

INTERNAL AUDIT REPORT

Operational Audit
Utilities Management – Port-wide

January 2023 – June 2024

Issue Date: October 16, 2024
Report No. 2024-10

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INTERNAL AUDIT

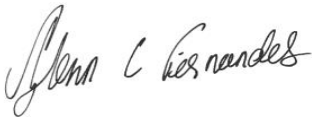
Executive Summary

Internal Audit (IA) completed an audit of Utilities Management – Port-wide for the period January 2023 through June 2024. The audit focused on water consumption and was performed to assess mitigation and monitoring efforts and internal controls of billing processes. The audit scope was determined based on our risk assessment procedures, as well as our preliminary interviews with various Port managers. We also referenced the article, "Seattle got dark and rainy again. Do we still need to conserve water?" published by KUOW on November 22, 2023. According to the author, Seattle Public Utilities identified the Port of Seattle (Port) as the city's second largest user of water between September 2022 and August 2023, consuming 435 million gallons (see Appendix B). Had the study included consumption data from January through December 2022, the Port would have most likely been reflected as the top user.

The Port bifurcates the water management program between the aviation and maritime divisions. Our audit identified several opportunities to improve internal processes. Issues one and two relate to Seattle Tacoma International Airport (SEA) while issue three relates to Maritime. All issues are explained in greater detail beginning on page six of this report.

- 1. (High) A leak detection monitoring system to identify and/or prevent water leaks from occurring does not exist. Since 2020, management identified 13 leaks, the most significant of which began in 2021, lasted 15 months, and leaked approximately 155 million gallons.**
- 2. (Medium) In 2019, an Internal Audit of Utilities concluded that some meters were not functioning correctly and either needed to be replaced or repaired. Of approximately 143 accounts, 12 remain broken and continue to be billed using estimates.**
- 3. (Medium) A leak detection monitoring system to identify and/or prevent water leaks from occurring does not exist. Unique to Maritime, some infrastructure is positioned underwater, creating a greater challenge to identify and repair leaks.**

We extend our appreciation to Port management and staff for their assistance and cooperation during this audit.



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Responsible Management Team

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Background

Water is measured in centum cubic feet (CCF) and gallons. One CCF equals 100 cubic feet (CF) or 748 gallons. The graph below represents water consumption for Aviation and Non-aviation divisions, for the period January 2022 to April 2024 measured in CCF. Between January 2023 and May 2024, approximately \$700,000 was billed to tenants for water consumption.

Aviation (Seattle Tacoma International Airport – SEA)

SEA's water distribution system is a public water system regulated by the Washington State Department of Health. SEA's system has over 28.5 miles of piping, ranging from 6" to 24" in diameter with a design between 50 to 70 years old. The age of the pipe ranges from as early as 1947 to the present, with the majority built in the 1970s. The system includes a cooling tower, fire suppression system, and drinking water for domestic use.

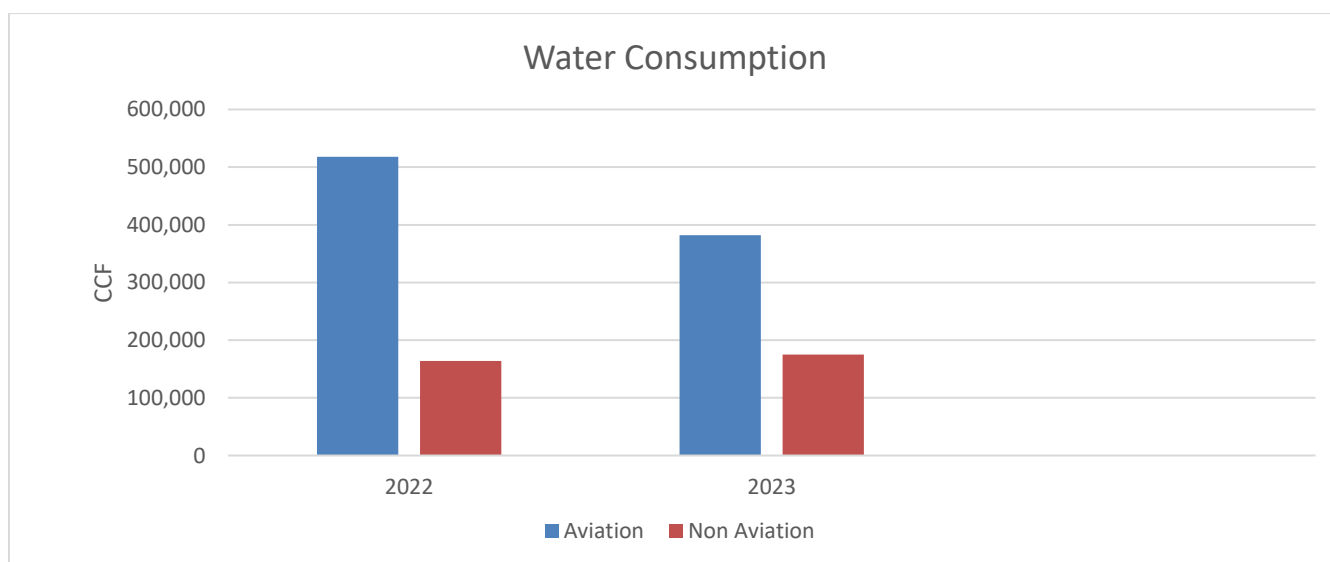
Consumption varies depending on temperature and passenger volumes, but averages about 20 million gallons monthly at a total cost of \$175,000. All water is purchased from Seattle Public Utilities, who provides drinking water to 1.5 million people in the greater Seattle area.

Maritime (Non-Aviation)

Portfolio Asset Management moved from the Economic Development Division to the Maritime Division in August of 2024. Portfolio Asset Management's responsibilities include: obtaining consumption data, applying a utility rate, and billing tenants for their usage.

Water is supplied by Seattle Public Utilities, while sub-meter readings are manually obtained by Port staff. Utility invoices and utility charges for sub-meter readings are processed through PROPworks® and then through PeopleSoft for billing purposes.

Maritime water consumption increased slightly from 2022 to 2023, primarily driven by increased usage from the commencement of Terminal Five operations. The Aviation division experienced a significant decrease in water consumption from 2022 to 2023. This was due from a water leak in July 2021 that was identified and not repaired until September 2022. After the leak was fixed, consumption returned to normal levels in 2023.



*Source: Seattle Public Utilities

Audit Scope and Methodology

We conducted the engagement in accordance with Generally Accepted Government Auditing Standards and the International Standards for the Professional Practice of Internal Auditing. Those standards require that we plan and conduct an engagement to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our engagement objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our engagement objectives.

In some instances, we used judgmental sampling methods to determine the samples selected for our audit test work. In those cases, the results of the work cannot be projected to the population as a whole.

The period audited was January 2023 through April 2024 and included the following procedures:

Data Analysis

- Prepared trending analysis from consumption data, obtained directly from Seattle Public Utilities, for the period beginning January 1, 2022 to April 30, 2024.
- Compared annual water usage, year-over-year to identify trends.
- Determined who the primary water users at the Port were (i.e. concessionaires, cruise, terminal, and other users).

Interviews & Process Walkthroughs

- Interviewed and performed process walkthroughs with employees from both Aviation and Economic Development, to obtain an understanding of billing processes.
- Discussed monitoring programs with management within Aviation Facility and Infrastructure.
- Reviewed documents, including leak incident reports, consumption data, and a Leak Detection Monitoring presentation.
- Assessed the design of processes, including the existence of internal controls.

Site Observation

- Performed site visits of Maritime, Economic Development (now Maritime), and The Northwest Seaport Alliance (NWSA) properties, including Jack Block Park, Terminals 90 and 91, and Terminal 5.
- Performed site visits of Aviation properties, including the South Runway Protection Zone, cooling towers, pump rooms, and the water tower.

Validation of PROPworks® and PeopleSoft (Maritime)

- Randomly selected 25 metered and billed transactions.
- Obtained current and prior months' reading from the photo image and calculated the net difference. When necessary, consumption was converted from CF to CCF.
- Observed current and prior months consumption, reflected in PROPworks®, and calculated the net monthly consumption.
- Validated that consumption, using the photo image, agreed to PROPworks®.
- Multiplied the tenant utility rate by consumption, to compute monthly amount billed, and validated that it agreed to PROPworks®.
- Validated that PROPworks® agreed to the invoice generated from PeopleSoft.
- If any variances were identified, they were discussed with management and resolved.

Schedule of Observations and Recommendations

1) Rating: High

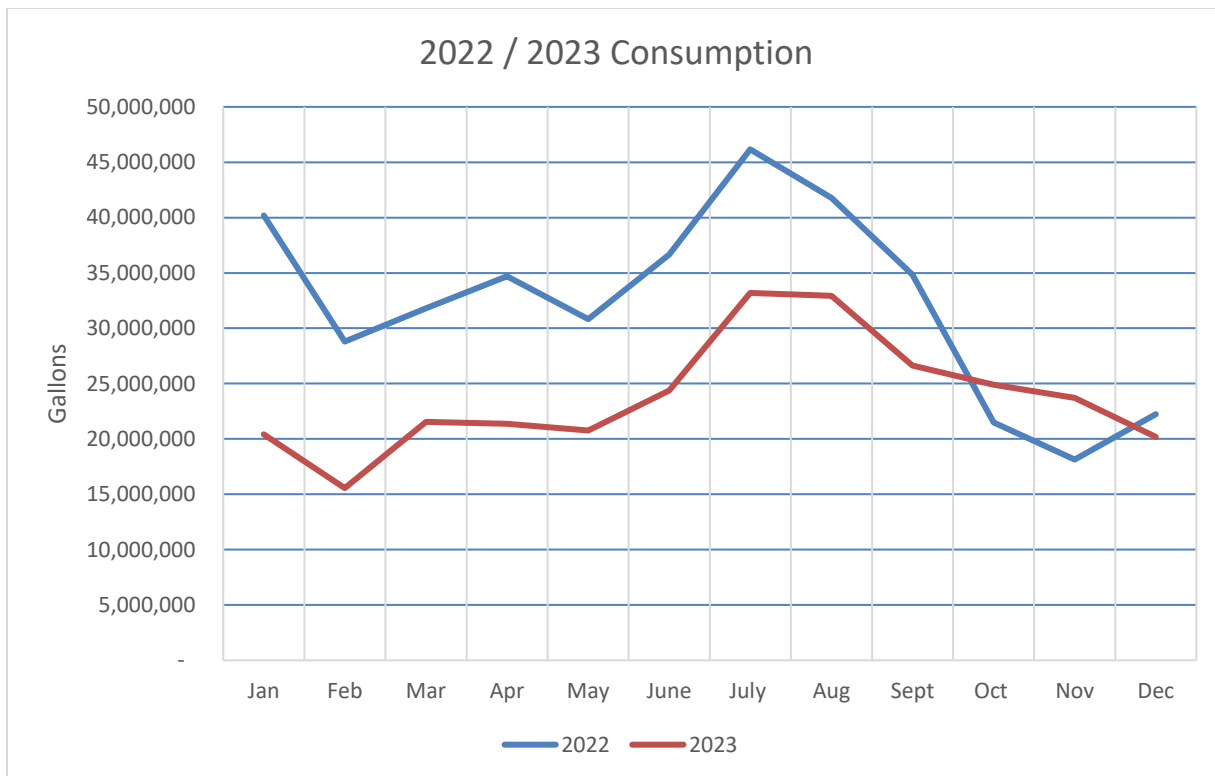
Aviation - SEA

(High) A leak detection monitoring system to identify and/or prevent water leaks from occurring does not exist. Since 2020, management identified 13 leaks, the most significant of which began in 2021, lasted 15 months, and leaked approximately 155 million gallons.

In July 2021, water consumption increased dramatically at an average of an additional 14 million gallons monthly. SEA averages approximately 20 million gallons monthly. Approximately 15 months later, five leaks were located, with the primary leak identified in the South Runway Protection Zone in a six-inch pipe running between the isolation valve and a fire hydrant.

Management concluded that the cause of the leak was because of where the pipe was located. In 2004, the pipe was routed through a wooded wetland area during the Des Moines Detention System Project. The pipe was reported to be laid at grade and over time, decomposed vegetation most likely caused the ground to settle and the pipe to separate and leak.

The leak caused an average loss of 155 million gallons of water at estimated cost of \$1.3 million. Below is consumption data, obtained by Internal Audit from Seattle Public Utilities. It reflects a decrease in consumption in 2023, when compared to 2022, and a return to more normal consumption in September 2023.



Environmental stewardship is fundamental to the Port's mission. The Mission Statement includes "Stewardship of the Environment", and the Century Agenda references a desire to be the "Greenest and most energy-efficient port in North America". Port values also include Stewardship: "we honor and care for the resources entrusted to us for the benefit of future generations."

Leak detection is limited to physical observation or areal analysis. This method proves ineffective since some leaks are found in areas, such as a storm pond where water is expected or leaks that occur underground. Since 2020, management identified a total of 13 leaks. With aging infrastructure, coupled with an increase in passenger growth, water demands will only increase, further stressing the infrastructure and highlighting the need for a leak detection system to mitigate future incidents.

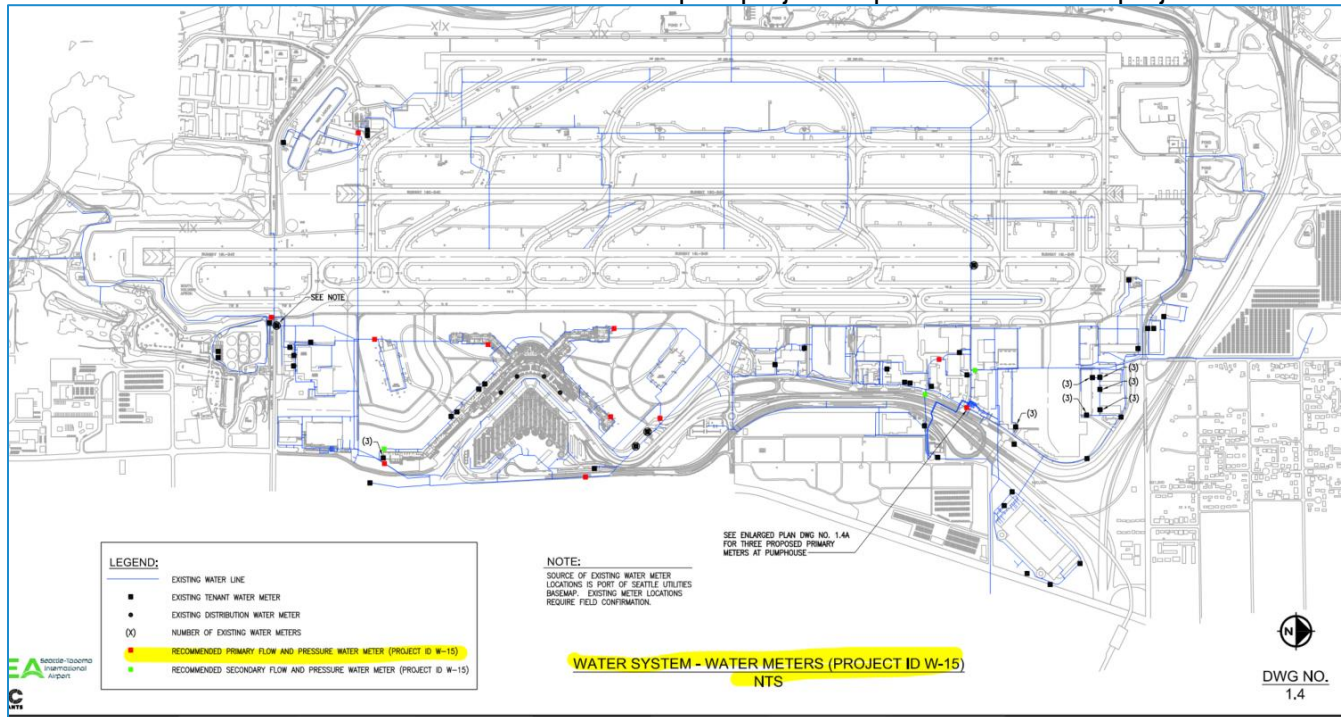
Recommendations:

Installing additional water meters in specific areas of the system to better pinpoint water losses and to conduct water audits.

Additionally, a water leak detection program should be developed and implemented to identify leaks and potential failing infrastructure.


Management Response/Action Plan:

Additional water meters are identified on Aviation Utility Master Plan Vision projects. The vision project scope is to install meters at strategic locations to monitor the water system to conduct a water audit. Aviation Facilities and Infrastructure will submit a capital project request for the vision project.




Utility Master Plan Vision Project (Water Meters)


Leak Detection technology is evolving, Aviation – Facilities & Infrastructure has started a Leak Detection pilot program prior to this audit to find the most suited technology for Airport conditions. When the program does find a reliable technology, a capital project will be submitted for a fully integrated leak detection system.



Attach the sensor to existing pressurized access points in the water network



Detect, pinpoint, and monitor existing and new leaks, as they emerge on the network



Increase your water network's resilience and mitigate risk of catastrophic failure

The compact EchoShore-TX is comprised a hydrophone sensor that is connected to the water column, an electronic module and communications equipment. Sensors are installed at preselected locations along the mains to be monitored as shown in Figure 2.

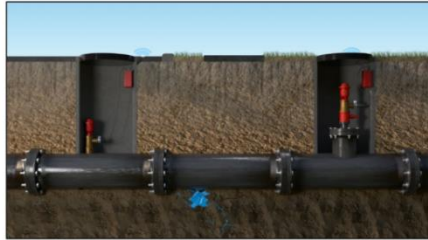



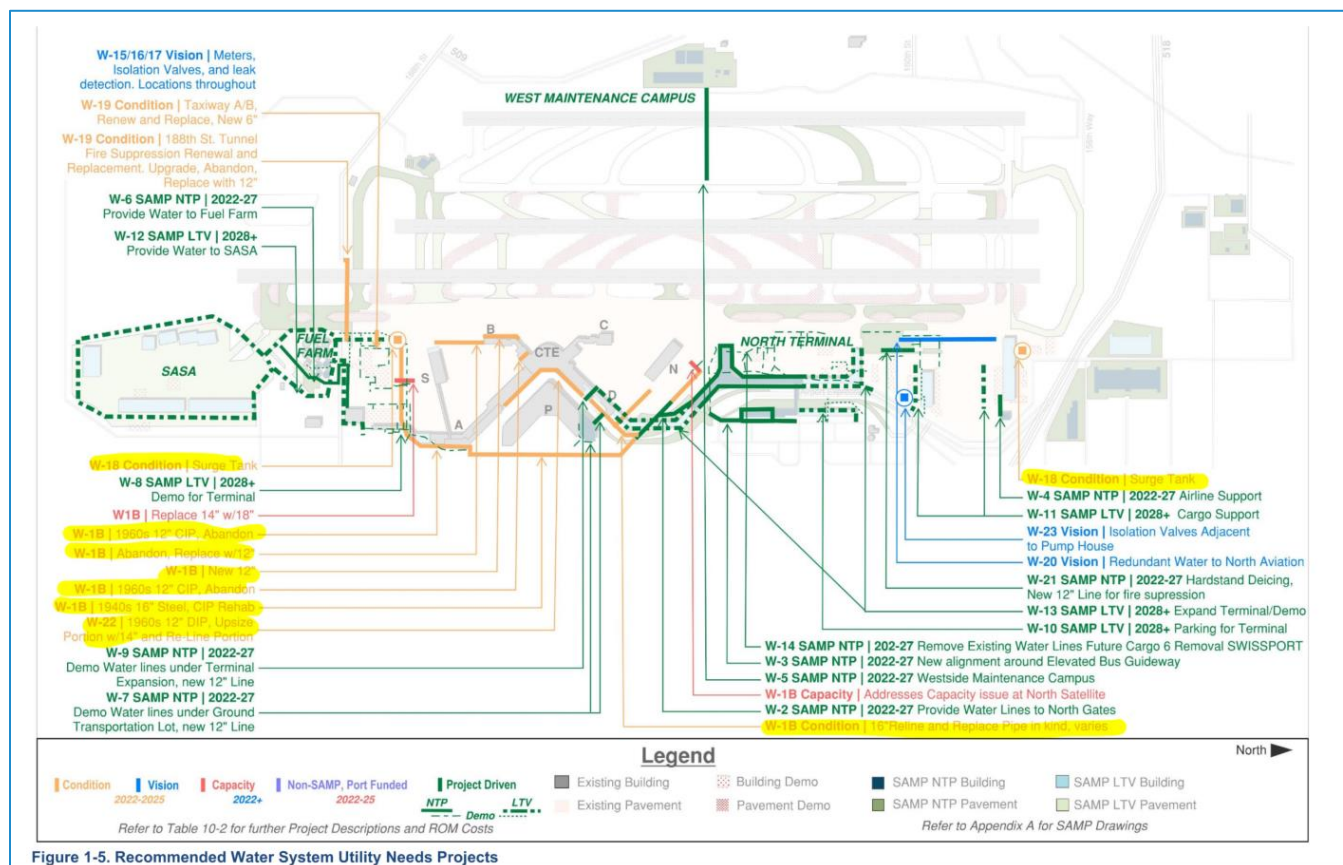
Figure 2: EchoShore®-TX Sensors: Designed for installation in existing chambers



• MUELLER brand

Pilot Program

Majority of the leaks are from aging infrastructure composed of Steel and Cast-Iron materials from the 1940s to 1960s. The Utility Master Plan had identified projects to renew or replace Steel and Cast-Iron infrastructure. Majority of the projects have been implemented or on the capital program.



Utility Master Plan (Yellow Indicates current Capital Projects)

2) Rating: Medium**Aviation - SEA**

(Medium) In 2019, an Audit of Utilities concluded that some meters were not functioning correctly and either needed to be replaced or repaired. Of approximately 143 accounts, 12 remain broken and continue to be billed using estimates.

Management, in response to the 2019 audit, pointed out that an informal process was in place but agreed that a more formal process was needed to improve communication between departments, namely, Utilities/Facilities Infrastructure and Aviation Maintenance. A more formal process was intended to align coordination among departments since multiple departments have different responsibilities (i.e. identification, billing, repair/maintenance).

The table below reflects broken meters, and the date that it went out of service.

Meter #	Customer Name	Date Broken
SSATBAR	HOST INTERNATIONAL	June 2010
9314E	Multiple Customers	August 2018
0967S	SKY CHEFS	February 2016
0967S-LF	SKY CHEFS	December 2016
1413	ALASKA AIRLINES	June 2019
1414	SKY CHEFS	May 2016
144B	FLYING FOOD SERVICE	September 2016
9291	AMB/AFCO CARGO SEA LLC	August 2018
9314W	UNITED AIRLINES	January 2013
9623W	SWISSPORT CARGO SERVICES	February 2016
9811S	ALASKA AIRLINES	March 2014
9811N	ALASKA AIRLINES	March 2014

Recommendations:

Develop a process to identify and repair or replace meters so that they are fixed within one year.

Management Response/Action Plan:

Management agrees with the finding that the identification and repair/replacement of inoperable tenant water meters needs process improvement. A water meter repair project was initiated June 5th, 2024, and it is in development with Capital Programs. That project included some but not all of meters noted in the audit results. F&I will update that project scope to include all known inoperable meters. Going forward, F&I utilities will flag any meter malfunction, seeking determination of the failure and then address the problem either through Aviation Maintenance, Port Construction Services, or PMG as the scope requires.

3) Rating: Medium

Maritime

(Medium) A leak detection monitoring system to identify and/or prevent water leaks from occurring does not exist. Unique to Maritime, some infrastructure is positioned underwater, creating a greater challenge to identify and repair leaks.

Like SEA, Maritime has aging infrastructure, making it prone to leaks. One-way leaks are currently detected by using billing and consumption data provided by Seattle Public Utilities, which is generally every 30 days. Another way is comparing consumption data, month-over-month, when meter readings are manually obtained. These approaches are reactive and might not always be effective if consumption is nominally higher.

The Maritime footprint is expansive, spanning 19 miles, with over 1,543 acres of waterfront land and neighboring properties, including over 500 acres of terminal facilities. Maritime water consumption exceeds 150 million gallons annually. Like SEA, a leak detection system for failing infrastructure to proactively remedy broken pipes is important for responsible stewardship of natural resources.

Recommendations:

Evaluate if a water leak detection system should be implemented to identify leaks from failing infrastructure. The evaluation system should include a financial cost benefit analysis. If management determines not to implement a system, alternative monitoring programs, such as a month-over-month analysis should be performed and formalized through procedural documents.

We also recommend leveraging efforts with the Aviation Division, if possible, so that efforts aren't duplicated.

Management Response/Action Plan:

Maritime Division agrees with the Audit findings and proposed recommendations. Marine Maintenance, in coordination with Portfolio Asset Management (PAM) and Maritime Operations, will evaluate if a water leak detection service should be implemented to identify leaks from failing infrastructure. The current process for locating and determining leaks is through visual inspection. Maritime Operations and Marine Maintenance team members regularly inspect the property at each facility. Additionally, E-Condition Survey is scheduled every three-year at each facility and Under-Dock Surveys are conducted annually. Facilities Maintenance Managers and Marine Maintenance Crafts will review monitoring technology and make recommendations where early detection by a water leak detection service would be helpful. The PAM utility specialist will continue to review and identify water usage anomalies on monthly utility invoices and request inspections for the affected location(s).

Appendix A: Risk Ratings

Findings identified during the audit are assigned a risk rating, as outlined in the table below. Only one of the criteria needs to be met for a finding to be rated High, Medium, or Low. Findings rated Low will be evaluated and may or may not be reflected in the final report.

Rating	Financial Stewardship	Internal Controls	Compliance	Public	Commission/ Management
High	Significant	Missing or not followed	Non-compliance with Laws, Port Policies, Contracts	High probability for external audit issues and / or negative public perception	Requires immediate attention
Medium	Moderate	Partial controls Not functioning effectively	Partial compliance with Laws, Port Policies Contracts	Moderate probability for external audit issues and / or negative public perception	Requires attention
Low	Minimal	Functioning as intended but could be enhanced	Mostly complies with Laws, Port Policies, Contracts	Low probability for external audit issues and/or negative public perception	Does not require immediate attention
Efficiency Opportunity	An efficiency opportunity is where controls are functioning as intended; however, a modification would make the process more efficient.				

Appendix B: Seattle’s Top 10 Water Users

Big gulpers: Seattle's top 10 water users

Water consumption (in millions of gallons), Sept. 2022 - Aug. 2023

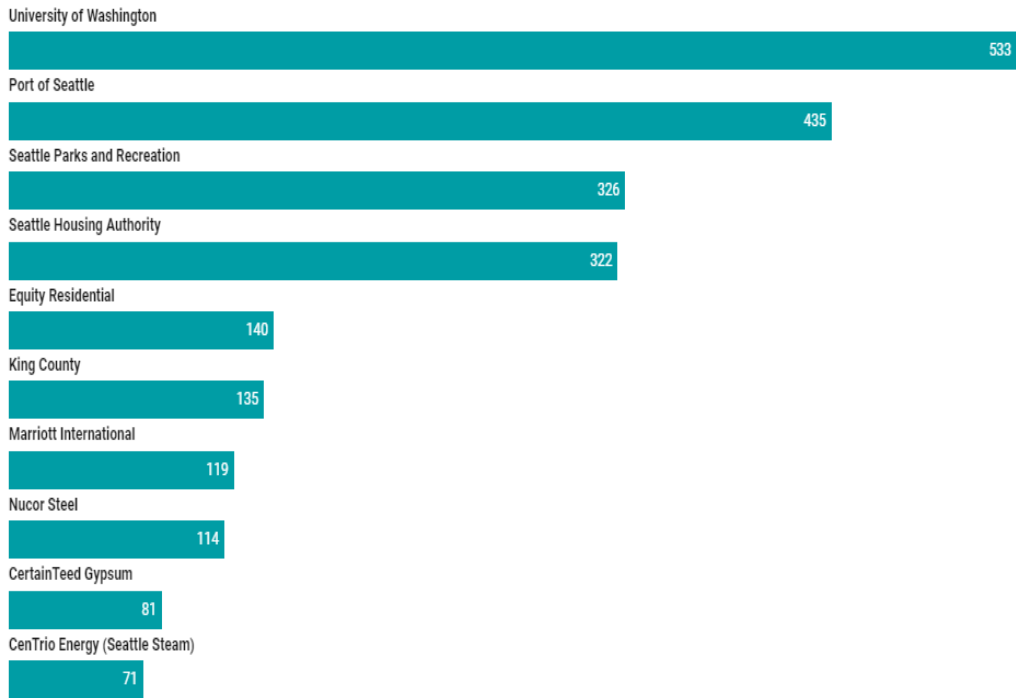


Chart: KUOW/Teo Popescu • Source: [Seattle Public Utilities](#) • Created with [Datawrapper](#)