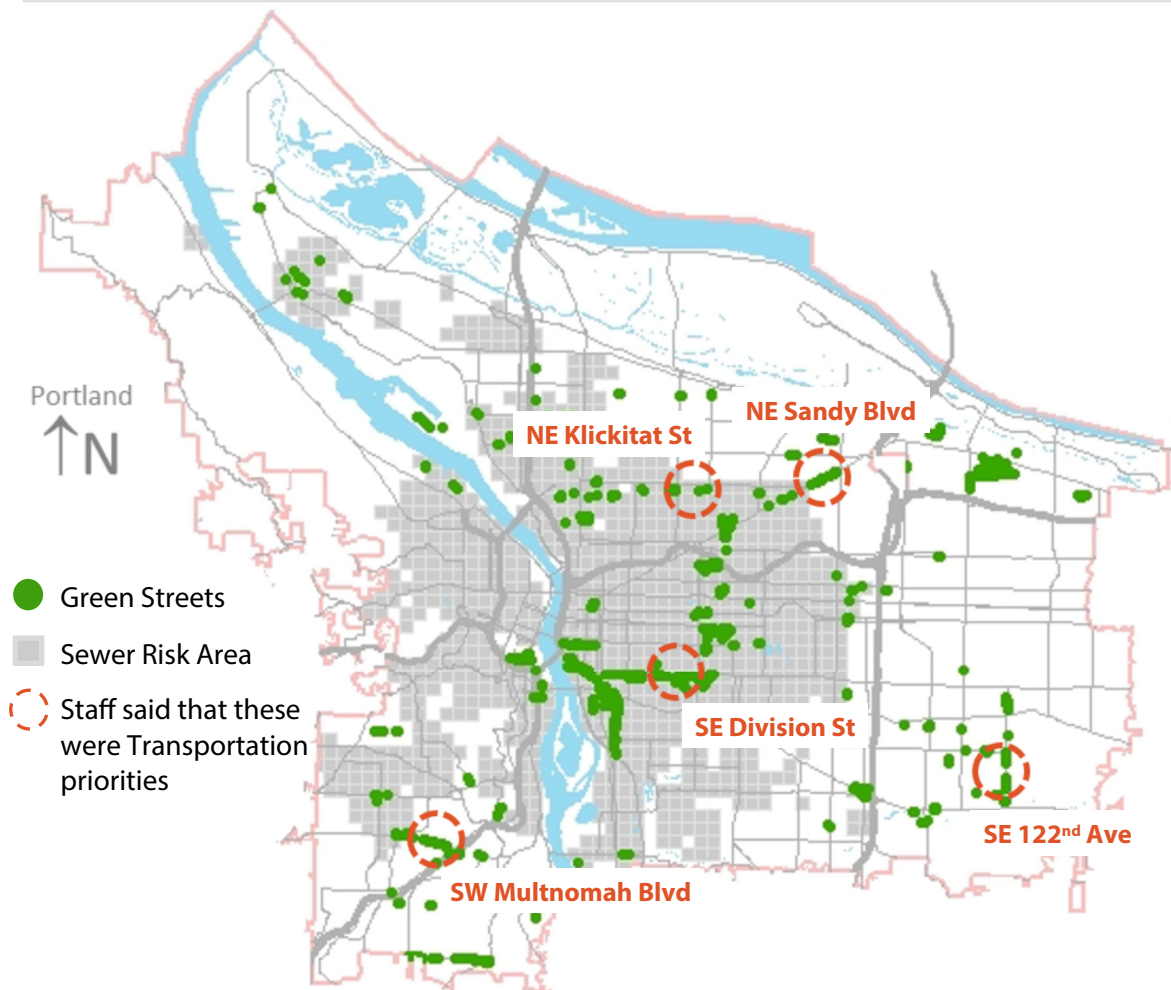
Only the Stormwater System Plan will meet all three criteria:

	City-wide Scale	Define Watershed Risks	Prioritize Projects Based on Risk
Portland Watershed Management Plan	✓	✓	✗
Combined and Sanitary Sewer System Plan	✓	✗	✓
Watershed-level Plans	✗	✓	✗
Future Stormwater System Plan	✓	✓	✓

Without a Stormwater System Plan, it was not possible to determine which restoration projects and green streets were located in the highest risk areas. Instead of relying on a system plan, the Bureau sited restoration projects and some green streets based on a series of small-scale watershed-level plans and consideration of the priorities of partner agencies such as the Bureau of Parks and Recreation, the Bureau of Transportation, and the Army Corps of Engineers.

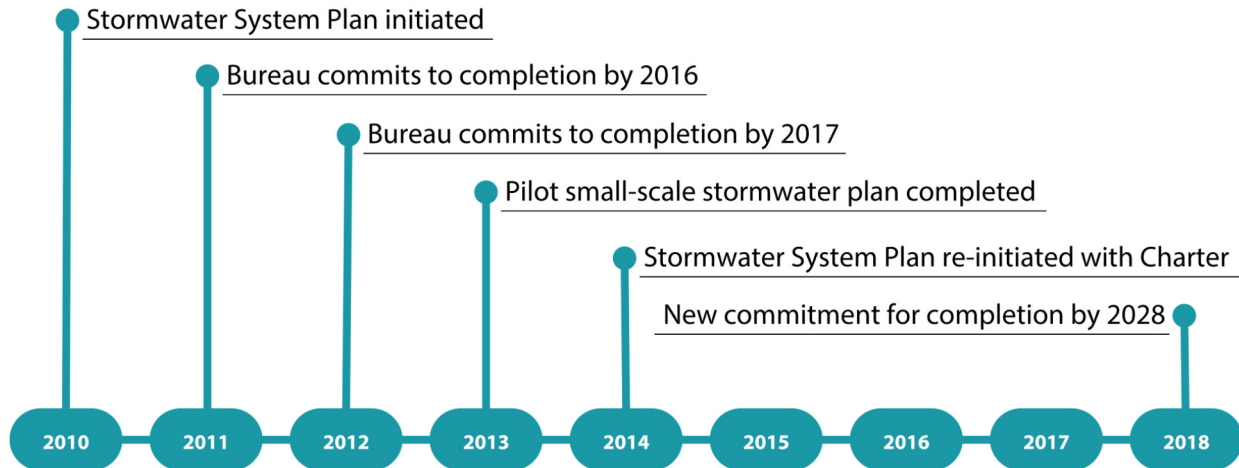
For example, the sewer system risk map from the Sewer System Plan did not adequately support the location of all green streets installed since the creation of the plan. Green streets did not align with sewer risks: 36 percent of green streets were located outside of the sewer system risk area. According to staff, some green streets outside the risk area addressed stormwater needs, but some also met Portland Bureau of Transportation needs. A Stormwater Systems Plan would illustrate the extent to which green streets addressed stormwater risks such as flooding, habitat loss, and impaired water quality.

36 percent of green streets were outside of the sewer system risk area. Without a Stormwater System Plan, it appears that some are placed for Bureau of Transportation needs.



Map only includes green streets built by the Bureau since 2012 when the sewer system plan was adopted.

The Bureau has not met past commitments to complete the Stormwater System Plan and the current commitment is to finish it in 10 years.



Bureau management said that previous goals for completion were only aspirational and that they were unable to commit to a deadline because system planning was evolving. They said that they were making a continuous investment in system planning. They said that they could work to develop some major milestones for an asset management approach to stormwater management, including a risk assessment, asset registry, risk registry, and condition assessment.

Unclear that restoration projects meet watershed goals

The Bureau cannot demonstrate that its restoration investments are making overall progress towards watershed goals because of inconsistent and piecemeal reporting.

The Bureau has affirmed the need for reporting restoration project outcomes, noting that reporting could provide benefits such as the ability to connect restoration project outcomes to watershed goals.

Reporting on outcomes will allow the Bureau to:

“track project opportunities, prioritize and select opportunities, and track implementation”

2005 Portland Watershed Management Plan

“connect the cumulative benefits of individual actions to the goals of the Portland Watershed Management Plan”

2008 Portland Watershed Management Plan Annual Report

“allow for the Bureau to adaptively manage, build resilience in the system, and monitor progress for enhancement”

2011 Bureau Strategic Plan

“view and characterize all of our projects, by monitoring cost, effectiveness, and viability”

Despite these benefits, the Bureau was not effective in reporting results:







- The Bureau issued annual reports about watershed projects, but the data reported was not consistent or relevant. Most data points related to activities conducted rather than quantifiable outcomes related to watershed health.
- The Bureau produced piecemeal reports on the outcomes of individual projects, but reports were not issued at regular intervals or comparable across watersheds.
- The Bureau’s annual compliance reports include water quality reporting but are not tied to restoration projects and are not in a format designed for public consumption.
- The Bureau is in the process of developing protocols to inventory projects and collect and analyze data.

The Bureau cannot report on overall progress because there is no inventory of restoration projects on which to base reporting, none of the projects we reviewed had quantifiable goals, and there are no protocols for consistent monitoring or data collection.

No green street condition reporting to ratepayers or regulators

The Bureau cannot demonstrate to ratepayers or regulators that the \$1 million it spends annually on green street maintenance kept them in functioning condition. The Bureau does not have a method to calculate condition scores for reporting or monitoring to ensure that staff meet inspection and maintenance standards.

The Bureau’s Operations and Maintenance Manual defines criteria for green street condition and maintenance activities. These same standards are also included in the water quality implementation plan submitted to the Oregon Department of Environmental Quality.

The manual requires that staff	We found that
 Keep green streets in functional condition.	 The Bureau did not report on whether green streets were in functional condition. Instead, it reported the total count of inspections and maintenance activities.
 Regularly inspect them each Spring and Fall.	 A majority of green streets, 53 percent, were not inspected in the Spring of 2018.
 Maintain them at least three or four times a year.	 Approximately 40 percent of green streets did not meet this standard in 2017 and 70 green streets were not maintained at all.

Staff said it did not follow operations and maintenance guidelines because:

- The standards in the manual were out of date, and the Bureau is working to re-write them.
- No one was responsible for oversight or kept track of whether individual green streets met operations and maintenance criteria.



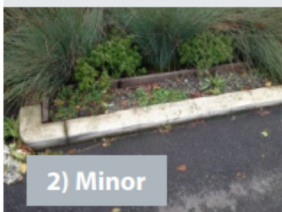

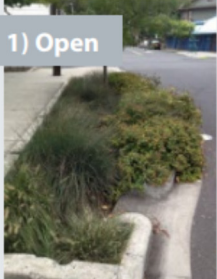

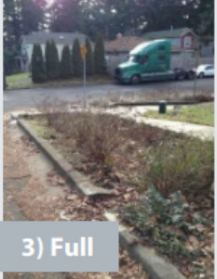

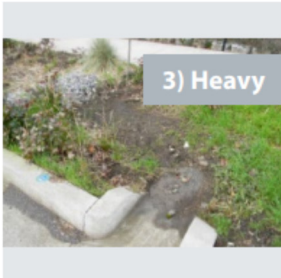


Barriers to reporting functioning condition included:

- The eight condition scores the Bureau tracked were not summarized into a single rating.
- Staff said that green streets could function even in conditions it rated as poor.
- Data on condition was not reliable because it was not collected consistently across the year. More inspections occurred during the Spring when vegetative cover was disproportionately good.
- Staff said that some facets of condition are more variable than others and some can resolve on their own even without maintenance. For example, inlets can clear themselves during a heavy rain.



The Bureau documents condition with three levels for each of eight factors, but does not report overall condition.

<p>Damage Damage beyond wear and tear</p>	<p>1) None</p>	<p>2) Minor</p> 	<p>3) Significant</p> 
<p>Structure Defects in grade, walls, inlets, outlets.</p>	<p>1) None</p>	<p>2) Minor</p> 	<p>3) Significant</p> 
<p>Inlets Unobstructed for water flow.</p>	<p>1) Open</p> 	<p>2) Partial</p> 	<p>3) Full</p> 
<p>Sediment Sand, silt, clay, dirt.</p>	<p>1) None</p>	<p>2) Light</p> 	<p>3) Heavy</p> 

<p>Debris Leaves, litter, trash within facility.</p>	<p>1) None</p>	<p>2) Light</p>	<p>3) Heavy</p>
<p>Vegetative Cover Extent of desirable vegetation, not weeds.</p>	<p>1) >90%</p>	<p>2) 76-89%</p>	<p>3) <75%</p>
<p>Vegetative Health Health of desired vegetation.</p>	<p>1) Excellent</p>	<p>2) Good</p>	<p>3) Poor</p>
<p>Trees Condition of Trees. (Does not apply to the 59 percent of green streets with no trees)</p>	<p>1) Excellent</p>	<p>2) Fair</p>	<p>3) Poor</p>

*The Bureau did not have photos to illustrate conditions listed as "None."
Photos by Bureau of Environmental Services.*

Conclusion In 2018, the Bureau spent nearly \$1 million in maintenance and \$12 million in construction on watershed protection, including restoration projects and green streets, however there was no formal method to track and report progress towards goals. Instead the Bureau relied on piecemeal reporting and staff assurances.

- Despite intentions going back almost a decade, the Bureau did not have a Stormwater System Plan in place to guide the investment of capital spending for restoration projects and green streets.
- The Bureau did not have an inventory to document where it invested funding for restoration projects and the goals achieved.
- The Bureau did not have a method to quantify the overall condition of more than 2,000 green streets.

We found that the Bureau did not have systems in place to ensure that it spent ratepayer money to address the highest stormwater risks or that projects successfully met watershed goals.

Recommendations To ensure that restoration projects and green streets are sited in the highest priority places, the Bureau should:

1. Commit to an implementation schedule for components of the stormwater system plan including risk assessments, asset registry, and condition assessment.
2. Create a method to use the risks identified in the Stormwater System plan to evaluate capital projects.

To demonstrate that restoration projects successfully meet overall watershed goals, it should:

3. Develop an inventory of restoration projects and track information, such as cost, location, project goals, and outcomes.
4. Ensure that all projects have quantifiable goals that are tied to the goals of the Portland Watershed Management Plan or that reduce risks identified in the Stormwater System Plan.
5. Regularly report project results to ratepayers in a way that explains the connection between projects and outcomes. Reports should also inform ratepayers about how project results contribute to future project selection and design.

To provide reliable reports about green street condition to ratepayers and regulatory agencies, it should:

6. Define quantifiable standards to describe functioning condition for green streets.
7. Update Operation and Maintenance guidelines that support functioning condition.
8. Create oversight procedures to ensure that staff follow Operation and Maintenance guidelines.

**Objective,
Scope,
and
Methodology**

Our audit objectives were to determine whether the Bureau effectively planned for and evaluated restoration projects and green streets. Our scope included restoration projects and green streets built as of Spring 2018.

To accomplish our audit objectives, we:

- Interviewed staff involved in planning, design, maintenance, and evaluation of restoration projects and green streets.
- Conducted field visits with staff to three restoration projects.
- Observed green street maintenance and inspection staff in the field.
- Conducted independent observations of 50 green streets.
- Reviewed policies and procedures related to restoration projects and green streets.
- Analyzed data from the Infor asset management information systems used to track green street data. There was no information system available to track restoration projects.

Because there was no data system available to document restoration project effectiveness, we reviewed:

- Annual Reports thru 2010 submitted in compliance with the Portland Watershed Management Plan.
- Water quality reporting from the 2017 annual compliance report for the National Pollution Discharge Elimination System and Municipal Separate Storm Sewer System permits.
- Design and final reports related to the three restoration projects to document project goals and outcomes.

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

RESPONSE TO THE AUDIT



Commissioner Nick Fish
City of Portland

DATE: November 30, 2018

TO: Mary Hull Caballero, City Auditor

FROM: Nick Fish, Commissioner *Nick Fish*
Michael Jordan, Director, Bureau of Environmental Services *Michael Jordan*

SUBJECT: Response to Audit Report, "Restoration Projects and Green Streets: Planning and evaluation needed to confirm success"

Thank you for your thoughtful audit of the Bureau of Environmental Services' (BES) restoration projects and green streets. In it, you celebrate the environmental wins BES has achieved through its watershed health work, which include opening the Willamette River to exciting new recreation opportunities and bringing salmon back to urban streams. You also advise the Bureau to improve its prioritization and monitoring to ensure maximum return on these investments.

BES is a leader in developing green infrastructure and restoring habitat and natural functions to: (1) manage stormwater, (2) comply with environmental regulations, and (3) meet the City's watershed health goals.

We are committed to making the right investments in the right places to protect watershed and public health, and to meet the expectations of our community.

The following outlines the actions the Bureau will take to focus on priority needs and to implement each of the audit recommendations.

Recommendation 1: *Commit to an implementation schedule for components of the Stormwater System Plan including risk assessments, asset registry, and condition assessment.*

BES is in the process of developing risk maps which will assess citywide stormwater risks. A first version of the Citywide Risk Maps are currently under internal review with a goal of having revised maps ready for use in Spring 2019.

BES will be working on the development of a stormwater asset register this winter, with an expected completion date of Spring 2019. An asset register is necessary for implementation of the Asset Inventory and Condition Assessment (AICA) program, which will assess the condition, define the attributes, and document the physical locations of each stormwater asset. The program will work collaboratively across several BES workgroups as well with other bureaus to collect condition assessment information for built and natural assets.

The AICA program will begin in late 2018 and will continue indefinitely because assets change over time and require periodic evaluation.

Recommendation 2: *Create a method to use the risks identified in the Stormwater System Plan to evaluate capital projects.*

BES used an early iteration of the risk maps to assist with review of eight projects recently included in the Bureau's FY20 Capital Improvement Program (CIP). The Bureau expects that the latest version of the risk maps will be used to review proposed projects and guide investment for the FY21 CIP.

In the future, BES anticipates a model that not only uses risk, or risk mitigation, as a factor for evaluating capital project, but also uses benefits and opportunities. Currently, the Bureau is engaged in a Transition Project which includes business process improvements for identifying, planning, and implementing projects. Implementation of the Transition Project outcomes is currently planned to be phased between July 2019 through July 2020.

Recommendation 3: *Develop an inventory of restoration projects and track information such as cost, location, project goals, and outcomes.*

The Bureau currently uses a spreadsheet to track cost, location, project goals, monitoring metrics, and outcomes of restoration projects. Developing a functional and interactive database to track restoration

projects is among the Bureau's data management needs. The timeline for the database development is dependent on whether BES can get additional resources to do this work.

Recommendation 4: Ensure that all projects have quantifiable goals that are tied to the goals of the Portland Watershed Management Plan or that reduce risks identified in the Stormwater System Plan.

BES identified the need for a standardized, quantitative approach to project monitoring and charted the Project Effectiveness Monitoring effort in 2017. A draft Project Effectiveness Monitoring Manual is expected to be completed in Spring 2019. The quantifiable metrics included in the manual will be aligned with forthcoming project delivery process improvements to ensure that all future projects have quantifiable goals that are measurable and responsive to adaptive management.

Recommendation 5: Regularly report project results to ratepayers in a way that explains the connection between projects and outcomes. Reports should also inform ratepayers about how project results contribute to future project selection.

BES uses the following to communicate project results and outcomes:

- 1) The Watershed Report Cards, which are issued every 4 years and provide a citywide assessment of watershed health;
- 2) Project communications materials including newsletters and flyers;
- 3) The annual reports for Municipal Separate Storm Sewer System (MS4) and Endangered Species Act regulatory requirements;
- 4) In response to the City's Salmon Safe certification, BES will be releasing an interactive web-based Ecosystems Diagnosis and Treatment (EDT) tool in 2019 which will analyze and forecast the 2003-2018 individual and cumulative project impacts relative to salmon in each watershed. This tool will help identify future opportunity areas that can align with Stormwater System Plan priorities.

BES is working towards connecting individual restoration projects to the quantifiable metrics in the Watershed Report Cards through the Project Effectiveness Monitoring efforts currently underway.

Recommendation 6: *Define quantifiable standards to describe functioning condition for green streets.*

BES will identify quantifiable standards to describe functioning conditions for green streets by updating our existing Green Street Inspection/Condition Assessment Codes document and assigning a numerical value to them. This will be completed by Summer 2019.

Recommendation 7: *Update Operation and Maintenance guidelines that support functioning condition.*

BES will update the Operations and Maintenance guidelines that support functioning condition in conjunction with the efforts associated with Recommendation #6 as they are related. To accomplish this, the Revegetation Program will identify Operations and Maintenance guidelines that relate specifically to function and identify a process to assess green street functionality. This will be completed by Summer 2019.

Recommendation 8: *Create oversight procedures to ensure staff follow Operation and Maintenance guidelines.*

The BES Revegetation Program has already started to create QA/QC procedures to ensure staff are following Operations and Maintenance guidelines by creating reports in Infor (an asset management program). The Revegetation Program will implement a business process in which the Program Manager and Supervisor will run monthly Infor reports to ensure the Program is meeting the level of service associated with maintaining green street assets. This will be completed by Summer 2019.

Thank you again for your thorough audit. We look forward to sharing our progress with you and the community as we move forward with this work.



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Report #512B, December 2018

Audit Team: Elizabeth Pape, Bob MacKay

Other related audit reports

Private Stormwater Management:
City reliance on property owners requires review of risks and results (July 2018)

Utility Payment Assistance:
Program Improvements would enable City to assist more customers (October 2017)

Columbia Building:
Scope additions and ineffective design oversight led to substantially higher project costs (October 2014)



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