2024 Annual Report

NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM WATERSHED-BASED WASTE DISCHARGE PERMIT

Clean Water Services

Clean Water Services

National Pollutant Discharge Elimination System (NPDES) Watershed-Based Waste Discharge Permit Annual Report

March 2024

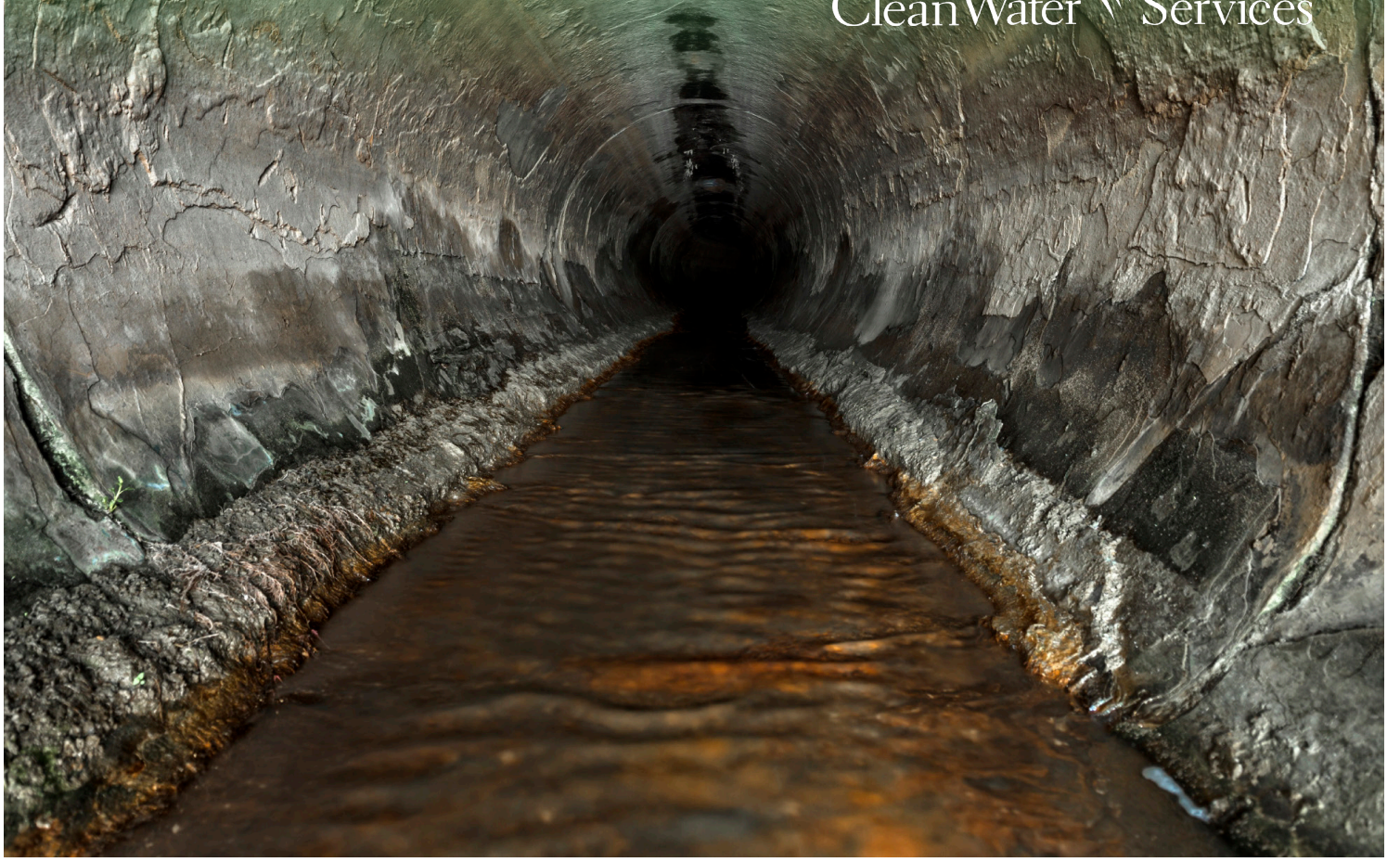
Clean Water Services hereby submits this NPDES Watershed-Based Waste Discharge Permit Annual Report in accordance with NPDES Permit Numbers 101141, 101142, 101143 and 101144. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for the gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Diane Taniguchi-Dennis
Chief Executive Officer

2024 Annual Report

INFLOW & INFILTRATION

Clean Water Services



Inflow & Infiltration Annual Report
March 2024

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1. Introduction

Schedule D.1 of the Clean Water Services (CWS) watershed-based NPDES Permit requires an annual inflow and infiltration (I/I) report which must include:

- An assessment of I/I issues at the four water resource recovery facilities based on comparisons of summer and winter flows.
- Details of activities performed in the previous year to identify and reduce I/I.
- Details of activities planned for the following year to identify and reduce I/I.
- A summary of sanitary sewer overflows that occurred during the previous year.

CWS is making continual progress in identifying and reducing I/I throughout the collection system. CWS continued its commitment to I/I abatement and rehabilitation through its Capital Improvement Program (CIP) and substantial maintenance, television (TV) inspection, and flow monitoring programs. Staff members use these programs to identify, quantify, and reduce I/I within the sanitary sewer collection system.

2. Collection System Description

CWS' collection system includes assets owned by CWS or its co-implementers including 46 pump stations, approximately 1,850 miles of sanitary sewer line, 70 miles of force main, and about 48,713 sanitary sewer manholes. Pipes range from 4 inches to 84 inches in diameter. CWS has intergovernmental agreements with each of the 12 cities in its service area and with Washington County that articulate the division of responsibilities and Performance Standards for managing, operating, and maintaining the collection system. The Performance Standards detail maintenance frequency and measurement criteria for activities such as line cleaning, manhole maintenance and repairs, root control, TV inspections, and emergency response. These standards provide consistency across the entire service area and are designed to maintain the collection system efficiently and cost-effectively; promptly identify and address potential issues; and minimize the risk of sanitary sewer overflows due to inadequate capacity, maintenance, or structural deficiencies.

3. Inflow and Infiltration Abatement Programs – 2023

3.1 Inflow and Infiltration Assessment

The following table summarizes the statistics used to compare summer and winter flows at CWS' four water resource recovery facilities (WRRFs) to support an assessment of facility I/I issues in 2023. Winter flows include those from November to April; summer flows include those from May through October.

Table 1: 2023 Water Resource Recovery Facility Influent Flow Statistics

Daily Average Flow	Rock Creek	Durham	Forest Grove	Hillsboro
Average winter flow, MGD	45.8	28.4	6.3	6.6
Peak winter flow, MGD	105.3	72.5	16.4	14.3
Winter peaking factor	2.3	2.6	2.6	2.2
Average summer flow, MGD	31.3	19.7	4.0	3.1
Peak summer flow, MGD	43.5	33.2	5.9	5.2
Summer peaking factor	1.4	1.7	1.5	1.7
Ratio of winter to summer average monthly flow	1.5	1.4	1.6	2.1

Peaking factors in excess of 4 and high ratios of winter versus summer average flows are considered to be an indication of significant levels of I/I entering the sanitary sewer system. Winter peaking factors at the WRRFs ranged from 2.2 to 2.6; winter to summer average flow ratios range from 1.4 to 2.1. The Forest Grove WRRF and Durham WWRF have the highest winter peaking factor of 2.6. The Hillsboro and Forest Grove WRRFs have the highest winter versus summer average flow ratio of 2.1 and 1.6, respectively. CWS is focusing on I/I reduction capital projects in the Forest Grove basin and the City of Hillsboro is partnering with CWS to focus on I/I reduction within its city. The relatively high peaking factors indicate the need for CWS to continue monitoring conveyance system flows in the Forest Grove and Hillsboro facility basins while continuing to evaluate potential project locations for I/I reduction opportunities as part of the West Basin I/I Abatement Study. Areas where CWS is initiating long-term I/I abatement planning include the Forest Grove sewershed, the sanitary pipes that feed the Beaverton sewer trunk in the Rock Creek sewershed, and the sanitary pipes that feed the Fanno Creek Interceptor in the Durham sewershed.

3.2 Activities Performed in 2023 to Identify and Reduce I/I

3.2.1 Capital Improvement Program

Capital Improvement Program Staffing: In 2023, CWS employed a principal engineer (0.5 FTE), engineer (1 FTE), and engineering technician (1 FTE) to work on CWS' I/I reduction program. The principal engineer is responsible for managing the overall I/I reduction program and the large-diameter sewer rehabilitation program. The engineer and engineering technician are responsible for planning, designing, and administering the I/I abatement projects.

CIP Prioritization: CWS has observed rapid residential growth over the past decade and anticipates this trend will continue. Capital project priorities have accordingly been focused on capacity assurance. One method of providing capacity is reducing I/I. Recent I/I abatement efforts have targeted high I/I basins to achieve capacity for growth and to reduce or eliminate downstream gravity sewer, pump station, and treatment plant expansion projects.

3.3 Study and Project Summary 2023

3.3.1 Clean Water Services

I/I Abatement Master Planning: CWS continued to review flow meter data and strategically relocated meters to further isolate and identify the sanitary flow basins experiencing the highest rates of I/I.

West Basin Master Plan: CWS is studying I/I abatement as a part of the West Basin Master Plan to better understand the I/I influence from the sewershed areas tributary to the Hillsboro, Rock Creek, and Forest Grove WRRFs.

Forest Grove I/I Abatement: Design work for phase 2 at 23rd and Main in Forest Grove began and cost $98,000. Construction of phase 2 began in July 2022 for $1.5 million and was completed in 2023 for approximately $1.7 million. Phase 3's design is expected to begin in the spring of 2024 to help address the high I/I observed at the Forest Grove WRRF during some storms. Design of phase 3 will continue through 2025 with construction in 2026 and 2027.

Cedar Hills Rehabilitation: This project includes the replacement of approximately 13,000 linear feet of 6, 8, and 10-inch sanitary sewer mainline and their associated structures and service lateral connections to reduce the I/I observed within this basin. The project was bid out for construction services in 2023 for $5.5 million. Construction is planned to begin in late spring of 2024 and conclude in late 2025.

Aloha 3 Pump Station Project: In 2022, CWS began a project to investigate the collection system for I/I-driven capacity constraints within the collection system tributary to the Aloha 3 Pump Station. The results of this investigation will determine the potential for I/I abatement within the subject flow basin to offset future improvements at the pump station.

East Basin Master Plan: Approximately $30 million in I/I reduction improvements were identified within the East Basin Master Plan for the Durham WRRF sewershed. In 2023, CWS began investigating the I/I removal opportunities within this basin and began investigating the feasibility of how I/I removal will help offset future capital projects within this basin.

3.3.2 City of Beaverton

SW 131st Barlow to Hanson Road I/I Abatement: CWS placed five flow monitors in a 250-acre residential area in 2020 and 2021. The City of Beaverton began a more concentrated investigation into the 45-acre 131st Avenue (Barlow to Hanson) subbasin,

which contributes the highest levels of I/I among the five basins where flow was monitored. The observed I/I contributed to the downstream pipe approaching capacity. Planning and design in the basin are underway. Construction is anticipated in 2025 and 2026.

3.3.3 CITY OF HILLSBORO

NW 1911-1936 Turner Creek Sanitary I/I Abatement: The City of Hillsboro advanced the design to rehabilitate or replace the remaining sanitary sewer in the NW 1911-1936 Turner Creek Sanitary Sewer District.

3.4 Activities Planned for 2024 to Identify and Reduce I/I

3.4.1 Clean Water Services

I/I Abatement Master Planning: CWS annually reviews flow meter data and strategically relocates meters to further isolate and identify the sanitary flow basins experiencing the highest rates of I/I.

West Basin Master Plan: CWS is studying I/I abatement as a part of the West Basin Master Plan to help better understand the I/I influence from the sewershed areas tributary to the Hillsboro, Rock Creek, and Forest Grove WRRFs. The completion of the plan in 2024 will determine the scope and priority of future I/I abatement projects performed within the west basin.

Forest Grove I/I Abatement: Phase 3's design is expected to begin in spring of 2024 to help address the high I/I observed at the Forest Grove WRRF during some storms. Design of phase 3 will continue through 2025 with construction in 2026 and 2027.

Cedar Hills I/I Abatement: Construction is scheduled in 2024 and will conclude in late 2025 to rehabilitate approximately 13,000 linear feet of 6, 8, and 10-inch sanitary sewer mainline, the associated access structures, and service lateral connections.

Aloha 3 Pump Station Project: Investigation and planning for the Aloha 3 Pump Station basin will continue in 2023 to determine the current state of the pump station and what improvements are necessary.

Fanno Interceptor Pipeline Rehabilitation: This project was identified in the East Basin Master Plan and will involve rehabilitating approximately 45,000 linear feet of the existing 36-inch to 60-inch diameter interceptor. The evaluation of this project will continue in 2024 and will be completed in 2025 with design scheduled to begin in 2026 and continue through 2028. Construction is expected to take five years.

East Basin I/I Abatement and Rehabilitation: The planning and evaluation of the scope of the necessary I/I abatement projects will continue in 2024; the evaluation is expected to be completed in late 2025. Design is expected to occur from 2026 through 2029 with construction following according to the priority and need of the projects.

3.4.2 City of Hillsboro

NW 1911-1936 Turner Creek Sanitary I/I Abatement: The City of Hillsboro anticipates beginning construction of the 6th phase of the NW 1911-1936 Turner Creek Sanitary Sewer District rehabilitation and I/I abatement in August 2024; work is expected to continue through October 2026.

3.4.3 City of Beaverton

SW 131st Barlow to Hanson Road: The City of Beaverton is planning to begin design in 2023 to build off the work from the Erickson Trunk improvements. Construction is anticipated to begin in 2024.

4. Operations and Maintenance

CWS provides regional services for chemical or mechanical root control, manhole rehabilitation activities, and flow monitoring, which are presented in this report.

Lateral Rehabilitation: CWS continued implementing its comprehensive lateral rehabilitation per Resolution and Order (R&O 98-67). CWS CCTV inspected 39 private laterals and repaired or replaced 34 laterals as part of routine maintenance.

Manhole Rehabilitation and Root Control: CWS performed chemical or mechanical root control on 92,791 linear feet of sanitary sewer. CWS crews rehabilitated 89 manholes to eliminate or reduce infiltration and completed 9 internal pipe repairs to reduce infiltration.

Flow Monitoring: CWS continued to operate and upgrade its flow monitoring program, which includes 70 portable flow meters. The portable flow meters provide flexibility in monitoring locations and allow flow data to be collected in support of CWS and its co-implementers' capital projects. CWS has 59 permanent flow monitors installed and maintains 14 telemetered rain gauges across the service area. Flow monitoring data provides conveyance system and plant operators information to better manage their respective systems and provides data for I/I evaluation.

Preventive Maintenance Program: The Performance Standards for CWS and its co-implementers include internal pipe CCTV inspection of every line once every eight years. All new construction is internally inspected at the time of construction and again within 12 months of completion of construction.

CWS crews TV inspected 560,083 linear feet of sanitary sewer one or more times within its maintenance area. CWS' co-implementers inspected an additional 677,636 linear feet of sanitary sewer one or more times. The combined CWS and co-implementer effort represent internal pipe inspection of 13.2% of the total system inventory of sanitary sewer lines.

5. Summary of Sanitary Sewer Overflows

CWS implements a program to reduce sanitary sewer overflows (SSO) based on the capacity, management, operation, and maintenance (CMOM) approach. For wastewater collection systems, one of the key performance indicators is the number of SSOs per 100 miles of sewer pipe per year. Over the past eight years (2016-2023), CWS has averaged fewer than one SSO event per 100 miles of sewer main per year, indicative of a high-performing collection system.

This section summarizes SSOs that occurred during 2023. The date given is the date the SSO started; if the start date is unknown the date the SSO was first reported to CWS or a co-implementer city is listed. CWS and cities responded to nine SSOs in 2023, of which one reached surface waters. Of the nine events, the causes included seven blockages caused by roots, grease, rocks, and rags; one from hardened asphalt in a manhole that blocked flow in the sanitary mainline; and one from material in an air release valve that caused improper sealing and leaking. For all SSOs, appropriate corrective action was taken as described. CWS submitted written reports on all SSOs to DEQ, except when waived by DEQ as noted.

1. **Date: January 30, 2023**
   OERS #: 2023-0242
   Location: 16690 SW Queen Anne Avenue, King City
   Estimated volume: 20 gallons.
   Cause: Blockage from grease and rags.
   Follow-up actions: Jetted and TV inspected the sanitary line to clear the blockage and re-established flow in the line. Used a vactor truck to clean the sanitary line and the street and used deicer as needed. Investigated the source of the grease and rags and determined if appropriate follow-up actions were necessary. CWS increased the cleaning frequency for this sanitary line to quarterly and will continue to monitor and re-evaluate the need for quarterly cleaning.
   Results of ambient monitoring: Ambient temperatures were cold enough that all material that overflowed from the sanitary system subsequently froze, was contained to the street, and did not reach surface waters or the stormwater conveyance system.

2. **Date: May 11, 2023**
   OERS #: 2023-1187
   Location: 3431 SE River Road, Hillsboro
   Estimated volume: Unknown.
   Cause: Blockage from grease.
   Follow-up actions: Cleaned the public mainline to restore flow; the business owners cleaned and disinfected the impacted buildings. Sleeved the joint in the public mainline to prevent further root intrusion. Provided fats, oils, and grease technical assistance to the facilities where the backup occurred.
   Results of ambient monitoring: Initial sampling on May 11 confirmed discharge to Rock Creek. Follow-up sampling on May 12 showed no further impact.

3. **Date: May 16, 2023**
   OERS #: 2023-1236
   Location: 15822 SW Beef Bend Road, Sherwood
   Estimated volume: 20-30 gallons.
   Cause: Material in air release valve caused improper sealing and leaking.
   Follow-up actions: Cleaned the valve box and the surrounding impacted areas and vacuumed all material and liquids up. Inspected and replaced the faulty valve.
   Results of ambient monitoring: The SSO was contained to either the in-ground valve box that the air release valve is in or was on the ground next to the valve box and did not reach surface waters.

4. **Date: July 12, 2023**
   OERS #: 2023-11711
   Location: 2278 NE Barberry Court, Hillsboro
   Estimated volume: Unknown.
   Cause: Hardened asphalt in manhole blocked flow in sanitary mainline.
   Follow-up actions: City used a jackhammer to remove the asphalt. Combo trucks were used to vactor the impacted sanitary line and disinfect the roadways, stormwater system, and stormwater catch basin.
   Results of ambient monitoring: The SSO was contained to a nearby stormwater catch basin and did not reach surface waters.

5. **Date: August 1, 2023**
   OERS #: N/A; 5-day reporting waiver granted by DEQ on August 4, 2023.
   Location: 11925 SW Tremont Street, Beaverton
   Estimated volume: Unknown.
   Cause: Root blockage in homeowner's private lateral.
   Follow-up actions: Cleaned and TV inspected the public sanitary mainline, cleared the root blockage, treated the line with root chemicals, and re-established flow. The homeowner cleaned the water in the basement. CWS will look into possible repairs for the public line. DEQ waived the submission of a 5-day SSO Report.
   Results of ambient monitoring: The SSO was contained in the homeowner's basement and did not reach surface waters.

6. **Date: August 26, 2023 (exact start date unknown)**
   OERS #: 2023-2155
   Location: 13304 NW Sherry Street, Portland
   Estimated volume: Unknown.
   Cause: Blockage from rock and roots in the public sanitary line from a private cleanout.
   Follow-up actions: Used a vactor truck to vacuum out the top of the overflowing manhole to stop the SSO. Cleaned the impacted public sanitary line and the impacted areas in the homeowner's yard.

Results of ambient monitoring: The SSO was contained to the yard and did not reach surface waters.

7. **Date: October 3, 2023 (exact start date unknown)**
   OERS #: 2023-2460
   Location: 7250 SE Blanton Street, Hillsboro
   Estimated volume: 20 gallons.
   Cause: Blockage of silt and rock in public sanitary mainline.
   Follow-up actions: City used a hydro cleaner to clear the blockage and re-establish flow in the public sanitary line. Cleaned the public sanitary line, the impacted overland areas, and the stormwater catch basin.
   Results of ambient monitoring: The SSO was contained to the stormwater catch basin and did not reach surface waters.

8. **Date: October 9, 2023 (exact start date unknown)**
   OERS #: 2023-2509
   Location: N Freemont Street and N 15th Avenue, Cornelius
   Estimated volume: 30 gallons.
   Cause: Grease blockage.
   Follow-up actions: City crews cleared the blockage and cleaned the public sanitary line and the impacted road and curbline.
   Results of ambient monitoring: The SSO was contained to the street and did not reach surface waters.

9. **Date: November 4, 2023**
   OERS #: 2023-2735
   Location: 16273 SW Ludwig Street, Beaverton
   Estimated volume: Unknown.
   Cause: Blockage caused by roots, grease, and rags in the public sanitary line.
   Follow-up actions: Used vactor trucks to clear the blockage, re-establish flow in the public sanitary line, and stop the SSO. Cleaned the public sanitary line, the impacted road, stormwater catch basin, and cul-de-sac.
   Results of ambient monitoring: The SSO was contained to the street and did not reach surface waters.

2024 Annual Report

WATER QUALITY CREDIT TRADING

Clean Water Services

Executive Summary

Clean Water Services (CWS) implements a water quality credit trading program that includes flow enhancement and riparian planting activities. The thermal credits generated by these activities are used to offset the thermal load discharged from CWS' Rock Creek Water Resource Recovery Facility (WRRF), Durham WRRF, and Forest Grove WRRF including the Natural Treatment System (NTS).

In 2023, CWS released an average of 41.8 cubic feet per second (cfs) of stored water from Hagg Lake in July and 43.5 cfs of stored water from Hagg Lake in August. Additionally, the Wapato instream lease provided 5.4 cfs in July and August. The stored releases and instream lease generated 1,269 million kilocalories (kcal) per day of thermal credit for July and 1,276 million kcal per day of thermal credit for August.

CWS also enrolled 10 riparian planting projects in 2023, enhancing approximately 3 stream miles and generating nearly 9 million kcal per day of thermal credit. Since establishing the trading program in 2004, CWS has implemented 209 planting projects along streams in the Tualatin River Watershed that have generated a total of 618 million kcal/day of thermal credit.

The thermal credits generated from CWS' flow enhancement and riparian planting activities completely offset the thermal load discharged by the Rock Creek, Durham, and Forest Grove facilities. This annual report details CWS' flow enhancement and riparian planting activities during 2023 and provides an accounting of the thermal credits used to offset the thermal load discharged from the treatment plants.

The At a Glance graphic on the following page summarizes the benefits to date of CWS' water quality credit trading program for the Tualatin River Watershed.

AT A GLANCE

Clean Water Services' Water Quality Trading Program Provides Watershed-Scale Benefits

SHADE PROVIDED

CWS has implemented **209** riparian planting projects along streams in the Tualatin River Watershed. Shade provided by these projects helps block potential solar load (sunlight) from warming streams.

TO DATE: 1,235,600

KILOCALORIES PER DAY OF SOLAR LOAD BLOCKED

Hagg Lake

Barney Reservoir

STREAMFLOW ENHANCED

CWS releases cool stored water from Barney Reservoir and Hagg Lake during the summertime to enhance stream flows and improve water quality in the Tualatin River and its tributaries.

IN 2023

AN AVERAGE OF 32 CUBIC FEET PER SECOND (21 MILLION GALLONS PER DAY) WERE RELEASED FROM SCOGGINS AND BARNEY RESERVOIRS

REDUCTIONS OF SEDIMENT, PHOSPHORUS, AND NITROGEN

CWS' riparian planting program not only provides shade for the streams but also helps reduce sediment and nutrients from reaching the streams.

IN 2023 **SEDIMENT REDUCED: 1,343,000 LBS.**
NITROGEN REDUCED: 10,500 LBS.
PHOSPHORUS REDUCED: 18,400 LBS.

STREAM MILES RESTORED

CWS' riparian planting program spans both urban and rural areas across the Tualatin River Watershed.

TO DATE: 100

STREAM MILES RESTORED

1. Background

CWS is a county service district that serves the urban portion of Washington County and small portions of Clackamas, Multnomah, and Yamhill counties. CWS owns and operates four WRRFs in the Tualatin River basin and works in partnership with its co-implementers — the 12 cities in the service area and Washington County. The WRRFs and the municipal separate storm sewer system (MS4) are permitted by the Oregon Department of Environmental Quality (DEQ) under CWS' watershed-based National Pollutant Discharge Elimination System (NPDES) permit. CWS' NPDES permit (Permit) was re-issued by DEQ on December 8, 2022, and became effective on January 1, 2023. This annual report covers CWS' activities conducted under the water quality credit trading program from January 1 – December 31, 2023. This report satisfies the reporting requirements specified in the Permit.

The Permit includes thermal load limits for CWS' Rock Creek WRRF, Durham WRRF, and Forest Grove WRRF and NTS based on the 2021 Temperature Total Maximum Daily Load for the Tualatin River. The Permit allows CWS to offset the thermal loads from the Rock Creek WRRF, Durham WRRF, and Forest Grove WRRF and NTS by implementing a water quality credit trading program for temperature. The program includes flow enhancement and riparian planting as specified in Schedule D.13. of the Permit and CWS' DEQ-approved Thermal Load Management Plan (TLMP). The TLMP documents CWS' approach and programs for offsetting the thermal load from the Rock Creek WRRF, Durham WRRF, and Forest Grove WRRF and NTS and specifies CWS' methodology for calculating the thermal credits associated with the riparian planting and flow enhancement programs. CWS updated its TLMP in July 2021; DEQ approved it with the 2022 Permit.

As required by Schedule D.13.f. of the Permit, CWS submitted information regarding thermal loads and credits in the July and August 2023 Discharge Monitoring Reports (DMRs) for the Rock Creek WRRF, Durham WRRF, and Forest Grove WRRF and NTS to demonstrate that CWS is offsetting thermal loads from its WRRFs. The July and August DMRs include the aggregate thermal load from the WRRFs, aggregate thermal credits from flow enhancement, aggregate thermal credits from riparian shade, aggregate total thermal credits, and the net thermal load to the Tualatin River.

Schedule D.13.g. of the Permit also requires CWS to submit a Water Quality Credit Trading Report annually by March 31 that summarizes the implementation and performance of the TLMP over the previous calendar year.

The Permit and TLMP require the annual report to include the following for each new riparian planting project that is enrolled within the calendar year:

- Project name and number.
- Stream length planted.
- Thermal load blocked.
- Thermal credits generated.

All this information is summarized in Section 5, Table 7.

The following information is also presented in this report. The section where the information appears in this report is noted.

- Thermal load reduction activities – recycled water use, treatment facility changes including use of the NTS, and source control activities (Section 2).
- Thermal loads discharged by the Rock Creek WRRF, Durham WRRF, and Forest Grove WRRF and NTS (Section 3, Table 4).
- Allowed thermal loads for the Rock Creek WRRF, Durham WRRF, and Forest Grove WRRF and NTS (Section 3, Table 4).
- Thermal load credits for flow enhancement (Section 3, Table 5).
- Thermal load credits for riparian shade (Section 5, Table 7).

For flow enhancement activities:

- The average daily effluent flow and maximum daily effluent temperature from the Rock Creek, Durham, and Forest Grove WRRFs for July 1 – August 31 (Appendix D).
- The average daily Tualatin River flow for July 1 – August 31 at Farmington Bridge (River Mile 33) and Golf Course Road (Appendix D).
- The average daily flow enhancement rate from Hagg Lake for July 1 – August 31 (Appendix D).

For riparian shade activities (at each site):

- Baseline vegetation conditions (density and width) (Appendix A).
- Enhanced vegetation conditions (type, width, and anticipated density) (Appendix A).
- Stream characteristics (stream aspect, elevation, wetted width, near stream disturbance zone, incision) (Appendix A).
- Baseline thermal load blocked by existing vegetation and the anticipated thermal load blocked by the enhanced vegetation (Section 5, Table 7).
- Thermal credits from each riparian planting project (Section 5, Table 7, and Appendices A and B).
- Riparian vegetation monitoring and maintenance activities (Section 2 and Appendix A).
- Baseline compliance assessment (Section 2).
- Documentation of the use of public conservation funds (Section 2).

This report includes all the above information and fulfills the requirements for submitting an annual report of CWS' water quality trading activities for 2023.

2. 2023 Thermal Load Management Activities

The thermal load management activities presented in this report are from January 1 to December 31, 2023.

CWS implements a number of strategies to reduce the thermal load discharged from the WRRFs. The water quality credit trading program, which includes flow enhancement and riparian planting activities, is used to offset the remaining thermal load from the WRRFs.

2.1 2023 Thermal Load Reduction Activities

CWS' TLMP states that, on an annual basis, CWS will submit a report that specifies the actions taken to reduce the thermal load discharged from the WRRFs. CWS identified its recycled water program, the Forest Grove NTS, WRRF improvements, and source control activities as methods that could be used to reduce the thermal load discharged by the WRRFs. The following is a summary of the actions taken in each of these areas in 2023.

2.1.1 Recycled Water Program

CWS produced 82.5 million gallons of Class A recycled water at the Durham WRRF in 2023. This volume of recycled water represents a direct reduction in the thermal load discharged by CWS' WRRFs. Recycled water from the Durham WRRF is used at three golf courses, two public school athletic fields, a City of Tigard natural area, a CWS-owned natural area, a privately-owned farm, Durham City Park, and for onsite irrigation.

2.1.2 Forest Grove Natural Treatment System

In 2017, CWS began discharging treated effluent from the Forest Grove and Hillsboro WRRFs through the 95-acre NTS in Forest Grove. Prior to implementing the NTS, the Forest Grove and Hillsboro WRRFs transferred wastewater through twin 24-inch pipelines to the Rock Creek WRRF for treatment and discharge during the dry season. Wastewater from the Forest Grove and Hillsboro service areas is now treated at the Forest Grove WRRF during the dry season; the treated effluent from the Forest Grove WRRF is then directed through the NTS for further treatment prior to discharge to the Tualatin River. CWS operated the NTS between June and September in 2023.

2.1.3 Improvements at Water Resource Recovery Facilities

CWS pursues capital improvements to further reduce thermal loads discharged from the Rock Creek, Durham, and Forest Grove WRRFs. In 2023, no significant changes were made at any of the facilities that would have reduced the thermal load. In previous years, CWS built a cogeneration facility at the Durham WRRF that included air-cooled radiators to dissipate excess heat to the atmosphere and avoid discharging excess heat to the treatment facility effluent. CWS also completed several projects at the Durham facility to expand the utilization of heat recovered from the operation of the cogeneration facility and displace the natural gas usage.

The hot weather conditions the past few years have highlighted the need to further evaluate temperature profiles across the WRRFs. In 2021, CWS began a study of the

temperature profiles across key unit processes at the Rock Creek and Durham WRRFs to evaluate opportunities to further reduce temperatures at the WRRFs. The study has been used to evaluate the effect of managing surface area by removing treatment units from service and shading secondary clarifiers. A shade pilot study was completed in 2023 and the results agree with model predictions that shading secondary clarifiers has the potential to reduce peak daily temperatures by approximately 0.2 degrees C. CWS will continue to study temperature profiles, evaluate the results, and define actions, if any, to further reduce temperatures at the WRRFs.

2.1.4 Source Control

CWS regulates all significant industrial user discharges into the sanitary sewer system as part of its DEQ-approved industrial pretreatment program. In 2023, there were no significant changes in permitted industrial sources that would have resulted in substantive changes in the thermal load to the WRRFs. CWS continues to evaluate new and potential industrial thermal loads. Two significant industrial users continue to implement cooling systems at their facilities, which resulted in a significant reduction in thermal load to the Rock Creek WRRF.

2.2 2023 Thermal Load Trading Activities

This section summarizes CWS' flow enhancement and riparian planting activities in 2023 as well as riparian monitoring and maintenance activities and shade monitoring activities. Additionally, this section describes CWS' programmatic evaluation of the riparian planting projects enrolled in the water quality trading program, including an assessment of baseline compliance and documentation of the use of public conservation funds for each project enrolled.

2.2.1 Flow Enhancement Activities

In 2023, CWS had 12,618 acre-feet of stored water available in Hagg Lake and 1,654 acre-feet in Barney Reservoir. CWS releases stored water during the summer and fall to meet the following objectives:

- Maintain minimum stream flows in the Tualatin River.
- Generate thermal credits to offset a portion of the thermal load from the CWS' WRRFs.
- Enhance tributary stream flows.
- Provide sustainable base flows in the upper Tualatin River.
- Improve dissolved oxygen levels and overall water quality in the Tualatin River.

Stored water releases in July and August form the basis of CWS' flow enhancement credit.

In 2023, CWS began releasing stored water from Hagg Lake on May 31 and continued until November 1. Stored water releases from Barney Reservoir began on September 1

and ended on October 31. Table 1 shows the average monthly release rates from Hagg Lake and Barney Reservoir for the 2023 release season.

CWS leases United States Fish and Wildlife Service natural flow water rights for instream use at Wapato Lake Wildlife Refuge as described in the 2020 Water Quality Credit Trading Annual Report. The water rights are relatively senior (1928) and located in the upper Tualatin River. They can be protected over the entire downstream length of the Tualatin River from May 1 to September 30. If natural flow water rights are regulated off, the water rights include access to supplemental water from the Tualatin Valley Irrigation District (TVID). Thermal credits are available from the instream lease as long as CWS maintains an agreement with the United States Fish and Wildlife Service and TVID for the instream lease. The credits are calculated for July and August as defined by CWS' Permit and TLMP. Temperature benefits and thermal credits associated with the instream lease at the Forest Grove, Rock Creek, and Durham facilities are calculated using the formulae in the TLMP.

CWS worked with the Oregon Water Resources Department District 18 Watermaster's office to protect the instream lease rate of 5.4 cfs and have it included as part of the baseflow for the Tualatin River. From May 1 until the end date of the lease on September 30, the instream lease was based on natural flow in the Tualatin River. Table 1 shows the average instream rate of the Wapato instream lease for the 2023 release season.

Table 1: 2023 Average Monthly Release Rates from Hagg Lake and Barney Reservoir and the Wapato Instream Lease

Month	2023 Average Release Rate from Scoggins Reservoir (cfs)	2023 Average Release Rate from Barney Reservoir (cfs)	2023 Average Rate from Wapato Instream Lease (cfs)	2023 Average Combined Stored Water Release Rate + Instream Lease (cfs)
May	-	-	5.4	5.4
June	18.5*	-	5.4	11.5*
July	41.8	-	5.4	47.2
August	43.5	-	5.4	48.9
September	31.7	14.0	5.4	51.1
October**	10.0*	14.0*	-	12.0
November 1**	-	-	-	-

* Average based on days stored water was released.

** Stored water releases from Hagg Lake and Barney Reservoir ended on November 1 and October 31, respectively.

CWS also works with landowners to lease their natural flow water rights for instream use. To date, CWS has leased over 20 water rights on the mainstem Tualatin River or tributaries, totaling nearly 483 acre-feet, for instream use. CWS has not yet used this water to generate credits as part of its water quality credit trading program.

In 2023, CWS used approximately 8,442 acre-feet (approximately 67%) and 1,694 acre-feet (over 100%) from Hagg Lake and Barney Reservoir, respectively.

2.2.2 Riparian Planting Activities

This section lists the riparian planting projects enrolled in the water quality trading program in 2023, describes the project summary created for each project, and describes CWS' Capital and Landowner Incentive programs.

For 2023, CWS enrolled 10 projects that total approximately 2.97 stream miles in the Tualatin River basin for thermal credit. Table 2 presents the riparian planting projects and the stream length associated with each project.

Table 2: 2023 Riparian Planting Projects

Project	Stream Name	Stream Length (ft)
2375 - West Bethany Creek	West Bethany Creek	3,595
2420 - Balm Grove	Chicken Creek	1,188
2439 - Ghost Creek - Sunset Terrace	Ghost Creek	500
2501 - TSWCD - McKay Creek	McKay Creek	2,865
2503 - Butternut Creek Enhancement at 198th	Butternut Creek	1,157
2519 – TSWCD – Tualatin River	Tualatin River	400
2520 - TSWCD - Tualatin River	Tualatin River	791
2521 - TSWCD - Tualatin River	Tualatin River	1,900
2522 - TSWCD - Tualatin River	Tualatin River	2,380
2538 - TSWCD - West Fork Dairy Creek	West Fork Dairy Creek	900
Total Stream Miles		**2.97 miles**

TSWCD: Tualatin Soil and Water Conservation District

2.2.2.1 Project Summaries

Appendix A contains a project summary for each project credited in 2023. Project summaries contain general site information (site location, number of acres, location description, stream length and average width, plant communities, partners involved, project activities, etc.), a site assessment report, a summary of the thermal credits generated, and the input and output data used to calculate the effective shade and thermal load blocked for each project.

2.2.2.2 Capital Program

Riparian planting projects implemented under CWS' Capital Program mostly occur on public lands where large-scale restoration opportunities are available and multiple water quality and ecological benefits can be achieved. Project activities under this program include securing easements or stewardship agreements with property owners, site preparation activities, managing invasive species, revegetation, monitoring, and maintenance. Additional enhancement activities such as reconfiguring channels; placing large wood, gravel, and boulders; and creating off-channel habitats are performed on a site-specific basis to improve a broader range of ecosystem functions. Four riparian

enhancement projects, which resulted in a total of 1.22 stream miles, were planted under CWS' Capital Program in 2023.

2.2.2.3 Landowner Incentive Program

CWS contracts with the Tualatin Soil and Water Conservation District (TSWCD) to provide incentives for enrolling landowners in an enhanced version of the U.S. Department of Agriculture's Conservation Reserve Enhancement Program (ECREP) and Vegetated Buffer Areas for Conservation (VEGBAC) program. The ECREP provides an opportunity to leverage local and federal programs. This collaboration has greatly increased the acceptance and implementation of restoration programs at the local level. Riparian planting projects in rural areas primarily consist of site preparation, revegetation, managing invasive species, monitoring, and maintenance. In 2023, six riparian enhancement projects were undertaken under the CWS' Landowner Incentive Program resulting in 1.75 stream miles of riparian planting.

2.2.2.4 Riparian Monitoring and Maintenance Activities

Site monitoring and maintenance are critical to ensure the success of riparian planting projects because revegetated sites need protection from a variety of stressors including invasive species, herbivores, and dry weather. As a result, CWS implements a robust monitoring and maintenance program that includes qualitative and quantitative monitoring activities. The following sections outline CWS' approach toward monitoring and maintenance. The results of the activities at each project site are presented in site assessment reports. The reports for projects enrolled in 2023 are presented in Appendix A and the reports for projects enrolled between 2004 and 2022 are available upon request.

2.2.2.5 Qualitative and Quantitative Monitoring

CWS conducts qualitative and quantitative monitoring during the summer at riparian planting projects that are enrolled for thermal credit. Crews document site conditions and site-specific management actions in site assessment reports.

Qualitative monitoring is conducted on an annual basis and is used to assess overall project health and inform management actions. This assessment approach not only helps project managers determine the necessary level of maintenance needed at each riparian planting project site (e.g., inter-planting, seeding, weed control, herbivore protections), but also accounts for the dynamic nature of riparian planting projects as they mature from initial plantings to stable riparian ecosystems.

Quantitative monitoring is conducted every two years and includes information regarding native tree and shrub counts, species composition, species diversity, density, and riparian structure. Project phase (i.e., transitional, established, or stewardship phase) is derived from these metrics for each plant community and serves to inform management actions.

2.2.2.6 Site Assessment Reports

CWS prepares an assessment report for each project site and uses the report to document site conditions, identify management actions taken, and propose actions for the following year. Each site assessment report contains project-specific information including project acreage, the initial planting year, the year when thermal credit was taken, and the stream

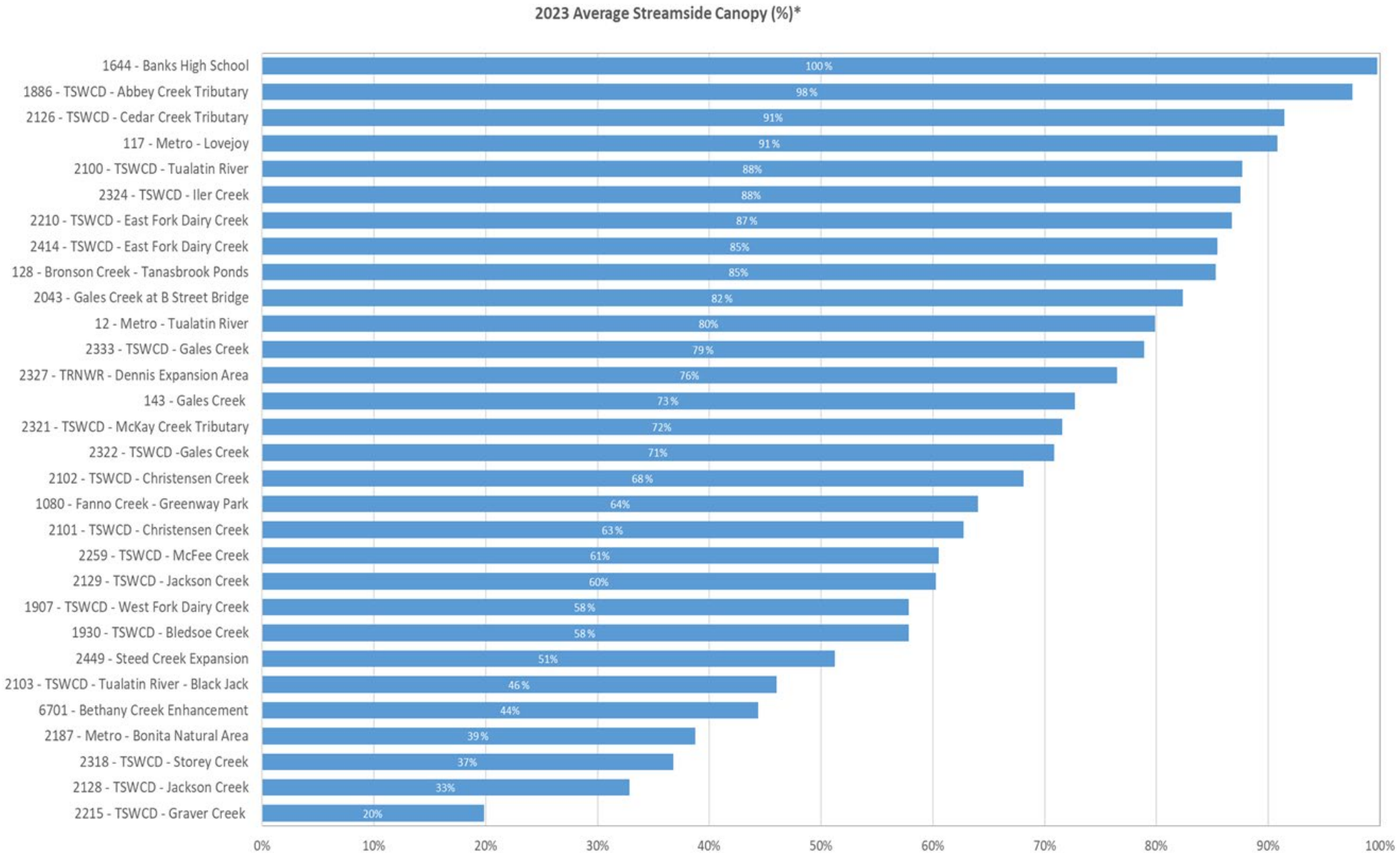
length associated with the project. Site assessment reports also contain information regarding each plant community (e.g., riparian forest, forested wetland, upland forest, scrub-shrub) within a project. This information includes a list of categorized plant species, stem densities, and the phase of each plant community. As described in the site assessment reports, the 10 projects credited in 2023 range from 1.5 to over 26 acres. Most of the projects were planted with a riparian forest-type plant community; other plant communities included scrub-shrub, oak woodland, oak savanna, upland forest, forested wetland, wet prairie, emergent marsh, and forested wetland. Management actions completed in 2023 and additional management actions recommended for 2024 at these sites include inter-planting, seeding, and invasive weed treatment.

2.2.3 Shade Monitoring

CWS monitors each project site to assess plant diversity and density, overall project health, and project phase. In addition, CWS collects data to assess shade at riparian projects every five years. An accurate representation of streamside canopy cover is difficult to obtain due to the challenges associated with field shade monitoring protocols. Shade monitoring is conducted using field measurements and remotely sensed datasets, including Light Detection and Ranging (LiDAR) and aerial photos. The shade monitoring protocol for the field measurements calls for establishing one monitoring point for each 500-foot stream segment of a project with a minimum of three monitoring points per project. Photographs and densiometer readings are taken at each monitoring point. Photographic monitoring includes upstream and downstream views of each stream bank within the project. Shade is estimated as densiometer readings of canopy cover on each stream bank within the project.

Figure 1 presents the shade monitoring results at the 30 sites that were enrolled in the program in 2008, 2013, or 2018 and that were monitored for shade in 2023.

Figure 1: 2023 Shade Monitoring Results



* Some project names have changed since their enrollment in the trading program to better reflect their location in the watershed. The project numbers have not changed.

Twenty-four of the 30 projects provided 50% or greater streamside canopy cover, the remaining six provided less than 50%.

The 2215-TSWCD-Graver Creek, 2128-TSWCD-Jackson Creek, 2318-TSWCD-Storey Creek, and 2187-Metro-Bonita Natural Area projects had an average streamside canopy cover of less than 40% when monitored for shade in 2023. The 2215-TSWCD-Graver Creek, 2318-TSWCD-Storey Creek, and 2187-Metro-Bonita Natural Area projects have been enrolled in the trading program for five years or less; as a result, the projects would not be expected to have significant canopy cover. CWS will continue to monitor these sites for invasive species cover, plant diversity, and density and increase management actions if the projects are not performing as expected when monitored 10 years after project enrollment.

The 2128-TSWCD-Jackson Creek project had an average streamside canopy cover of 33% when monitored in 2023. This project was planted with 4,000 native shrubs and trees in 2013 and has extensive wetland complexes, significant beaver activity, and ongoing challenges with deer, elk, and beaver browsing. This project has had focused attention including invasive weed treatment and inter-planting as shown below:

2015 – 1,014 plants
2016 – 4,800 plants
2017 – 1,000 plants
2018 – 1,000 plants
2019 – 1,000 plants

This project will continue to be monitored for invasive species cover, and plant diversity and density. An interplanting of trees and shrubs is planned for 2024. Tree tubes will be used to protect trees from herbivory. In the future, strategic caging of trees along the creek could assist in the establishment of a tall canopy.

Eight of the 30 sites were monitored for shade in 2008, eight were monitored for shade in 2013, and 14 were monitored for shade in 2018. Except for the sites mentioned above, the projects are achieving performance goals. Minor variations in shade estimates at project sites are likely due to challenges associated with the precision of field shade monitoring protocols; more significant changes in shade are likely a result of natural processes that alter stream and riparian characteristics.

Four projects (110-TSWCD-Chicken Creek Tributary, 112-TSWCD-Tualatin River, 1522-TSWCD-Abbey Creek, and 1524-TSWCD-Rock Creek) that were enrolled in the program in 2007; one project enrolled in 2008 (1927-TSWCD-Cedar Creek); and one project enrolled in 2013 (2140-Gales Creek) were not monitored for canopy cover using field densiometers as an estimate of shade in 2023 because they are currently between landowner contracts; these projects are scheduled for routine shade monitoring using LiDAR and aerial imagery. Streamside canopy cover at these four projects was over 40% when monitored with LiDAR in 2019 and a LiDAR flight is planned for 2024.

CWS is committed to ensuring the success of each of its planting projects. Crews monitor each project site extensively and evaluate plant diversity and density, overall project health, and project phase. Should a project not be performing as expected, CWS implements management actions to ensure the project's success. Out of the 209 riparian planting projects enrolled in CWS' water quality trading program, eight required additional management actions to improve project performance. Appendix C describes the challenges encountered at these sites and the additional management actions that were taken at each project site.

Monitoring and management follow-up efforts have been successful in improving project conditions and overall performance. For example, Project 1907-TSWCD-West Fork Dairy Creek project was not performing as expected and was previously reported in Appendix C. However, CWS implemented additional management actions including invasive weed treatment and several inter-planting events at this site. Over the years, more than 5,700 plants were planted adjacent to the stream. These additional management actions resulted in an increase in streamside canopy cover from 5% in 2018 to nearly 58% in 2023. As a result, this project was removed from Appendix C.

2.2.4 Programmatic Assessment of Enrolled Riparian Planting Projects

This section describes the programmatic assessments conducted for riparian planting projects enrolled in the water quality trading program in 2023. These include a baseline compliance assessment and an evaluation of the use of public conservation funds.

2.2.4.1 Baseline Compliance Assessment

In accordance with Schedule D.13.c.ii. of the Permit, CWS conducts a baseline compliance assessment for each riparian planting project enrolled in the trading program. CWS identifies the regulatory requirements regarding riparian areas that apply at each site and verifies the project is in compliance. CWS then determines the conditions that should be used to determine a baseline for calculating thermal credit.

For riparian planting projects in agricultural areas, local water quality management rules (Oregon Administrative Rules (OAR) Chapter 603, Division 95) developed by the Oregon Department of Agriculture (ODA) were identified as the regulatory requirements that apply. These rules include non-disturbance criteria for streamside riparian areas. The TSWCD, with the support of local partners, implements the Agricultural Water Quality Management Plan as a local management agency for the ODA. Only projects that are in compliance with applicable rules are enrolled into the program, and the TSWCD verifies compliance. For sites deemed to be in compliance, existing vegetation is used to define baseline conditions for determining thermal credit. The seven riparian planting projects located in agricultural areas in 2023 (2420-Balm Grove, 2501-TSWCD-McKay Creek, 2519-TSWCD-Tualatin River, 2520-TSWCD-Tualatin River, 2521-TSWCD-Tualatin River, 2522-TSWCD-Tualatin River, and 2538-TSWCD-West Fork Dairy Creek) were in compliance with the ODA's local water quality management rules. Thus, existing conditions were used as a baseline to determine thermal credit.

For riparian planting projects in urban areas, CWS' Design and Construction Standards (D&C Standards) (adopted in 2019 by CWS Resolution and Order 19-5 and amended by

CWS Resolution and Order 19-22) apply to all active construction sites and to all construction project sites undertaken since the mid-1990s. In 2023, CWS did not enroll any projects for thermal credit in urban areas governed by the D&C Standards.

The cities within CWS' service area and Washington County also have regulations regarding riparian protection in urban natural resource areas. Three projects were implemented that were located within city jurisdictions in 2023. The 2439-Ghost Creek-Sunset Terrace project is in North Plains. The city's regulations regarding riparian protection are voluntary and do not require active riparian planting (City of North Plains Code of Ordinance Title XV, Chapter 155.389). Therefore, existing conditions were used as a baseline to determine thermal credits for the project.

Projects 2375-West Bethany Creek and 2503-Butternut Creek Enhancement at 198th are located outside an urban area, but not where agricultural activities occur. As a result, neither the ODA's local water quality management rules nor CWS' D&C Standards apply. However, these projects are in Washington County, where regulations regarding riparian protection are voluntary and do not require active riparian planting (Washington County Development Code Section 422-1). Therefore, existing conditions were used as a baseline for determining thermal credits.

2.2.4.2 Public Conservation Funds

CWS' TLMP includes a requirement to document the use of public conservation funds (PCFs) for each project in the trading program. PCFs are defined in OAR 340-039-0005(4) as "[p]ublic funds that are targeted to support voluntary natural resource protection or restoration." OAR 340-039-0040(4) states that "[c]redits generated under an approved trading plan may not include water quality benefits obtained with public conservation funds. Where public sources of funding are used for credit-generating activities, it is the entity's responsibility to demonstrate compliance with this requirement in its annual report." Based on the definition of water quality benefits in DEQ's Water Quality Trading Internal Management Directive, credit-generating activities include site preparation, planting, monitoring, and maintenance activities.

CWS works with several partner agencies to implement riparian planting projects. For projects where PCFs are used, CWS uses the approaches described below to demonstrate that the thermal credits being claimed are based on CWS' contribution toward credit-generating activities (e.g., site preparation, planting, monitoring, and maintenance activities).

For projects conducted through the VEGBAC and ECREP programs, PCFs are not used. CWS funds the cost of all credit-generating activities and thus, is eligible for 100% of the thermal credits generated by these projects.

As part of the Capital Program, CWS partners with the co-implementers, Metro, Tualatin Hills Park & Recreation District (THPRD), and other agencies to implement riparian planting projects. For Metro and THPRD projects, CWS has intergovernmental agreements that identify the work performed by each entity at a project site. CWS conducts the credit-generating activities, thus, 100% of the thermal credits generated are

available for CWS' use. For projects where CWS partners with the co-implementers or other agencies such as the U.S. Fish and Wildlife Service, PCFs are not used. CWS funds the cost of all credit-generating activities and is, therefore, eligible for 100% of the thermal credits generated by these projects.

PCFs were not used at any of the riparian projects enrolled in 2023.

3. Calculation of Thermal Loads and Credits for 2023

Schedule B.4.f. of the Permit requires CWS to report the aggregate thermal load to offset and the aggregate thermal credits for the Durham WRRF, Rock Creek WRRF, and Forest Grove WRRF and NTS. As referenced in Table 3 (which is Table B9 in Schedule B.4.f. of the Permit), the "aggregate thermal load to offset" is the combined "excess thermal load to offset" from the Durham WRRF, Rock Creek WRRF, and the Forest Grove WRRF and NTS. The aggregate thermal credit is the combined credits from riparian shade plantings and flow enhancement. The "aggregate thermal load to offset" is the aggregate of the excess thermal load minus the allowable thermal load at each WRRF.

Table 3: Aggregate Thermal Load to Offset and Aggregate Thermal Credits Generated

Item or Parameter	Units	Time Period	Minimum Frequency	Sample Type / Required Action	Report Statistic (See note a.)
Aggregate Thermal Load to Offset	Million kcals/day	July 1 – August 31	1/month	Calculation (See note b.)	Monthly Maximum
Aggregate Thermal Load Credit	Million kcals/day	July 1-August 31	1/month	Calculation (See note c.)	Monthly Maximum

Note:
a. When submitting DMRs electronically, all data used to determine summary statistics must be submitted in a DEQ-approved format as a spreadsheet via electronic reporting unless otherwise directed by DEQ.
b. The aggregate thermal load to offset is the combined thermal load to offset from the Durham and Rock Creek WRRFs and the Forest Grove NTS.
c. The aggregate thermal credit is the combined credits from riparian shade plantings and flow enhancement.

This section presents the aggregate thermal load to offset and the aggregate thermal load credits for the Rock Creek WRRF, Durham WRRF, and Forest Grove WRRF and NTS for 2023.

3.1 Aggregate Thermal Load to Offset

The excess thermal loads discharged from the Rock Creek WRRF, Durham WRRF, and Forest Grove WRRF and NTS are based on daily average effluent temperature and daily average effluent flow conditions for each WRRF for July and August. The period July 1 to August 31 is identified in the Permit as the temperature credit trading period and corresponds to the time of year when river temperatures are of most concern.

The excess thermal loads discharged from each WRRF are calculated daily for July and August using the equation from Schedule A.2 in the Permit:

$$Excess\ Thermal\ Load\ \left(million\frac{kcal}{day}\right) = Q_{PS} \times \Delta T \times \left(\frac{1000}{35.3}\right) x\ 86400\ x\ 5/9$$

where: $\Delta T = T_{PS}\text{-}T_{SP}$ *(degrees F)*

Q_{PS} *= treatment plant effluent flow (cfs)*

T_{PS} *= treatment plant maximum daily effluent temperature (degrees F)*

T_{SP}*=system potential temperature (degrees F)*

(Durham WRRF = 64.6 degrees F, Rock Creek WRRF=58.5 degrees F, Forest Grove WRRF and NTS = 53.1 degrees F)

Other factors: 1000 kg/m^3; 35.3 ft^3/m^3; 86,400 sec/day; (5 degrees C)/(9 degrees F)

The daily average effluent flow and daily maximum effluent temperatures that are used to calculate the excess thermal loads for each WRRF for July and August are presented in Appendix D.

The allowable thermal load, which represents the permitted thermal load, is also calculated for each WRRF for July and August. The aggregate thermal load to offset for the WRRFs is calculated as shown in the following equation:

$$Aggregate\ Thermal\ Load\ to\ Offset = Aggregate\ Excess\ Thermal\ Load - Aggregate\ Allowable\ Thermal\ Load$$

In 2023, the aggregate thermal load to offset from the WRRFs was 1,049 million kcal/day for July and 1,142 million kcal/day for August. The aggregate excess thermal loads, aggregate allowable thermal loads, and aggregate thermal loads to offset the WRRFs for July and August 2023 are presented in Table 4.

Table 4: Aggregate Thermal Load Summary for July and August 2023

Data Aggregate Summary for Rock Creek WRRF, Durham WRRF, and Forest Grove WRRF and NTS	
July 2023	
Aggregate excess thermal load	1,107 million kcal/day
Aggregate allowable thermal load	58 million kcal/day
Aggregate thermal load to offset	1,049 million kcal/day
August 2023	
Aggregate excess thermal load	1,198 million kcal/day
Aggregate allowable thermal load	56 million kcal/day
Aggregate thermal load to offset	1,142 million kcal/day

3.2 Aggregate Thermal Load Credits Generated

This section presents the aggregate thermal load credits generated from flow enhancement and riparian planting for the Durham WRRF, Rock Creek WRRF, and Forest Grove WRRF and NTS for July and August 2023.

3.2.1 Flow Enhancement Credits

Table 5 presents the median flow at the Farmington gauge and the average flow enhancement rate for July and August 2023. Flow enhancement credits are calculated using empirical equations that quantify the temperature benefits of CWS' stored water releases at each facility. The aggregate thermal credits from flow enhancement were 1,269 million kcal/day for July 2023 and 1,276 million kcal/day for August 2023. Thermal credits from flow enhancement in July and August are based on CWS' stored water releases from Hagg Lake and the Wapato instream lease; no thermal credit was taken this year for the stored water releases from Barney Reservoir.

Table 5: Flow Enhancement Information and Aggregate Thermal Credits from Flow Enhancement (July and August 2023)

Flow Enhancement Summary	
July 2023	**Flow rate / credits**
Median Farmington flow	179 cfs
Average flow enhancement rate	47.2 cfs
Aggregate thermal credits from flow enhancement	1,269 million kcal/day
August 2023	**Flow rate / credits**
Median Farmington flow	169 cfs
Average flow enhancement rate	48.9 cfs
Aggregate thermal credits from flow enhancement	1,276 million kcal/day

4. Reconciliation of Thermal Loads and Credits for 2023

Table B1 and Table B9 from Schedule B.4.f. of the Permit require CWS to report the aggregate thermal load to offset and the aggregate thermal credits for the Durham WRRF, Rock Creek WRRF, and Forest Grove WRRF and NTS as part of the July and August DMRs submitted to DEQ. The numbers presented in Table 6 were reported in the July 2023 and August 2023 DMR to show:

- The aggregate excess thermal load.
- The aggregate allowable thermal load.
- The aggregate thermal load to offset from the Rock Creek WRRF, Durham WRRF, and Forest Grove WRRF and NTS.
- The aggregate thermal credits generated with flow enhancement.
- The 614 million kcal/day of aggregate thermal credits generated with riparian plantings for 2004 – 2022.
- The total aggregate thermal load credit.
- The net thermal load to the Tualatin River.

Table 6: Aggregate Thermal Loads and Credits Summary (July and August 2023)

Thermal Loads and Credits: July and August 2023 (in million kcal/day*)								
	Aggregate Excess Thermal Load	Aggregate Allowable Thermal Load	Aggregate Thermal Load to Offset	Aggregate Thermal Credits from Flow Augmentation	Aggregate Thermal Credits from Riparian Shade		Aggregate Thermal Load Credit	Net Thermal Load (to Tualatin River)
					Generated Before Reporting Period	Generated During Reporting Period		
Jul	969	57	911	1,207	614	0	1,884	0
Aug	1,078	56	1,022	1,275	614	0	1,889	0

* Thermal loads and credits are reported in the July and August DMRs only

** In accordance with Schedule A.2, compliance with the thermal load limits is demonstrated by generating thermal credits that meet or exceed the Aggregate Thermal Load to Offset discharged from the Durham, Rock Creek, and Forest Grove water resource recovery facilities. The term "Net Thermal Load to Tualatin River" is the "Aggregate Thermal Load to Offset" minus the "Aggregate Thermal Load Credit." Compliance with the thermal load limits is achieved if the "Net Thermal Load to Tualatin River" is zero.

This table shows that CWS continues to offset the excess thermal loads from the Rock Creek WRRF, Durham WRRF, and Forest Grove WRRF and NTS using credits generated from flow enhancement and riparian shade planting activities as demonstrated by a zero net thermal load to the Tualatin River.

CWS generated significantly more thermal credits with its water quality trading program than needed to offset thermal loads from the WRRFs. In 2023, CWS generated 910 million kcal/day and 867 million kcal/day of extra thermal credits in July and August, respectively.

5. Riparian Planting Credits Available for 2024

As specified in Schedule D.13.g. of the Permit, this report must include, at a minimum, the project name, project number, stream length planted, thermal load blocked, and thermal credits generated for each new riparian shade project completed within the calendar year.

Table 7 presents this information for the riparian planting projects credited in 2023. The table shows the stream miles planted, the thermal load blocked by existing vegetation conditions (baseline), the thermal load blocked by future enhanced vegetation conditions (modeled using a 20-year shade establishment period), and the overall thermal load reduction. Using riparian vegetation codes (Appendix E) and stream characteristic information as inputs, the "Shade-a-Lator" component of DEQ's Heat Source temperature model (version 6.0) was used to calculate effective shade and thermal load blocked with baseline riparian vegetation conditions, and effective shade and thermal load blocked for the future enhanced vegetation conditions. The difference between the thermal load blocked with enhanced conditions and the thermal load blocked with baseline conditions represents the reduction in thermal load (i.e., environmental benefit) associated with the riparian planting project. CWS' TLMP specifies a 2-to-1 trading ratio for calculating credit for shade (i.e., the thermal credit for shade is equal to 50% of the environmental benefit).

For 2023, CWS generated approximately 8.8 million kcal/day of thermal credit from riparian planting projects.

Table 7: 2023 Riparian Planting Projects and Associated Thermal Credit

Project	CWS Program	Stream Length (feet)	Thermal Load Blocked (Baseline Conditions) (million kcal/day)	Thermal Load Blocked (Enhanced Conditions) (million kcal/day)	Thermal Load Reduction (Environmental Benefits) [a] (million kcal/day)	Thermal Credits Available [b] (million kcal/day)	CWS Thermal Credits [c] (million kcal/day)
2375 - West Bethany Creek	Capital	3,595	0.53	2.46	1.93	0.97	0.97
2420 - Balm Grove	Capital	1,188	3.05	7.27	4.21	2.11	2.11
2439 - Ghost Creek - Sunset Terrace	Capital	500	0.004	0.98	0.98	0.49	0.49
2501 - TSWCD - McKay Creek	VEGBAC	2,865	13.67	15.16	1.49	0.74	0.74
2503 - Butternut Creek Enhancement at 198th	Capital	1,157	1.44	5.11	3.67	1.83	1.83
2519 - TSWCD - Tualatin River	VEGBAC	400	3.55	3.61	0.06	0.03	0.03
2520 - TSWCD - Tualatin River	VEGBAC	791	6.84	7.01	0.17	0.08	0.08
2521 - TSWCD - Tualatin River	VEGBAC	1,900	13.99	14.52	0.53	0.26	0.26
2522 - TSWCD - Tualatin River	VEGBAC	2,380	16.67	20.01	3.34	1.67	1.67
2538 - TSWCD - West Fork Dairy Creek	VEGBAC	900	0.63	1.84	1.21	0.61	0.61

a) The “Thermal Load Reduction” represents the thermal load blocked by enhanced conditions minus the thermal load blocked by baseline conditions.

b) Using CWS' 2-to-1 trading ratio, the “Thermal Credits Available” represent 50% of the “Thermal Load Reduction.” Note there are minor differences in the calculation of thermal credits due to rounding associated with the application of the trading ratio.

c) “CWS Thermal Credits” represents the thermal credit claimed by CWS based on its contribution to credit-generating activities. Public conservation funds were not used at any of the riparian projects enrolled in 2023, so CWS is eligible for 100% of the thermal credits generated by these projects.

As of 2023, CWS has 209 riparian shade projects enrolled in the water quality trading program, which has resulted in 618 million kcal/day of riparian shade credit and the restoration of nearly 100 stream miles of riparian vegetation. Appendix B presents a summary of the riparian shade projects including project name, credit year, project characteristics (average wetted width and stream length), and the thermal credit claimed by CWS. CWS takes thermal credits for those projects for which a valid contract or agreement is in place. For projects that are between landowner contracts, CWS conducts routine shade monitoring using LiDAR and aerial imagery and takes thermal credits if they are providing the expected canopy cover. All projects identified in Appendix B, Table B, as being "active" are enrolled in CWS' water quality trading program.

Five projects were removed from the water quality trading calculation portfolio in 2019 because the landowners opted not to renew their contracts or agreements. In 2023, CWS added these projects back into its calculation portfolio and conducts routine shade monitoring using LiDAR and aerial imagery. CWS reviewed the 2019 LiDAR and aerial imagery data for these projects to ensure they were continuing to function as intended before re-enrolling them into the water quality trading shade portfolio. Should the projects provide less than the anticipated shade and require onsite work, and a landowner agreement or contract is not in place, the project will be removed from the program until a landowner contract or agreement is renewed.

In 2024, CWS voluntarily removed one of the five projects, Project 1910-TSWCD-Tualatin River, from its portfolio of riparian shade projects because it is no longer providing the anticipated shade and requires onsite work, and a landowner agreement or contract is not in place. The 618 million kcal/day of riparian shade credit reflects the removal of this project and its associated credits from CWS' portfolio. If the landowner contract or agreement is renewed at this project site in the future, the project will be added back into CWS' portfolio of riparian shade projects. CWS will review the project to ensure it is continuing to function as intended before re-enrolling it into CWS' water quality credit trading program.

CWS' 618 million kcal/day of riparian shade credit includes the addition of the approximately 8.8 million kcal/day of riparian shade credits that were generated by the 10 riparian shade projects enrolled in the program in 2023. The 618 million kcal/day of riparian shade credit will be available for use in 2024 and will be reported in the July and August 2024 DMRs for the Rock Creek, Durham, and Forest Grove WRRFs.

6. Adaptive Management

In its February 6, 2019, policy memorandum on water quality trading, the Environmental Protection Agency noted that adaptive management is a key principle of a water quality trading program. CWS implements an adaptive management program to assess effectiveness and to improve its water quality trading program. Project-specific adaptive management strategies are discussed in the Shade Monitoring section above. Additionally, CWS reviews its TLMP to ensure it reflects current implementation strategies; any updates to the TLMP are included in the annual report. There were no other adaptive management changes implemented in 2023.

An updated TLMP was submitted to DEQ as an addendum to the Permit renewal application in July 2021. The updated plan incorporated the adaptive management changes to the TLMP that CWS had made during the 2016 Permit cycle. The updated TLMP was approved by DEQ with the reissuance of the Permit in December 2022.

7. Environmental Benefits

CWS' water quality credit trading program provides numerous benefits beyond temperature benefits. Ecosystem benefits include improved stream functions (e.g., floodplain roughness, bank stabilization, peak flow attenuation, habitat creation), increased diversity of aquatic and terrestrial plant and animal species, filtering of stormwater runoff, and improved water quality. The increased complexity of structure and diversity of restored riparian forests, forested wetlands, and scrub-shrub wetlands support many important ecosystem functions for the aquatic environment. One example is the colonization of some stream reaches by beavers, a keystone species for stream function in the watershed. By raising the water table, beavers promote floodplain wetlands with enhanced plant, animal, and geomorphic diversity in comparison to the original simplified stream channel. These features, and the resulting geomorphic complexity, enhance fish habitat quality and create off-channel habitats that may provide cold water refuges. CWS works with multiple partners to enhance riparian areas, which improves the overall health of the Tualatin River Watershed and improves water quality.

CWS has quantified the water quality benefits associated with sediment and nutrient reduction from the riparian planting program. The 209 riparian planting projects enrolled in CWS' water quality trading program are estimated to remove approximately 1,343,000 pounds of sediment, 10,500 pounds of total nitrogen, and 18,400 pounds of phosphorus each year that would otherwise be released to streams in the Tualatin Basin. These estimated load reductions are based on a 2014 study on nutrient and sediment removal rates for stream restoration projects in the Chesapeake Bay[1]. The Chesapeake Bay study provides a wide range of sediment and nutrient removal reduction for stream restoration projects.

CWS' release of stored water flow enhancement provides cooling effects, buffers against temperature changes, and results in higher dissolved oxygen levels and improved overall water quality to support aquatic life. CWS' releases of stored water also sustain base flows in the upper Tualatin River that otherwise would not exist. The release of stored water and the release of highly treated discharges from CWS' Rock Creek WRRF, Durham WRRF, and Forest Grove WRRF and NTS provide a sustainable base flow to the mainstem Tualatin River during the dry season.

[1] Schueler, T., Stack, B. 2013. Recommendations of the Expert Panel to Define Removal Rates for Individual Stream Restoration Projects. Chesapeake Stormwater Network and Center for Watershed Protection, Ellicott City, MD. Pages 1-131 available at: http://www.chesapeakebay.net/documents/Final_CBP_Approved_Stream_Restoration_Panel_report_LONG_with_appendices_A-G_02062014.pdf

8. Appendices

Appendix A: Project Summaries for Riparian Planting Projects Credited in 2023

Appendix B: Riparian Shade Planting Projects (2004-2023)

Appendix C: Additional Management Actions

Appendix D: Identification of Trading Baselines for Flow Enhancement

Appendix E: Riparian Codes for Shade-a-Lator

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Appendix A

Project Summaries for Riparian Planting Projects Credited in 2023

2375: West Bethany Creek

Project Summary

Project ID	Acres
2375	26.39
Location	
Private and public, urban property in Washington County, bisected by West Bethany Creek, located just north of NW Springville Road.	
Program	
Capital	
Lat/Long	**Number of Plants Installed**
45.56, -122.83	83,954
Stream Length	**Average Stream Width**
3,595 feet	2.3 feet
Initial Planting Year/Credit Year	**CWS Thermal Benefits/Credits**
2018/2023	0.97 million kcal/day
Plant Communities	
Riparian Forest, Scrub Shrub, and Emergent Marsh (refer to the Site Assessment Report for additional information)	
Partners	
Homeowner's Associations and Private Landowners	
Riparian Planting Activities	
Site preparation, targeted invasive species treatment, riparian planting	
Instream Enhancement Activities	
Stream stabilization and regrading stream bed	

Project Number: 2375	Project Name: West Bethany Creek		
Project Acres: 26.39	Initial Planting Year: 2018	Initial Credit Year: 2023	Length of Stream: 3,595 ft

Summary of Current Conditions by Plant Community Type

* denotes species that are considered diverse

Plant Community: Riparian Forest

Stems per Acre: 2,967 — Phase: Implementation

Native Tree	Native Shrub	Native Herbaceous	Invasives
bigleaf maple	beaked hazelnut	Blue Wildrye	Canada thistle
black cottonwood	black twinberry	cleavers	common hawthorn
Douglas-fir	clustered wild rose	Columbia brome	common velvetgrass
grand fir	Douglas' spirea	common beggarticks	Himalayan blackberry
Oregon ash	dune willow	common cattail	reed canary grass
*Oregon oak	*nootka rose	fowl bluegrass	tansy ragwort
pacific crab apple	Pacific ninebark	fringecup	
red alder	Pacific Willow	*giant horsetail	
vine maple	red flowering currant	Pacific rush	
	red-osier dogwood	riverbank lupine	
	serviceberry	seep monkeyflower	
	*snowberry	slender rush	
	*trailing blackberry	slough sedge	
		small duckweed	
		small-fruited bulrush	
		soft rush	
		western swordfern	
		willowherb	
		yellow touch-me-not	

Plant Community: Upland Forest

Stems per Acre: 3,100 — Phase: Implementation

Native Tree	Native Shrub	Native Herbaceous	Invasives
bigleaf maple	*beaked hazelnut	Alaska oniongrass	bull thistle
bitter cherry	*nootka rose	American trailplant	Canada thistle
*Douglas-fir	osoberry, indian plum	*bracken fern	common hawthorn
grand fir	snowberry	cleavers	common velvetgrass
Oregon ash	*trailing blackberry	common sweet cicely	Himalayan blackberry
		drops-of-gold	reed canary grass
		fowl bluegrass	St. John's wort
		western swordfern	tansy ragwort

Management Actions

Completed: 2023	Recommended: 2024
☑ Interplant	☑ Interplant
☑ Invasive weed treatment	☐ Invasive weed treatment
☑ Seeding	☐ Seeding
☐ Herbivore Control	☐ Herbivore Control
☐ Other	☐ Other
☑ Monitoring for Adaptive Management	☑ Monitoring for Adaptive Management

Thermal Credit for Shade Enhancement

Project	CWS Program	Stream Length (ft)	Thermal Load Blocked (Baseline Conditions) (million kcal/day)	Thermal Load Blocked (Enhanced Conditions) (million kcal/day)	Thermal Load Reduction (Environmental Benefits) (million kcal/day)	Thermal Credits Available (million kcal/day)	CWS Thermal Credits (million kcal/day)
2375 - West Bethany Creek	Capital	3,595	0.53	2.46	1.93	0.97	0.97

Shade-a-Lator Input and Output Spreadsheets
Baseline Shade Conditions

	SHADE & HEAT		STREAM INFORMATION					RIPARIAN CODES -- LEFT BANK-- code only vegetation that CWS is responsible for									RIPARIAN CODES -- RIGHT BANK-- code only vegetation that CWS is responsible for								
PROJECT	Effective Shade (%)	Thermal Load Blocked (kcal/d)	Segment Length (ft)	Orientation (0 deg=N)	Wetted Width (ft)	NSDZ Width (ft)	Channel Incision (ft)	LB 0-15 ft	LB 15-30 ft	LB 30-45ft	LB 45-60 ft	LB 60-75 ft	LB 75-90 ft	LB 90-105 ft	LB 105-120 ft	LB 120-135 ft	RB 0-15 ft	RB 15-30 ft	RB 30-45ft	RB 45-60 ft	RB 60-75 ft	RB 75-90 ft	RB 90-105 ft	RB 105-120 ft	RB 120-135 ft
2375 - West Bethany Creek	0.0%	0.0E+00	100	249	2.3	3.6	1.6	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	1000	1000	1000	1000	1000	1000	1000
2375 - West Bethany Creek	0.0%	0.0E+00	100	269	2.3	3.6	1.6	1100	1100	1100	1100	1100	1100	1000	1000	1000	1100	1100	1100	1000	1000	1000	1000	1000	1000
2375 - West Bethany Creek	0.0%	0.0E+00	100	285	2.3	3.6	1.6	1100	1100	1100	1100	1100	1100	1000	1000	1000	1100	1100	1100	1000	1000	1000	1000	1000	1000
2375 - West Bethany Creek	0.0%	0.0E+00	100	276	2.3	3.6	1.6	1100	1100	1100	1100	1150	1175	1175	1175	1175	1100	1100	1100	1100	1000	1000	1000	1000	1000
2375 - West Bethany Creek	0.4%	4.2E+02	100	247	2.3	3.6	1.6	1100	1100	1100	1100	1100	1125	1125	1125	1150	1100	1100	1100	1100	1000	1000	1000	1000	1000
2375 - West Bethany Creek	0.5%	5.7E+02	100	242	2.3	3.6	1.6	1000	1300	1300	1300	1300	1300	1300	1300	1300	1000	1000	1300	1300	1325	1325	1000	1000	1000
2375 - West Bethany Creek	0.9%	9.9E+02	100	243	2.3	3.6	1.6	1000	1300	1300	1300	1300	1300	1300	1300	1300	1000	1000	1300	1300	1325	1350	1375	1375	1375
2375 - West Bethany Creek	0.1%	9.7E+01	100	239	2.3	3.6	1.6	1000	1300	1300	1300	1300	1300	1300	1100	1125	1000	1000	1300	1300	1300	1300	1300	1300	1300
2375 - West Bethany Creek	1.5%	1.6E+03	100	230	2.3	3.6	1.6	1000	1300	1300	1300	1300	1300	1125	1150	1150	1000	1000	1300	1300	1300	1300	1300	1300	1000
2375 - West Bethany Creek	6.9%	7.6E+03	100	243	2.3	3.6	1.6	1000	1300	1125	1125	1150	1125	1150	1150	1125	1000	1000	1300	1300	1300	1000	1000	1000	1000
2375 - West Bethany Creek	2.5%	2.8E+03	100	244	2.3	3.6	1.6	1000	1300	1325	1150	1150	1150	1150	1100	1100	1000	1000	1300	1300	1000	1000	1000	1000	1000
2375 - West Bethany Creek	5.2%	5.7E+03	100	237	2.3	3.6	1.6	1000	1325	1325	1300	1300	1300	1300	1300	1300	1000	1000	1300	1000	1000	1000	1000	1000	1000
2375 - West Bethany Creek	2.9%	3.2E+03	100	239	2.3	3.6	1.6	1300	1300	1300	1300	1300	1300	1300	1300	1300	1000	1325	1300	1300	1300	1300	1000	1000	1000
2375 - West Bethany Creek	0.0%	0.0E+00	100	246	2.3	3.6	1.6	1300	1300	1300	1300	1300	1300	1300	1300	1300	1000	1300	1300	1300	1000	1000	1000	1000	1000
2375 - West Bethany Creek	0.0%	0.0E+00	100	253	2.3	3.6	1.6	1000	1300	1300	1300	1300	1300	1300	1300	1300	1000	1300	1300	1000	1000	1000	1000	1000	1000
2375 - West Bethany Creek	0.0%	0.0E+00	100	248	2.3	3.6	1.6	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	1000	1000	1000	1000	1000	1000	1000
2375 - West Bethany Creek	51.1%	5.6E+04	100	262	2.3	3.6	1.6	1125	1125	1100	1100	1100	1100	1100	1100	1100	1150	1125	1100	1100	1400	1400	1400	1400	1400
2375 - West Bethany Creek	70.7%	7.8E+04	100	243	2.3	3.6	1.6	1150	1125	1100	1100	1100	1000	1000	1000	1000	1150	1175	1175	1150	1125	1125	1100	1125	1125
2375 - West Bethany Creek	14.2%	1.6E+04	100	251	2.3	3.6	1.6	1100	1100	1100	1100	1100	1000	1000	1000	1000	1125	1125	1175	1175	1175	1175	1175	1175	1175
2375 - West Bethany Creek	16.8%	1.8E+04	100	251	2.3	3.6	1.6	1100	1100	1100	1100	1100	1000	1000	1000	1000	1175	1175	1175	1175	1125	1125	1125	1100	1100
2375 - West Bethany Creek	14.3%	1.6E+04	100	253	2.3	3.6	1.6	1100	1100	1100	1100	1100	1000	1000	1000	1000	1150	1150	1175	1150	1100	1100	1100	1000	1000
2375 - West Bethany Creek	62.4%	6.8E+04	100	244	2.3	3.6	1.6	1150	1100	1100	1100	1100	1100	1100	1000	1000	1150	1125	1125	1100	1100	1000	1000	1000	1000
2375 - West Bethany Creek	31.9%	3.5E+04	100	264	2.3	3.6	1.6	1100	1150	1150	1100	1100	1100	1000	1000	1000	1100	1100	1100	1100	1000	1000	1000	1000	1000
2375 - West Bethany Creek	2.0%	2.2E+03	100	254	2.3	3.6	1.6	1000	1000	1125	1100	1100	1100	1100	1000	1000	1000	1000	1100	1100	1100	1100	1100	1100	1400
2375 - West Bethany Creek	6.9%	7.5E+03	100	254	2.3	3.6	1.6	1000	1000	1175	1125	1100	1100	1100	1100	1000	1000	1000	1000	1100	1100	1100	1100	1100	1400
2375 - West Bethany Creek	21.4%	2.3E+04	100	238	2.3	3.6	1.6	1000	1000	1175	1175	1150	1100	1100	1100	1100	1000	1000	1000	1000	1100	1100	1100	1400	1400
2375 - West Bethany Creek	2.8%	3.0E+03	100	258	2.3	3.6	1.6	1000	1000	1150	1125	1100	1100	1100	1100	1100	1000	1000	1000	1100	1100	1100	1400	1400	1400
2375 - West Bethany Creek	4.7%	5.2E+03	100	251	2.3	3.6	1.6	1000	1000	1125	1100	1100	1100	1100	1100	1100	1000	1000	1000	1000	1100	1100	1400	1400	1400
2375 - West Bethany Creek	3.4%	3.8E+03	100	259	2.3	3.6	1.6	1000	1000	1175	1125	1100	1100	1100	1100	1100	1000	1000	1000	1100	1400	1400	1400	1400	1400
2375 - West Bethany Creek	54.9%	6.0E+04	100	233	2.3	3.6	1.6	1325	1325	1375	1325	1300	1300	1300	1300	1300	1325	1300	1300	1300	1300	1300	1100	1100	1100
2375 - West Bethany Creek	0.0%	0.0E+00	95	173	2.3	3.6	1.6	1300	1300	1300	1300	1300	1300	1000	1000	1000	1300	1300	1300	1000	1000	1000	1000	1000	1000
2375 - West Bethany Creek	0.9%	9.9E+02	100	190	2.3	3.6	1.6	1300	1300	1300	1300	1300	1300	1300	1300	1000	1300	1300	1300	1325	1300	1300	1300	1300	1000
2375 - West Bethany Creek	42.9%	4.7E+04	100	203	2.3	3.6	1.6	1325	1300	1300	1300	1300	1300	1300	1000	1000	1325	1300	1300	1300	1300	1300	1000	1000	1000
2375 - West Bethany Creek	46.4%	5.1E+04	100	211	2.3	3.6	1.6	1325	1300	1300	1300	1300	1300	1300	1000	1000	1325	1300	1300	1300	1300	1000	1000	1000	1000
2375 - West Bethany Creek	0.2%	2.0E+02	100	234	2.3	3.6	1.6	1300	1300	1300	1325	1300	1300	1300	1300	1000	1300	1300	1300	1300	1300	1100	1100	1100	1100
2375 - West Bethany Creek	10.1%	1.1E+04	100	235	2.3	3.6	1.6	1300	1325	1350	1350	1325	1300	1300	1325	1000	1300	1325	1325	1300	1300	1300	1300	1100	1100

Enhanced Shade Conditions

	SHADE & HEAT		STREAM INFORMATION					RIPARIAN CODES -- LEFT BANK-- *code only vegetation that CWS is responsible for*									RIPARIAN CODES -- RIGHT BANK-- *code only vegetation that CWS is responsible for*								
PROJECT	Effective Shade (%)	Thermal Load Blocked (kcal/d)	Segment Length (ft)	Orientation (0 deg=N)	Wetted Width (ft)	NSDZ Width (ft)	Channel Incision (ft)	LB 0-15 ft	LB 15-30 ft	LB 30-45ft	LB 45-60 ft	LB 60-75 ft	LB 75-90 ft	LB 90-105 ft	LB 105-120 ft	LB 120-135 ft	RB 0-15 ft	RB 15-30 ft	RB 30-45ft	RB 45-60 ft	RB 60-75 ft	RB 75-90 ft	RB 90-105 ft	RB 105-120 ft	RB 120-135 ft
2375 - West Bethany Creek	92.6%	1.0E+05	100	249	2.3	3.6	1.6	1375	1375	1375	1375	1375	1375	1375	1375	1375	1375	1375	1000	1000	1000	1000	1000	1000	1000
2375 - West Bethany Creek	95.2%	1.0E+05	100	269	2.3	3.6	1.6	1175	1175	1175	1175	1175	1175	1000	1000	1000	1175	1175	1175	1000	1000	1000	1000	1000	1000
2375 - West Bethany Creek	92.6%	1.0E+05	100	285	2.3	3.6	1.6	1175	1175	1175	1175	1175	1175	1000	1000	1000	1175	1175	1175	1000	1000	1000	1000	1000	1000
2375 - West Bethany Creek	92.8%	1.0E+05	100	276	2.3	3.6	1.6	1175	1175	1175	1175	1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000
2375 - West Bethany Creek	93.9%	1.0E+05	100	247	2.3	3.6	1.6	1175	1175	1175	1175	1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000
2375 - West Bethany Creek	8.2%	9.0E+03	100	242	2.3	3.6	1.6	1000	1375	1375	1375	1375	1375	1375	1375	1375	1000	1000	1375	1375	1375	1375	1000	1000	1000
2375 - West Bethany Creek	7.6%	8.3E+03	100	243	2.3	3.6	1.6	1000	1375	1375	1375	1375	1375	1375	1375	1375	1000	1000	1375	1375	1375	1375	1375	1375	1375
2375 - West Bethany Creek	13.2%	1.4E+04	100	239	2.3	3.6	1.6	1000	1375	1375	1375	1375	1375	1375	1175	1175	1000	1000	1375	1375	1375	1375	1375	1375	1375
2375 - West Bethany Creek	19.5%	2.1E+04	100	230	2.3	3.6	1.6	1000	1375	1375	1375	1375	1375	1175	1175	1175	1000	1000	1375	1375	1375	1375	1375	1375	1000
2375 - West Bethany Creek	23.8%	2.6E+04	100	243	2.3	3.6	1.6	1000	1375	1175	1175	1175	1175	1175	1175	1175	1000	1000	1375	1375	1375	1000	1000	1000	1000
2375 - West Bethany Creek	7.7%	8.5E+03	100	244	2.3	3.6	1.6	1000	1375	1375	1175	1175	1175	1175	1175	1175	1000	1000	1375	1375	1000	1000	1000	1000	1000
2375 - West Bethany Creek	14.5%	1.6E+04	100	237	2.3	3.6	1.6	1000	1375	1375	1375	1375	1375	1375	1375	1375	1000	1000	1375	1000	1000	1000	1000	1000	1000
2375 - West Bethany Creek	78.2%	8.6E+04	100	239	2.3	3.6	1.6	1375	1375	1375	1375	1375	1375	1375	1375	1375	1000	1375	1375	1375	1375	1375	1000	1000	1000
2375 - West Bethany Creek	79.8%	8.8E+04	100	246	2.3	3.6	1.6	1375	1375	1375	1375	1375	1375	1375	1375	1375	1000	1375	1375	1375	1000	1000	1000	1000	1000
2375 - West Bethany Creek	7.8%	8.5E+03	100	253	2.3	3.6	1.6	1000	1375	1375	1375	1375	1375	1375	1375	1375	1000	1375	1375	1000	1000	1000	1000	1000	1000
2375 - West Bethany Creek	89.8%	1.5E+05	100	248	3.6	3.6	1.6	1375	1375	1375	1375	1375	1375	1375	1375	1375	1375	1375	1000	1000	1000	1000	1000	1000	1000
2375 - West Bethany Creek	94.1%	1.0E+05	100	262	2.3	3.6	1.6	1175	1175	1175	1175	1175	1175	1175	1175	1175	1175	1175	1175	1175	1475	1475	1475	1475	1475
2375 - West Bethany Creek	94.0%	1.0E+05	100	243	2.3	3.6	1.6	1175	1175	1175	1175	1175	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2375 - West Bethany Creek	94.2%	1.0E+05	100	251	2.3	3.6	1.6	1175	1175	1175	1175	1175	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2375 - West Bethany Creek	94.2%	1.0E+05	100	251	2.3	3.6	1.6	1175	1175	1175	1175	1175	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2375 - West Bethany Creek	93.9%	1.0E+05	100	253	2.3	3.6	1.6	1175	1175	1175	1175	1175	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1000	1000
2375 - West Bethany Creek	93.9%	1.0E+05	100	244	2.3	3.6	1.6	1175	1175	1175	1175	1175	1175	1175	1000	1000	1175	1175	1175	1175	1175	1000	1000	1000	1000
2375 - West Bethany Creek	94.4%	1.0E+05	100	264	2.3	3.6	1.6	1175	1175	1175	1175	1175	1175	1000	1000	1000	1175	1175	1175	1175	1000	1000	1000	1000	1000
2375 - West Bethany Creek	13.5%	1.5E+04	100	254	2.3	3.6	1.6	1000	1000	1175	1175	1175	1175	1175	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1475
2375 - West Bethany Creek	11.9%	1.3E+04	100	254	2.3	3.6	1.6	1000	1000	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1175	1175	1175	1175	1175	1475
2375 - West Bethany Creek	26.4%	2.9E+04	100	238	2.3	3.6	1.6	1000	1000	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1175	1175	1175	1475	1475
2375 - West Bethany Creek	7.7%	8.5E+03	100	258	2.3	3.6	1.6	1000	1000	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1175	1175	1175	1475	1475	1475
2375 - West Bethany Creek	20.1%	2.2E+04	100	251	2.3	3.6	1.6	1000	1000	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1175	1175	1475	1475	1475
2375 - West Bethany Creek	6.2%	6.8E+03	100	259	2.3	3.6	1.6	1000	1000	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1175	1475	1475	1475	1475	1475
2375 - West Bethany Creek	91.8%	1.0E+05	100	233	2.3	3.6	1.6	1375	1375	1375	1375	1375	1375	1375	1375	1375	1375	1375	1375	1375	1375	1375	1175	1175	1175
2375 - West Bethany Creek	94.9%	9.9E+04	95	173	2.3	3.6	1.6	1375	1375	1375	1375	1375	1375	1000	1000	1000	1375	1375	1375	1000	1000	1000	1000	1000	1000
2375 - West Bethany Creek	86.9%	9.5E+04	100	190	2.3	3.6	1.6	1375	1375	1375	1375	1375	1375	1375	1375	1000	1375	1375	1375	1375	1375	1375	1375	1375	1000
2375 - West Bethany Creek	86.4%	9.5E+04	100	203	2.3	3.6	1.6	1375	1375	1375	1375	1375	1375	1375	1000	1000	1375	1375	1375	1375	1375	1375	1000	1000	1000
2375 - West Bethany Creek	89.2%	9.8E+04	100	211	2.3	3.6	1.6	1375	1375	1375	1375	1375	1375	1375	1000	1000	1375	1375	1375	1375	1375	1000	1000	1000	1000
2375 - West Bethany Creek	92.0%	1.0E+05	100	234	2.3	3.6	1.6	1375	1375	1375	1375	1375	1375	1375	1375	1000	1375	1375	1375	1375	1375	1175	1175	1175	1175
2375 - West Bethany Creek	92.0%	1.0E+05	100	235	2.3	3.6	1.6	1375	1375	1375	1375	1375	1375	1375	1375	1000	1375	1375	1375	1375	1375	1375	1375	1175	1175

2420: Balm Grove

Project Summary

Project ID	Acres
2420	11.02
Location	
Private, rural property in Washington County, directly adjacent to Gales Creek, located east of NW Gales Creek Road.	
Program	
Capital	
Lat/Long	**Number of Plants Installed**
45.59, -123.21	829
Stream Length	**Average Stream Width**
1,188 feet	28.3 feet
Initial Planting Year/Credit Year	**CWS Thermal Benefits/Credits**
2020/2023	2.11 million kcal/day
Plant Communities	
Riparian Forest (refer to the Site Assessment Report for additional information)	
Partners	
None	
Riparian Planting Activities	
Site preparation, targeted invasive species treatment, riparian plantings	
Instream Enhancement Activities	
Channel realignment, large woody structures installed, dam removed	

Project Number: 2420	Project Name: Balm Grove		
Project Acres: 11.02	Initial Planting Year: 2020	Initial Credit Year: 2023	Length of Stream: 1,188 ft

Summary of Current Conditions by Plant Community Type

* denotes species that are considered diverse

Plant Community: Riparian Forest

Stems per Acre: 244 — Phase: Implementation

Native Tree	Native Shrub	Native Herbaceous	Invasives
bigleaf maple	black twinberry	horseweed	bull thistle
*red alder		neckweed	Canada thistle
		*slender hairgrass	common velvetgrass
		spike bentgrass	perennial pea
		teal lovegrass	reed canary grass
		water foxtail	tansy ragwort
		western dock	
		western pearly everlasting	
		willowherb	
		witchgrass	

Management Actions

Completed: 2023	Recommended: 2024
☐ Interplant	☑ Interplant
☑ Invasive weed treatment	☐ Invasive weed treatment
☑ Seeding	☐ Seeding
☐ Herbivore Control	☐ Herbivore Control
☐ Other	☐ Other
☑ Monitoring for Adaptive Management	☑ Monitoring for Adaptive Management

Thermal Credit for Shade Enhancement

Project	CWS Program	Stream Length (ft)	Thermal Load Blocked (Baseline Conditions) (million kcal/day)	Thermal Load Blocked (Enhanced Conditions) (million kcal/day)	Thermal Load Reduction (Environmental Benefits) (million kcal/day)	Thermal Credits Available (million kcal/day)	CWS Thermal Credits (million kcal/day)
2420 - Balm Grove	Capital	1,188	3.05	7.27	4.21	2.11	2.11

Shade-a-Lator Input and Output Spreadsheets
Baseline Conditions

	SHADE & HEAT		STREAM INFORMATION					RIPARIAN CODES -- LEFT BANK-- code only vegetation that CWS is responsible for									RIPARIAN CODES -- RIGHT BANK-- code only vegetation that CWS is responsible for								
PROJECT	Effective Shade (%)	Thermal Load Blocked (kcal/d)	Segment Length (ft)	Orientation (0 deg=N)	Wetted Width (ft)	NSDZ Width (ft)	Channel Incision (ft)	LB 0-15 ft	LB 15-30 ft	LB 30-45ft	LB 45-60 ft	LB 60-75 ft	LB 75-90 ft	LB 90-105 ft	LB 105-120 ft	LB 120-135 ft	RB 0-15 ft	RB 15-30 ft	RB 30-45ft	RB 45-60 ft	RB 60-75 ft	RB 75-90 ft	RB 90-105 ft	RB 105-120 ft	RB 120-135 ft
2420 - Balm Grove	27.0%	3.7E+05	100	177.0	28.3	40.7	1.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1150	1150	1125	1125	1125	1125	1125	1125	1125
2420 - Balm Grove	25.2%	3.0E+05	88	144.0	28.3	40.7	1.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1125	1125	1175	1175	1175	1175	1000	1000	1000
2420 - Balm Grove	11.3%	1.5E+05	100	154.0	28.3	40.7	1.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1100	1100	1150	1175	1175	1175	1175	1150	1125
2420 - Balm Grove	9.8%	1.3E+05	100	152.0	28.3	40.7	1.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1100	1100	1125	1175	1175	1175	1175	1175	1175
2420 - Balm Grove	15.2%	2.1E+05	100	149.0	28.3	40.7	1.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1100	1125	1175	1175	1175	1150	1150	1150	1175
2420 - Balm Grove	17.1%	2.3E+05	100	136.0	28.3	40.7	1.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1125	1125	1100	1100	1100	1100	1100	1100	1100
2420 - Balm Grove	18.5%	2.5E+05	100	145.0	28.3	40.7	1.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1125	1100	1125	1150	1150	1150	1150	1125	1150
2420 - Balm Grove	9.0%	1.2E+05	100	151.0	28.3	40.7	1.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1100	1125	1150	1125	1125	1100	1100	1100	1100
2420 - Balm Grove	26.5%	3.6E+05	100	158.0	28.3	40.7	1.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1150	1125	1100	1100	1100	1100	1125	1125	1125
2420 - Balm Grove	1.3%	1.8E+04	100	163.0	28.3	40.7	1.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1100	1100	1100	1100	1100	1100	1125	1125	1150
2420 - Balm Grove	29.8%	4.1E+05	100	155.0	28.3	40.7	1.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1150	1150	1125	1100	1100	1100	1100	1100	1100
2420 - Balm Grove	37.0%	5.0E+05	100	168.0	28.3	40.7	1.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1150	1150	1100	1100	1100	1100	1100	1100

Enhanced Shade Conditions

	SHADE & HEAT		STREAM INFORMATION					RIPARIAN CODES -- LEFT BANK-- *code only vegetation that CWS is responsible for*									RIPARIAN CODES -- RIGHT BANK-- *code only vegetation that CWS is responsible for*								
PROJECT	Effective Shade (%)	Thermal Load Blocked (kcal/d)	Segment Length (ft)	Orientation (0 deg=N)	Wetted Width (ft)	NSDZ Width (ft)	Channel Incision (ft)	LB 0-15 ft	LB 15-30 ft	LB 30-45ft	LB 45-60 ft	LB 60-75 ft	LB 75-90 ft	LB 90-105 ft	LB 105-120 ft	LB 120-135 ft	RB 0-15 ft	RB 15-30 ft	RB 30-45ft	RB 45-60 ft	RB 60-75 ft	RB 75-90 ft	RB 90-105 ft	RB 105-120 ft	RB 120-135 ft
2420 - Balm Grove	38.5%	5.2E+05	100	177	28.3	40.7	1.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2420 - Balm Grove	47.3%	5.6E+05	88	144	28.3	40.7	1.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1000	1000	1000
2420 - Balm Grove	45.4%	6.2E+05	100	154	28.3	40.7	1.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2420 - Balm Grove	45.8%	6.2E+05	100	152	28.3	40.7	1.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2420 - Balm Grove	46.4%	6.3E+05	100	149	28.3	40.7	1.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2420 - Balm Grove	49.0%	6.7E+05	100	136	28.3	40.7	1.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2420 - Balm Grove	47.1%	6.4E+05	100	145	28.3	40.7	1.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2420 - Balm Grove	46.0%	6.3E+05	100	151	28.3	40.7	1.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2420 - Balm Grove	44.5%	6.1E+05	100	158	28.3	40.7	1.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2420 - Balm Grove	43.2%	5.9E+05	100	163	28.3	40.7	1.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2420 - Balm Grove	45.2%	6.1E+05	100	155	28.3	40.7	1.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2420 - Balm Grove	41.7%	5.7E+05	100	168	28.3	40.7	1.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175

2439: Ghost Creek – Sunset Terrace

Project Summary

Project ID	Acres
2439	4.99
Location	
Private, urban property in North Plains, bisected by McKay Creek, located just north of NW Hornecker Road.	
Program	
Capital	
Lat/Long	**Number of Plants Installed**
45.60, -123.01	1,800
Stream Length	**Average Stream Width**
500 feet	4.6 feet
Initial Planting Year/Credit Year	**CWS Thermal Benefits/Credits**
2020/2023	0.49 million kcal/day
Plant Communities	
Riparian Forest and Scrub Shrub (refer to the Site Assessment Report for additional information)	
Partners	
Homeowner's Association	
Riparian Planting Activities	
Site preparation, targeted invasive species treatment, riparian plantings	
Instream Enhancement Activities	
None	

Project Number: 2439	Project Name: Ghost Creek - Sunset Terrace		
Project Acres: 4.99	Initial Planting Year: 2020	Initial Credit Year: 2023	Length of Stream: 500 ft

Summary of Current Conditions by Plant Community Type

* denotes species that are considered diverse

Plant Community: Riparian Forest

Stems per Acre: 2,600 — Phase: Implementation

Native Tree	Native Shrub	Native Herbaceous	Invasives
cascara	black twinberry	American bird's-foot trefoil	Canada thistle
grand fir	*clustered wild rose	denseflower willowherb	common velvetgrass
Oregon oak	Douglas' spirea	Douglas aster	Himalayan blackberry
red alder	mock orange	grooved rush	reed canary grass
W. v. ponderosa pine	nootka rose	tall annual willowherb	St. John's wort
	Pacific ninebark		
	*snowberry		
	tall Oregon grape		
	thimbleberry		

Plant Community: Scrub-Shrub

Stems per Acre: 3,167 — Phase: Implementation

Native Tree	Native Shrub	Native Herbaceous	Invasives
*Oregon ash	black twinberry	common spikerush	common velvetgrass
	clustered wild rose	cursed buttercup	reed canary grass
	*Douglas' spirea	denseflower willowherb	
	Pacific Willow	lateral sedge	
	red-osier dogwood	marsh seedbox	
		Pacific rush	
		redroot flatsedge	
		simple stem bur-reed	
		slender hairgrass	
		slough sedge	
		*small duckweed	
		small-fruited bulrush	
		softstem bulrush	
		spike bentgrass	
		tall annual willowherb	
		western marsh cudweed	
		willowherb	
		witchgrass	

Management Actions

Completed: 2023	Recommended: 2024
☐ Interplant	☐ Interplant
☐ Invasive weed treatment	☐ Invasive weed treatment
☐ Seeding	☐ Seeding
☐ Herbivore Control	☐ Herbivore Control
☐ Other	☐ Other
☑ Monitoring for Adaptive Management	☑ Monitoring for Adaptive Management

Thermal Credit for Shade Enhancement

Project	CWS Program	Stream Length (ft)	Thermal Load Blocked (Baseline Conditions) (million kcal/day)	Thermal Load Blocked (Enhanced Conditions) (million kcal/day)	Thermal Load Reduction (Environmental Benefits) (million kcal/day)	Thermal Credits Available [b] (million kcal/day)	CWS Thermal Credits (million kcal/day)
2439 - Ghost Creek - Sunset Terrace	Capital	500	0.004	0.98	0.98	0.49	0.49

Shade-a-Lator Input and Output Spreadsheets
Baseline Conditions

	SHADE & HEAT		STREAM INFORMATION					RIPARIAN CODES -- LEFT BANK-- code only vegetation that CWS is responsible for									RIPARIAN CODES -- RIGHT BANK-- code only vegetation that CWS is responsible for								
PROJECT	Effective Shade (%)	Thermal Load Blocked (kcal/d)	Segment Length (ft)	Orientation (0 deg=N)	Wetted Width (ft)	NSDZ Width (ft)	Channel Incision (ft)	LB 0-15 ft	LB 15-30 ft	LB 30-45ft	LB 45-60 ft	LB 60-75 ft	LB 75-90 ft	LB 90-105 ft	LB 105-120 ft	LB 120-135 ft	RB 0-15 ft	RB 15-30 ft	RB 30-45ft	RB 45-60 ft	RB 60-75 ft	RB 75-90 ft	RB 90-105 ft	RB 105-120 ft	RB 120-135 ft
2439 - Ghost Creek-Sunset Terrace	0.0%	9.3E+01	100	138.0	4.7	7.8	1.2	1300	1300	1300	1300	1300	1300	1300	1100	1100	1300	1300	1300	1300	1325	1000	1000	1000	1000
2439 - Ghost Creek-Sunset Terrace	0.0%	0.0E+00	100	140.0	4.7	7.8	1.2	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	1000	1000	1000	1000
2439 - Ghost Creek-Sunset Terrace	0.0%	0.0E+00	100	142.0	4.7	7.8	1.2	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	1100	1100
2439 - Ghost Creek-Sunset Terrace	0.4%	8.2E+02	100	143.0	4.7	7.8	1.2	1300	1300	1300	1300	1300	1300	1300	1300	1100	1300	1300	1300	1300	1300	1300	1350	1125	1100
2439 - Ghost Creek-Sunset Terrace	1.4%	3.2E+03	100	142.0	4.7	7.8	1.2	1300	1300	1300	1300	1300	1300	1300	1300	1100	1300	1300	1300	1300	1300	1350	1150	1125	1100

Enhanced Shade Conditions

	SHADE & HEAT		STREAM INFORMATION					RIPARIAN CODES -- LEFT BANK-- *code only vegetation that CWS is responsible for*									RIPARIAN CODES -- RIGHT BANK-- *code only vegetation that CWS is responsible for*								
PROJECT	Effective Shade (%)	Thermal Load Blocked (kcal/d)	Segment Length (ft)	Orientation (0 deg=N)	Wetted Width (ft)	NSDZ Width (ft)	Channel Incision (ft)	LB 0-15 ft	LB 15-30 ft	LB 30-45ft	LB 45-60 ft	LB 60-75 ft	LB 75-90 ft	LB 90-105 ft	LB 105-120 ft	LB 120-135 ft	RB 0-15 ft	RB 15-30 ft	RB 30-45ft	RB 45-60 ft	RB 60-75 ft	RB 75-90 ft	RB 90-105 ft	RB 105-120 ft	RB 120-135 ft
2439 - Ghost Creek-Sunset Terrace	86.7%	1.9E+05	100	138	4.7	7.8	1.2	1375	1375	1375	1375	1375	1375	1375	1175	1175	1375	1375	1375	1375	1375	1000	1000	1000	1000
2439 - Ghost Creek-Sunset Terrace	87.2%	2.0E+05	100	140	4.7	7.8	1.2	1375	1375	1375	1375	1375	1375	1375	1375	1375	1375	1375	1375	1375	1375	1000	1000	1000	1000
2439 - Ghost Creek-Sunset Terrace	87.8%	2.0E+05	100	142	4.7	7.8	1.2	1375	1375	1375	1375	1375	1375	1375	1375	1375	1375	1375	1375	1375	1375	1375	1375	1175	1175
2439 - Ghost Creek-Sunset Terrace	88.2%	2.0E+05	100	143	4.7	7.8	1.2	1375	1375	1375	1375	1375	1375	1375	1375	1175	1375	1375	1375	1375	1375	1375	1375	1175	1175
2439 - Ghost Creek-Sunset Terrace	87.8%	2.0E+05	100	142	4.7	7.8	1.2	1375	1375	1375	1375	1375	1375	1375	1375	1175	1375	1375	1375	1375	1375	1375	1175	1175	1175

2501: TSWCD - McKay Creek

Project Summary

Project ID	Acres
2501	4.52
Location	
Private, rural property in Washington County, irectly adjacent to McKay Creek, located east of SW Roy Rogers Road.	
Program	
VEGBAC	
Lat/Long	**Number of Plants Installed**
45.55, -122.99	10,000
Stream Length	**Average Stream Width**
2,865 feet	30 feet
Initial Planting Year/Credit Year	**CWS Thermal Benefits/Credits**
2023/2023	0.74 million kcal/day
Plant Communities	
Riparian Forest (refer to the Site Assessment Report for additional information)	
Partners	
Tualatin Soil and Water Conservation District	
Riparian Planting Activities	
Site preparation, targeted invasive species treatment, riparian plantings	
Instream Enhancement Activities	
None	

Project Number: 2501	Project Name: TSWCD - McKay Creek		
Project Acres: 4.52	Initial Planting Year: 2023	Initial Credit Year: 2023	Length of Stream: 2,865 ft

Summary of Current Conditions by Plant Community Type

* denotes species that are considered diverse

Plant Community: Riparian Forest

Stems per Acre: 7,943 — Phase: Establishment

Native Tree	Native Shrub	Native Herbaceous	Invasives
bigleaf maple	*beaked hazelnut	Alaska brome	Canada thistle
bitter cherry	*clustered wild rose	Blue Wildrye	English ivy
cascara	Douglas' spirea	feathery false lily of the valley	Himalayan blackberry
*Oregon ash	native wild rose	fowl bluegrass	reed canary grass
pacific crab apple	oceanspray	fringecup	shiny geranium
	osoberry, indian plum	slender hairgrass	
	Oval-leaved viburnum	taperfruit shortscale sedge	
	*Pacific ninebark	tufted hairgrass	
	Pacific poison oak	western meadow-rue	
	red-osier dogwood	willowherb	
	*serviceberry	woodland strawberry	
	*snowberry	yellow wood violet	
	tall Oregon grape		
	*thimbleberry		
	*trailing blackberry		

Management Actions

Completed: 2023	Recommended: 2024
☑ Interplant	☑ Interplant
☑ Invasive weed treatment	☑ Invasive weed treatment
☑ Seeding	☐ Seeding
☐ Herbivore Control	☐ Herbivore Control
☐ Other	☐ Other
☑ Monitoring for Adaptive Management	☑ Monitoring for Adaptive Management

Thermal Credit for Shade Enhancement

Project	CWS Program	Stream Length (ft)	Thermal Load Blocked (Baseline Conditions) (million kcal/day)	Thermal Load Blocked (Enhanced Conditions) (million kcal/day)	Thermal Load Reduction (Environmental Benefits) [a] (million kcal/day)	Thermal Credits Available (million kcal/day)	CWS Thermal Credits (million kcal/day)
2501 - TSWCD - McKay Creek	VEGBAC	2,865	13.67	15.16	1.49	0.74	0.74

Shade-a-Lator Input and Output Spreadsheets
Baseline Conditions

	SHADE & HEAT		STREAM INFORMATION					RIPARIAN CODES -- LEFT BANK-- code only vegetation that CWS is responsible for									RIPARIAN CODES -- RIGHT BANK-- code only vegetation that CWS is responsible for								
PROJECT	Effective Shade (%)	Thermal Load Blocked (kcal/d)	Segment Length (ft)	Orientation (0 deg=N)	Wetted Width (ft)	NSDZ Width (ft)	Channel Incision (ft)	LB 0-15 ft	LB 15-30 ft	LB 30-45ft	LB 45-60 ft	LB 60-75 ft	LB 75-90 ft	LB 90-105 ft	LB 105-120 ft	LB 120-135 ft	RB 0-15 ft	RB 15-30 ft	RB 30-45ft	RB 45-60 ft	RB 60-75 ft	RB 75-90 ft	RB 90-105 ft	RB 105-120 ft	RB 120-135 ft
2501 - TSWCD - McKay Creek	19.5%	2.8E+05	100	133.0	30.0	40.8	6.8	1175	1175	1150	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	37.4%	3.5E+05	65	217.0	30.0	40.8	6.8	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	25.8%	3.7E+05	100	185.0	30.0	40.8	6.8	1175	1150	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	4.3%	6.3E+04	100	101.0	30.0	40.8	6.8	1150	1150	1100	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	22.5%	3.2E+05	100	141.0	30.0	40.8	6.8	1175	1150	1175	1175	1125	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	27.7%	4.0E+05	100	172.0	30.0	40.8	6.8	1175	1175	1125	1125	1100	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	30.8%	4.4E+05	100	184.0	30.0	40.8	6.8	1175	1175	1150	1175	1150	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	34.6%	5.0E+05	100	204.0	30.0	40.8	6.8	1175	1175	1150	1150	1150	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	0.0%	0.0E+00	100	214.0	30.0	40.8	6.8	1100	1100	1100	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	12.8%	1.8E+05	100	223.0	30.0	40.8	6.8	1125	1100	1100	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	32.2%	4.6E+05	100	196.0	30.0	40.8	6.8	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	31.3%	4.5E+05	100	173.0	30.0	40.8	6.8	1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	34.0%	4.9E+05	100	194.0	30.0	40.8	6.8	1175	1175	1175	1175	1175	1175	1175	1150	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	42.3%	6.1E+05	100	220.0	30.0	40.8	6.8	1175	1175	1175	1175	1175	1175	1150	1150	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	45.1%	6.5E+05	100	227.0	30.0	40.8	6.8	1175	1175	1175	1175	1175	1175	1175	1150	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	50.4%	7.3E+05	100	239.0	30.0	40.8	6.8	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	58.7%	8.5E+05	100	255.0	30.0	40.8	6.8	1175	1175	1175	1175	1175	1175	1150	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	34.5%	5.0E+05	100	356.0	30.0	40.8	6.8	1150	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	20.4%	2.9E+05	100	48.0	30.0	40.8	6.8	1175	1175	1175	1175	1175	1175	1175	1150	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	33.8%	4.9E+05	100	10.0	30.0	40.8	6.8	1175	1175	1175	1175	1175	1175	1150	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	47.4%	6.8E+05	100	324.0	30.0	40.8	6.8	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	53.2%	7.7E+05	100	305.0	30.0	40.8	6.8	1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	53.2%	7.7E+05	100	305.0	30.0	40.8	6.8	1175	1175	1175	1175	1175	1125	1125	1125	1125	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	41.8%	6.0E+05	100	286.0	30.0	40.8	6.8	1150	1150	1125	1125	1100	1100	1100	1100	1100	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	46.9%	6.8E+05	100	234.0	30.0	40.8	6.8	1175	1175	1150	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	29.5%	4.2E+05	100	192.0	30.0	40.8	6.8	1175	1175	1125	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	29.5%	4.2E+05	100	185.0	30.0	40.8	6.8	1175	1175	1150	1125	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	33.9%	4.9E+05	100	209.0	30.0	40.8	6.8	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	29.2%	4.2E+05	100	190.0	30.0	40.8	6.8	1175	1175	1125	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000

Enhanced Shade Conditions

	SHADE & HEAT		STREAM INFORMATION					RIPARIAN CODES -- LEFT BANK-- *code only vegetation that CWS is responsible for*									RIPARIAN CODES -- RIGHT BANK-- *code only vegetation that CWS is responsible for*								
PROJECT	Effective Shade (%)	Thermal Load Blocked (kcal/d)	Segment Length (ft)	Orientation (0 deg=N)	Wetted Width (ft)	NSDZ Width (ft)	Channel Incision (ft)	LB 0-15 ft	LB 15-30 ft	LB 30-45ft	LB 45-60 ft	LB 60-75 ft	LB 75-90 ft	LB 90-105 ft	LB 105-120 ft	LB 120-135 ft	RB 0-15 ft	RB 15-30 ft	RB 30-45ft	RB 45-60 ft	RB 60-75 ft	RB 75-90 ft	RB 90-105 ft	RB 105-120 ft	RB 120-135 ft
2501 - TSWCD - McKay Creek	19.9%	2.9E+05	100	133	30.0	40.8	6.8	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	37.4%	3.5E+05	65	217	30.0	40.8	6.8	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	27.9%	4.0E+05	100	185	30.0	40.8	6.8	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	5.2%	7.5E+04	100	101	30.0	40.8	6.8	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	23.3%	3.4E+05	100	141	30.0	40.8	6.8	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	30.5%	4.4E+05	100	172	30.0	40.8	6.8	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	31.8%	4.6E+05	100	184	30.0	40.8	6.8	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	36.1%	5.2E+05	100	204	30.0	40.8	6.8	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	38.4%	5.5E+05	100	214	30.0	40.8	6.8	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	42.3%	6.1E+05	100	223	30.0	40.8	6.8	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	32.2%	4.6E+05	100	196	30.0	40.8	6.8	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	31.3%	4.5E+05	100	173	30.0	40.8	6.8	1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	34.1%	4.9E+05	100	194	30.0	40.8	6.8	1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	42.3%	6.1E+05	100	220	30.0	40.8	6.8	1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	45.1%	6.5E+05	100	227	30.0	40.8	6.8	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	50.4%	7.3E+05	100	239	30.0	40.8	6.8	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	58.7%	8.5E+05	100	255	30.0	40.8	6.8	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	39.5%	5.7E+05	100	356	30.0	40.8	6.8	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	20.4%	2.9E+05	100	48	30.0	40.8	6.8	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	33.8%	4.9E+05	100	10	30.0	40.8	6.8	1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	47.4%	6.8E+05	100	324	30.0	40.8	6.8	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	53.2%	7.7E+05	100	305	30.0	40.8	6.8	1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	53.2%	7.7E+05	100	305	30.0	40.8	6.8	1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	56.4%	8.1E+05	100	286	30.0	40.8	6.8	1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	47.5%	6.8E+05	100	234	30.0	40.8	6.8	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	31.3%	4.5E+05	100	192	30.0	40.8	6.8	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	31.3%	4.5E+05	100	185	30.0	40.8	6.8	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	33.9%	4.9E+05	100	209	30.0	40.8	6.8	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2501 - TSWCD - McKay Creek	30.9%	4.5E+05	100	190	30.0	40.8	6.8	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000

2503: Butternut Creek at 198th Ave

Project Summary

Project ID	Acres
2503	4.59
Location	
Public, urban property in Washington County, bisected by Butternut Creek, located directly west of 198th Avenue.	
Program	
Capital	
Lat/Long	**Number of Plants Installed**
45.48, -122.88	47,374
Stream Length	**Average Stream Width**
1,157 feet	11.7 feet
Initial Planting Year/Credit Year	**CWS Thermal Benefits/Credits**
2021/2023	1.83 million kcal/day
Plant Communities	
Forested Wetland and Scrub Shrub (refer to the Site Assessment Report for additional information)	
Partners	
City of Hillsboro	
Riparian Planting Activities	
Site preparation, targeted invasive species treatment, riparian plantings	
Instream Enhancement Activities	
None	

Project Number: 2503	Project Name: Butternut Creek Enhancement at 198th		
Project Acres: 4.59	Initial Planting Year: 2021	Initial Credit Year: 2023	Length of Stream: 1,157 ft

Summary of Current Conditions by Plant Community Type

* denotes species that are considered diverse

Plant Community: Forested Wetland

Stems per Acre: 1,333 — Phase: Implementation

Native Tree	Native Shrub	Native Herbaceous	Invasives
bigleaf maple	black twinberry	*cleavers	common hawthorn
black hawthorn	*native wild rose	fowl bluegrass	English ivy
*Oregon ash	Pacific ninebark	fringecup	reed canary grass
	*snowberry	*giant horsetail	
		large camas	
		*slough sedge	
		spike bentgrass	

Plant Community: Scrub-Shrub

Stems per Acre: 1,925 — Phase: Implementation

Native Tree	Native Shrub	Native Herbaceous	Invasives
black cottonwood	black twinberry	common cattail	morning-glory
*Oregon ash	*Douglas' spirea	denseflower willowherb	reed canary grass
pacific crab apple	native wild rose	fleabane	
red alder	osoberry, indian plum	giant horsetail	
western red cedar	Pacific Willow	meadow barley	
	*red-osier dogwood	Pacific rush	
	Scouler's Willow	*rice cutgrass	
	snowberry	slender hairgrass	
	trailing blackberry	slough sedge	
	willow	small-fruited bulrush	
		*spike bentgrass	
		tall annual willowherb	
		*water horsetail	

Management Actions

Completed: 2023	Recommended: 2024
☑ Interplant	☑ Interplant
☑ Invasive weed treatment	☐ Invasive weed treatment
☑ Seeding	☐ Seeding
☐ Herbivore Control	☐ Herbivore Control
☐ Other	☐ Other
☑ Monitoring for Adaptive Management	☑ Monitoring for Adaptive Management

Thermal Credit for Shade Enhancement

Project	CWS Program	Stream Length (ft)	Thermal Load Blocked (Baseline Conditions) (million kcal/day)	Thermal Load Blocked (Enhanced Conditions) (million kcal/day)	Thermal Load Reduction (Environmental Benefits) (million kcal/day)	Thermal Credits Available (million kcal/day)	CWS Thermal Credits (million kcal/day)
2503 - Butternut Creek Enhancement	Capital	1,157	1.44	5.11	3.67	1.83	1.83

Shade-a-Lator Input and Output Spreadsheets
Baseline Conditions

	SHADE & HEAT		STREAM INFORMATION					RIPARIAN CODES -- LEFT BANK-- code only vegetation that CWS is responsible for									RIPARIAN CODES -- RIGHT BANK-- code only vegetation that CWS is responsible for								
PROJECT	Effective Shade (%)	Thermal Load Blocked (kcal/d)	Segment Length (ft)	Orientation (0 deg=N)	Wetted Width (ft)	NSDZ Width (ft)	Channel Incision (ft)	LB 0-15 ft	LB 15-30 ft	LB 30-45ft	LB 45-60 ft	LB 60-75 ft	LB 75-90 ft	LB 90-105 ft	LB 105-120 ft	LB 120-135 ft	RB 0-15 ft	RB 15-30 ft	RB 30-45ft	RB 45-60 ft	RB 60-75 ft	RB 75-90 ft	RB 90-105 ft	RB 105-120 ft	RB 120-135 ft
2503 - Butternut Creek at 198th Ave	69.7%	3.9E+05	100	304.0	11.7	6.8	3.7	1150	1175	1000	1000	1000	1000	1000	1000	1000	1125	1150	1150	1150	1175	1175	1000	1000	1000
2503 - Butternut Creek at 198th Ave	79.5%	4.5E+05	100	344.0	11.7	6.8	3.7	1150	1175	1175	1175	1175	1175	1150	1175	1175	1150	1150	1150	1125	1150	1150	1125	1100	1000
2503 - Butternut Creek at 198th Ave	1.2%	6.8E+03	100	250.0	11.7	6.8	3.7	1300	1300	1300	1100	1125	1175	1175	1175	1000	1300	1300	1300	1300	1300	1300	1300	1000	1000
2503 - Butternut Creek at 198th Ave	25.6%	8.2E+04	57	251.0	11.7	6.8	3.7	1100	1125	1125	1000	1000	1000	1000	1000	1000	1350	1375	1375	1375	1375	1000	1000	1000	1000
2503 - Butternut Creek at 198th Ave	26.1%	1.5E+05	100	259.0	11.7	6.8	3.7	1100	1125	1175	1175	1000	1000	1000	1000	1000	1325	1350	1350	1350	1350	1000	1000	1000	1000
2503 - Butternut Creek at 198th Ave	18.7%	1.0E+05	100	262.0	11.7	6.8	3.7	1100	1125	1150	1175	1175	1175	1000	1000	1000	1300	1300	1325	1375	1375	1000	1000	1000	1000
2503 - Butternut Creek at 198th Ave	14.8%	8.3E+04	100	273.0	11.7	6.8	3.7	1300	1125	1150	1175	1175	1175	1000	1000	1000	1300	1300	1325	1325	1350	1375	1375	1000	1000
2503 - Butternut Creek at 198th Ave	4.3%	2.4E+04	100	257.0	11.7	6.8	3.7	1300	1300	1100	1175	1175	1175	1175	1175	1000	1300	1300	1325	1375	1375	1375	1000	1000	1000
2503 - Butternut Creek at 198th Ave	9.1%	5.1E+04	100	232.0	11.7	6.8	3.7	1300	1300	1300	1125	1150	1175	1175	1175	1175	1300	1300	1300	1350	1375	1375	1375	1000	1000
2503 - Butternut Creek at 198th Ave	4.5%	2.5E+04	100	318.0	11.7	6.8	3.7	1300	1300	1300	1325	1125	1125	1150	1150	1150	1300	1300	1300	1300	1300	1325	1350	1325	1325
2503 - Butternut Creek at 198th Ave	11.8%	6.6E+04	100	249.0	11.7	6.8	3.7	1300	1325	1150	1175	1175	1175	1175	1175	1175	1300	1300	1300	1300	1300	1325	1300	1350	1000
2503 - Butternut Creek at 198th Ave	1.6%	8.7E+03	100	251.0	11.7	6.8	3.7	1300	1300	1100	1125	1125	1175	1175	1175	1175	1300	1300	1300	1300	1300	1300	1300	1000	1000

Enhanced Shade Conditions

	SHADE & HEAT		STREAM INFORMATION					RIPARIAN CODES -- LEFT BANK-- *code only vegetation that CWS is responsible for*									RIPARIAN CODES -- RIGHT BANK-- *code only vegetation that CWS is responsible for*								
PROJECT	Effective Shade (%)	Thermal Load Blocked (kcal/d)	Segment Length (ft)	Orientation (0 deg=N)	Wetted Width (ft)	NSDZ Width (ft)	Channel Incision (ft)	LB 0-15 ft	LB 15-30 ft	LB 30-45ft	LB 45-60 ft	LB 60-75 ft	LB 75-90 ft	LB 90-105 ft	LB 105-120 ft	LB 120-135 ft	RB 0-15 ft	RB 15-30 ft	RB 30-45ft	RB 45-60 ft	RB 60-75 ft	RB 75-90 ft	RB 90-105 ft	RB 105-120 ft	RB 120-135 ft
2503 - Butternut Creek at 198th Ave	82.9%	4.7E+05	100	304	11.7	6.8	3.7	1175	1175	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1000	1000	1000
2503 - Butternut Creek at 198th Ave	92.2%	5.2E+05	100	344	11.7	6.8	3.7	1175	1175	1175	1175	1175	1175	1175	1175	1175	1175	1175	1175	1175	1175	1175	1175	1175	1000
2503 - Butternut Creek at 198th Ave	71.2%	4.0E+05	100	250	11.7	6.8	3.7	1375	1375	1375	1175	1175	1175	1175	1175	1000	1375	1375	1375	1375	1375	1375	1375	1000	1000
2503 - Butternut Creek at 198th Ave	84.5%	2.7E+05	57	251	11.7	6.8	3.7	1175	1175	1175	1000	1000	1000	1000	1000	1000	1375	1375	1375	1375	1375	1000	1000	1000	1000
2503 - Butternut Creek at 198th Ave	87.7%	4.9E+05	100	259	11.7	6.8	3.7	1175	1175	1175	1175	1000	1000	1000	1000	1000	1375	1375	1375	1375	1375	1000	1000	1000	1000
2503 - Butternut Creek at 198th Ave	88.6%	5.0E+05	100	262	11.7	6.8	3.7	1175	1175	1175	1175	1175	1175	1000	1000	1000	1375	1375	1375	1375	1375	1000	1000	1000	1000
2503 - Butternut Creek at 198th Ave	74.9%	4.2E+05	100	273	11.7	6.8	3.7	1375	1175	1175	1175	1175	1175	1000	1000	1000	1375	1375	1375	1375	1375	1375	1375	1000	1000
2503 - Butternut Creek at 198th Ave	73.1%	4.1E+05	100	257	11.7	6.8	3.7	1375	1375	1175	1175	1175	1175	1175	1175	1000	1375	1375	1375	1375	1375	1375	1000	1000	1000
2503 - Butternut Creek at 198th Ave	69.7%	3.9E+05	100	232	11.7	6.8	3.7	1375	1375	1375	1175	1175	1175	1175	1175	1175	1375	1375	1375	1375	1375	1375	1375	1000	1000
2503 - Butternut Creek at 198th Ave	76.8%	4.3E+05	100	318	11.7	6.8	3.7	1375	1375	1375	1375	1175	1175	1175	1175	1175	1375	1375	1375	1375	1375	1375	1375	1375	1375
2503 - Butternut Creek at 198th Ave	71.5%	4.0E+05	100	249	11.7	6.8	3.7	1375	1375	1175	1175	1175	1175	1175	1175	1175	1375	1375	1375	1375	1375	1375	1375	1375	1000
2503 - Butternut Creek at 198th Ave	72.1%	4.1E+05	100	251	11.7	6.8	3.7	1375	1375	1175	1175	1175	1175	1175	1175	1175	1375	1375	1375	1375	1375	1375	1375	1000	1000

2519: TSWCD - Tualatin River

Project Summary

Project ID	Acres
2519	1.53
Location	
Private, rural property in Washington County, directly adjacent to the Tualatin River, located north of SW Blooming Fern Hill Road.	
Program	
VEGBAC	
Lat/Long	**Number of Plants Installed**
45.49, -123.07	3,950
Stream Length	**Average Stream Width**
400 feet	46.6 feet
Initial Planting Year/Credit Year	**CWS Thermal Benefits/Credits**
2022/2023	0.03 million kcal/day
Plant Communities	
Riparian Forest (refer to the Site Assessment Report for additional information)	
Partners	
Tualatin Soil and Water Conservation District	
Riparian Planting Activities	
Site preparation, targeted invasive species treatment, riparian plantings	
Instream Enhancement Activities	
None	

Project Number: 2519	Project Name: TSWCD - Tualatin River		
Project Acres: 1.53	Initial Planting Year: 2022	Initial Credit Year: 2023	Length of Stream: 400 ft

Summary of Current Conditions by Plant Community Type

* denotes species that are considered diverse

Plant Community: Riparian Forest

Stems per Acre: 1,833 — Phase: Implementation

Native Tree	Native Shrub	Native Herbaceous	Invasives
bigleaf maple	Douglas' spirea	common beggarticks	Canada thistle
*cascara	native wild rose	*common yarrow	common velvetgrass
*Oregon ash	osoberry, indian plum	Cusick's popcornflower	Himalayan blackberry
	Pacific poison oak	fringecup	St. John's wort
	red-osier dogwood	giant horsetail	
	*snowberry	grand collomia	
	tall Oregon grape	gumweed	
	thimbleberry	horseweed	
	*trailing blackberry	riverbank lupine	

Management Actions

Completed: 2023	Recommended: 2024
☐ Interplant	☐ Interplant
☑ Invasive weed treatment	☑ Invasive weed treatment
☑ Seeding	☐ Seeding
☐ Herbivore Control	☐ Herbivore Control
☐ Other	☐ Other
☑ Monitoring for Adaptive Management	☑ Monitoring for Adaptive Management

Thermal Credit for Shade Enhancement

Project	CWS Program	Stream Length (ft)	Thermal Load Blocked (Baseline Conditions) (million kcal/day)	Thermal Load Blocked (Enhanced Conditions) (million kcal/day)	Thermal Load Reduction (Environmental Benefits) (million kcal/day)	Thermal Credits Available (million kcal/day)	CWS Thermal Credits (million kcal/day)
2519 - TSWCD - Tualatin River	VEGBAC	400	3.55	3.61	0.06	0.03	0.03

Shade-a-Lator Input and Output Spreadsheets
Baseline Conditions

	SHADE & HEAT		STREAM INFORMATION					RIPARIAN CODES -- LEFT BANK-- code only vegetation that CWS is responsible for									RIPARIAN CODES -- RIGHT BANK-- code only vegetation that CWS is responsible for								
PROJECT	Effective Shade (%)	Thermal Load Blocked (kcal/d)	Segment Length (ft)	Orientation (0 deg=N)	Wetted Width (ft)	NSDZ Width (ft)	Channel Incision (ft)	LB 0-15 ft	LB 15-30 ft	LB 30-45ft	LB 45-60 ft	LB 60-75 ft	LB 75-90 ft	LB 90-105 ft	LB 105-120 ft	LB 120-135 ft	RB 0-15 ft	RB 15-30 ft	RB 30-45ft	RB 45-60 ft	RB 60-75 ft	RB 75-90 ft	RB 90-105 ft	RB 105-120 ft	RB 120-135 ft
2519 - TSWCD - Tualatin River	41.9%	9.4E+05	100	111.0	46.7	76.7	21.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1150	1150	1150	1175	1000
2519 - TSWCD - Tualatin River	40.8%	9.1E+05	100	64.0	46.7	76.7	21.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1150	1100	1100	1100	1100	1100
2519 - TSWCD - Tualatin River	37.6%	8.4E+05	100	53.0	46.7	76.7	21.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1150	1100	1100	1100	1100	1100	1100
2519 - TSWCD - Tualatin River	38.1%	8.5E+05	100	82.0	46.7	76.7	21.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1125	1100	1100	1100	1100	1100	1100	1100

Enhanced Shade Conditions

	SHADE & HEAT		STREAM INFORMATION					RIPARIAN CODES -- LEFT BANK-- *code only vegetation that CWS is responsible for*									RIPARIAN CODES -- RIGHT BANK-- *code only vegetation that CWS is responsible for*								
PROJECT	Effective Shade (%)	Thermal Load Blocked (kcal/d)	Segment Length (ft)	Orientation (0 deg=N)	Wetted Width (ft)	NSDZ Width (ft)	Channel Incision (ft)	LB 0-15 ft	LB 15-30 ft	LB 30-45ft	LB 45-60 ft	LB 60-75 ft	LB 75-90 ft	LB 90-105 ft	LB 105-120 ft	LB 120-135 ft	RB 0-15 ft	RB 15-30 ft	RB 30-45ft	RB 45-60 ft	RB 60-75 ft	RB 75-90 ft	RB 90-105 ft	RB 105-120 ft	RB 120-135 ft
2519 - TSWCD - Tualatin River	41.9%	9.4E+05	100	111	46.7	76.7	21.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1000
2519 - TSWCD - Tualatin River	41.0%	9.2E+05	100	64	46.7	76.7	21.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2519 - TSWCD - Tualatin River	38.8%	8.7E+05	100	53	46.7	76.7	21.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2519 - TSWCD - Tualatin River	39.3%	8.8E+05	100	82	46.7	76.7	21.7	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175

2520: TSWCD - Tualatin River

Project Summary

Project ID	Acres
2520	2.28
Location	
Private, rural property in Washington County, directly adjacent to the Tualatin River, located north of SW Blooming Fern Hill Road.	
Program	
VEGBAC	
Lat/Long	**Number of Plants Installed**
45.49, -123.07	4,850
Stream Length	**Average Stream Width**
791 feet	46.66 feet
Initial Planting Year/Credit Year	**CWS Thermal Benefits/Credits**
2022/2023	0.08 million kcal/day
Plant Communities	
Riparian Forest (refer to the Site Assessment Report for additional information)	
Partners	
Tualatin Soil and Water Conservation District	
Riparian Planting Activities	
Site preparation, targeted invasive species treatment, riparian plantings	
Instream Enhancement Activities	
None	

Project Number: 2520	Project Name: TSWCD - Tualatin River		
Project Acres: 2.28	Initial Planting Year: 2022	Initial Credit Year: 2023	Length of Stream: 791 ft

Summary of Current Conditions by Plant Community Type

* denotes species that are considered diverse

Plant Community: Riparian Forest

Stems per Acre: 1,533 — Phase: Implementation

Native Tree	Native Shrub	Native Herbaceous	Invasives
black cottonwood	Douglas' spirea	American bird's-foot trefoil	bull thistle
black hawthorn	native wild rose	California brome	common velvetgrass
Oregon oak	Pacific poison oak	common beggarticks	morning-glory
	Pacific Willow	cow parsnip	pennyroyal
	red-osier dogwood	*Cusick's popcornflower	reed canary grass
	*snowberry	drops-of-gold	St. John's wort
	trailing blackberry	field chickweed	
		fowl bluegrass	
		fringecup	
		grand collomia	
		gumweed	
		horseweed	
		slender hairgrass	
		tall annual willowherb	
		tarweed	

Management Actions

Completed: 2023	Recommended: 2024
☐ Interplant	☐ Interplant
☑ Invasive weed treatment	☑ Invasive weed treatment
☑ Seeding	☐ Seeding
☐ Herbivore Control	☐ Herbivore Control
☐ Other	☐ Other
☑ Monitoring for Adaptive Management	☑ Monitoring for Adaptive Management

Thermal Credit for Shade Enhancement

Project	CWS Program	Stream Length (ft)	Thermal Load Blocked (Baseline Conditions) (million kcal/day)	Thermal Load Blocked (Enhanced Conditions) (million kcal/day)	Thermal Load Reduction (Environmental Benefits) (million kcal/day)	Thermal Credits Available (million kcal/day)	CWS Thermal Credits (million kcal/day)
2520 - TSWCD - Tualatin River	VEGBAC	791	6.84	7.01	0.17	0.08	0.08

Shade-a-Lator Input and Output Spreadsheets
Baseline Conditions

	SHADE & HEAT		STREAM INFORMATION					RIPARIAN CODES -- LEFT BANK-- code only vegetation that CWS is responsible for									RIPARIAN CODES -- RIGHT BANK-- code only vegetation that CWS is responsible for								
PROJECT	Effective Shade (%)	Thermal Load Blocked (kcal/d)	Segment Length (ft)	Orientation (0 deg=N)	Wetted Width (ft)	NSDZ Width (ft)	Channel Incision (ft)	LB 0-15 ft	LB 15-30 ft	LB 30-45ft	LB 45-60 ft	LB 60-75 ft	LB 75-90 ft	LB 90-105 ft	LB 105-120 ft	LB 120-135 ft	RB 0-15 ft	RB 15-30 ft	RB 30-45ft	RB 45-60 ft	RB 60-75 ft	RB 75-90 ft	RB 90-105 ft	RB 105-120 ft	RB 120-135 ft
2520 - TSWCD - Tualatin River	48.3%	1.1E+06	100	65.0	46.7	65.0	23.3	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1150	1100	1100	1100	1100
2520 - TSWCD - Tualatin River	50.0%	1.0E+06	91	77.0	46.7	65.0	23.3	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1100
2520 - TSWCD - Tualatin River	39.2%	8.8E+05	100	37.0	46.7	65.0	23.3	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1150	1150	1125
2520 - TSWCD - Tualatin River	32.3%	7.2E+05	100	15.0	46.7	65.0	23.3	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1150	1100	1100	1100	1100
2520 - TSWCD - Tualatin River	31.6%	7.1E+05	100	16.0	46.7	65.0	23.3	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1150	1100	1100	1100	1100	1100
2520 - TSWCD - Tualatin River	32.0%	7.2E+05	100	17.0	46.7	65.0	23.3	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1150	1125	1100	1100	1100	1100
2520 - TSWCD - Tualatin River	35.5%	8.0E+05	100	31.0	46.7	65.0	23.3	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1125	1100	1100	1100	1100	1100
2520 - TSWCD - Tualatin River	40.9%	9.2E+05	100	45.0	46.7	65.0	23.3	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1150	1100	1100	1100	1100	1100

Enhanced Shade Conditions

	SHADE & HEAT		STREAM INFORMATION					RIPARIAN CODES -- LEFT BANK-- *code only vegetation that CWS is responsible for*									RIPARIAN CODES -- RIGHT BANK-- *code only vegetation that CWS is responsible for*								
PROJECT	Effective Shade (%)	Thermal Load Blocked (kcal/d)	Segment Length (ft)	Orientation (0 deg=N)	Wetted Width (ft)	NSDZ Width (ft)	Channel Incision (ft)	LB 0-15 ft	LB 15-30 ft	LB 30-45ft	LB 45-60 ft	LB 60-75 ft	LB 75-90 ft	LB 90-105 ft	LB 105-120 ft	LB 120-135 ft	RB 0-15 ft	RB 15-30 ft	RB 30-45ft	RB 45-60 ft	RB 60-75 ft	RB 75-90 ft	RB 90-105 ft	RB 105-120 ft	RB 120-135 ft
2520 - TSWCD - Tualatin River	48.4%	1.1E+06	100	65	46.7	65.0	23.3	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2520 - TSWCD - Tualatin River	50.0%	1.0E+06	91	77	46.7	65.0	23.3	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2520 - TSWCD - Tualatin River	39.3%	8.8E+05	100	37	46.7	65.0	23.3	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2520 - TSWCD - Tualatin River	33.3%	7.5E+05	100	15	46.7	65.0	23.3	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2520 - TSWCD - Tualatin River	33.5%	7.5E+05	100	16	46.7	65.0	23.3	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2520 - TSWCD - Tualatin River	33.7%	7.5E+05	100	17	46.7	65.0	23.3	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2520 - TSWCD - Tualatin River	37.4%	8.4E+05	100	31	46.7	65.0	23.3	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2520 - TSWCD - Tualatin River	41.8%	9.4E+05	100	45	46.7	65.0	23.3	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175

2521: TSWCD - Tualatin River

Project Summary

Project ID	Acres
2521	5.47
Location	
Private, rural property in Washington County, directly adjacent to the Tualatin River, located north of SW Blooming Fern Hill Road.	
Program	
VEGBAC	
Lat/Long	**Number of Plants Installed**
45.49, -123.07	17,900
Stream Length	**Average Stream Width**
1,900 feet	45 feet
Initial Planting Year/Credit Year	**CWS Thermal Benefits/Credits**
2022/2023	0.26 million kcal/day
Plant Communities	
Riparian Forest (refer to the Site Assessment Report for additional information)	
Partners	
Tualatin Soil and Water Conservation District	
Riparian Planting Activities	
Site preparation, targeted invasive species treatment, riparian plantings	
Instream Enhancement Activities	
None	

Project Number: 2521	Project Name: TSWCD - Tualatin River		
Project Acres: 5.47	Initial Planting Year: 2022	Initial Credit Year: 2023	Length of Stream: 1,900 ft

Summary of Current Conditions by Plant Community Type

* denotes species that are considered diverse

Plant Community: Riparian Forest

Stems per Acre: 6,467 — Phase: Establishment

Native Tree	Native Shrub	Native Herbaceous	Invasives
bigleaf maple	*beaked hazelnut	American bird's-foot trefoil	Canada thistle
*Douglas-fir	Douglas' spirea	California brome	Himalayan blackberry
*Oregon ash	*low Oregon grape	cow parsnip	reed canary grass
Oregon oak	*native wild rose	fringecup	St. John's wort
vine maple	oceanspray	giant horsetail	
	*osoberry, indian plum	slender hairgrass	
	Pacific ninebark	taperfruit shortscale sedge	
	Pacific poison oak	western swordfern	
	red flowering currant	willowherb	
	*red-osier dogwood		
	*snowberry		
	tall Oregon grape		
	thimbleberry		
	*trailing blackberry		

Management Actions

Completed: 2023	Recommended: 2024
☐ Interplant	☐ Interplant
☑ Invasive weed treatment	☑ Invasive weed treatment
☑ Seeding	☐ Seeding
☐ Herbivore Control	☐ Herbivore Control
☐ Other	☐ Other
☑ Monitoring for Adaptive Management	☑ Monitoring for Adaptive Management

Thermal Credit for Shade Enhancement

Project	CWS Program	Stream Length (ft)	Thermal Load Blocked (Baseline Conditions) (million kcal/day)	Thermal Load Blocked (Enhanced Conditions) (million kcal/day)	Thermal Load Reduction (Environmental Benefits) (million kcal/day)	Thermal Credits Available (million kcal/day)	CWS Thermal Credits (million kcal/day)
2521 - TSWCD - Tualatin River	VEGBAC	1,900	13.99	14.52	0.53	0.26	0.26

Shade-a-Lator Input and Output Spreadsheets
Baseline Conditions

	SHADE & HEAT		STREAM INFORMATION					RIPARIAN CODES -- LEFT BANK-- code only vegetation that CWS is responsible for									RIPARIAN CODES -- RIGHT BANK-- code only vegetation that CWS is responsible for								
PROJECT	Effective Shade (%)	Thermal Load Blocked (kcal/d)	Segment Length (ft)	Orientation (0 deg=N)	Wetted Width (ft)	NSDZ Width (ft)	Channel Incision (ft)	LB 0-15 ft	LB 15-30 ft	LB 30-45ft	LB 45-60 ft	LB 60-75 ft	LB 75-90 ft	LB 90-105 ft	LB 105-120 ft	LB 120-135 ft	RB 0-15 ft	RB 15-30 ft	RB 30-45ft	RB 45-60 ft	RB 60-75 ft	RB 75-90 ft	RB 90-105 ft	RB 105-120 ft	RB 120-135 ft
2521 - TSWCD - Tualatin River	47.5%	1.0E+06	100	88.0	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1150	1100
2521 - TSWCD - Tualatin River	28.3%	6.1E+05	100	197.0	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1150	1150	1175	1150	1150	1150
2521 - TSWCD - Tualatin River	22.3%	4.8E+05	100	209.0	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1150	1100	1100	1100	1100	1100	1100
2521 - TSWCD - Tualatin River	22.0%	4.8E+05	100	207.0	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1150	1150	1125	1100	1100	1100	1100	1100
2521 - TSWCD - Tualatin River	24.7%	5.3E+05	100	204.0	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1125	1100	1100	1100	1100	1100
2521 - TSWCD - Tualatin River	23.8%	5.1E+05	100	208.0	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1150	1100	1100	1100	1100	1100
2521 - TSWCD - Tualatin River	22.8%	4.9E+05	100	210.0	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1100	1100	1100	1100	1100	1100
2521 - TSWCD - Tualatin River	24.2%	5.2E+05	100	209.0	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1150	1125	1100	1100	1100
2521 - TSWCD - Tualatin River	22.3%	4.8E+05	100	208.0	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1150	1175	1175	1175	1175	1175	1175	1150	1125
2521 - TSWCD - Tualatin River	31.7%	6.8E+05	100	189.0	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1150	1175	1175	1175
2521 - TSWCD - Tualatin River	34.7%	7.5E+05	100	181.0	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1150	1175	1175	1175
2521 - TSWCD - Tualatin River	35.8%	7.7E+05	100	178.0	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1150	1175	1175	1175	1175
2521 - TSWCD - Tualatin River	39.1%	8.4E+05	100	167.0	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1150	1175	1175	1175	1175	1175	1175
2521 - TSWCD - Tualatin River	40.1%	8.7E+05	100	165.0	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2521 - TSWCD - Tualatin River	33.2%	7.2E+05	100	165.0	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1150	1150	1175	1175	1175	1175	1175	1175	1175
2521 - TSWCD - Tualatin River	50.0%	1.1E+06	100	117.0	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1150
2521 - TSWCD - Tualatin River	49.7%	1.1E+06	100	111.0	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1125	1100
2521 - TSWCD - Tualatin River	47.0%	1.0E+06	100	104.0	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1150	1175	1175	1175	1175	1175	1150	1100
2521 - TSWCD - Tualatin River	48.5%	1.0E+06	100	98.0	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1125	1100

Enhanced Shade Conditions

	SHADE & HEAT		STREAM INFORMATION					RIPARIAN CODES -- LEFT BANK-- *code only vegetation that CWS is responsible for*									RIPARIAN CODES -- RIGHT BANK-- *code only vegetation that CWS is responsible for*								
PROJECT	Effective Shade (%)	Thermal Load Blocked (kcal/d)	Segment Length (ft)	Orientation (0 deg=N)	Wetted Width (ft)	NSDZ Width (ft)	Channel Incision (ft)	LB 0-15 ft	LB 15-30 ft	LB 30-45ft	LB 45-60 ft	LB 60-75 ft	LB 75-90 ft	LB 90-105 ft	LB 105-120 ft	LB 120-135 ft	RB 0-15 ft	RB 15-30 ft	RB 30-45ft	RB 45-60 ft	RB 60-75 ft	RB 75-90 ft	RB 90-105 ft	RB 105-120 ft	RB 120-135 ft
2521 - TSWCD - Tualatin River	47.5%	1.0E+06	100	88	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2521 - TSWCD - Tualatin River	28.9%	6.2E+05	100	197	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2521 - TSWCD - Tualatin River	24.9%	5.4E+05	100	209	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2521 - TSWCD - Tualatin River	25.6%	5.5E+05	100	207	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2521 - TSWCD - Tualatin River	26.5%	5.7E+05	100	204	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2521 - TSWCD - Tualatin River	25.2%	5.4E+05	100	208	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2521 - TSWCD - Tualatin River	24.7%	5.3E+05	100	210	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2521 - TSWCD - Tualatin River	24.9%	5.4E+05	100	209	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2521 - TSWCD - Tualatin River	25.2%	5.4E+05	100	208	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2521 - TSWCD - Tualatin River	31.8%	6.9E+05	100	189	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2521 - TSWCD - Tualatin River	34.8%	7.5E+05	100	181	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2521 - TSWCD - Tualatin River	35.9%	7.8E+05	100	178	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2521 - TSWCD - Tualatin River	39.6%	8.5E+05	100	167	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2521 - TSWCD - Tualatin River	40.1%	8.7E+05	100	165	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2521 - TSWCD - Tualatin River	40.1%	8.7E+05	100	165	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2521 - TSWCD - Tualatin River	50.0%	1.1E+06	100	117	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2521 - TSWCD - Tualatin River	49.7%	1.1E+06	100	111	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2521 - TSWCD - Tualatin River	48.3%	1.0E+06	100	104	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2521 - TSWCD - Tualatin River	48.5%	1.0E+06	100	98	45.0	63.8	18.8	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175

2522: TSWCD- Tualatin River

Project Summary

Project ID	Acres
2522	12.46
Location	
Private, rural property in Washington County, directly adjacent to the Tualatin River, located north of SW Blooming Fern Hill Road.	
Program	
VEGBAC	
Lat/Long	**Number of Plants Installed**
45.49, -123.06	7,000
Stream Length	**Average Stream Width**
2,380 feet	46 feet
Initial Planting Year/Credit Year	**CWS Thermal Benefits/Credits**
2023/2023	1.67 million kcal/day
Plant Communities	
Riparian Forest and Oak Woodland (refer to the Site Assessment Report for additional information)	
Partners	
Tualatin Soil and Water Conservation District	
Riparian Planting Activities	
Site preparation, targeted invasive species treatment, riparian plantings	
Instream Enhancement Activities	
None	

Project Number: 2522	Project Name: TSWCD - Tualatin River		
Project Acres: 12.46	Initial Planting Year: 2023	Initial Credit Year: 2023	Length of Stream: 2,380 ft

Summary of Current Conditions by Plant Community Type

* denotes species that are considered diverse

Plant Community: Oak Woodland

Stems per Acre: 800 — Phase: Implementation

Native Tree	Native Shrub	Native Herbaceous	Invasives
black hawthorn	*beaked hazelnut	Alaska brome	Canada thistle
cascara	mock orange	American black nightshade	common velvetgrass
Oregon ash	native wild rose	Blue Wildrye	Himalayan blackberry
Oregon oak	oceanspray	California oatgrass	morning-glory
	Pacific ninebark	common beggarticks	pennyroyal
	red flowering currant	*common horsetail	reed canary grass
	red-osier dogwood	horseweed	
	tall Oregon grape	needleleaf navarretia	
		slender hairgrass	
		*small tarweed	
		tall annual willowherb	
		tufted hairgrass	
		western marsh cudweed	
		willowherb	

Plant Community: Riparian Forest

Stems per Acre: 3,673 — Phase: Establishment

Native Tree	Native Shrub	Native Herbaceous	Invasives
*bigleaf maple	*beaked hazelnut	Alaska brome	Canada thistle
Douglas-fir	Douglas' spirea	American black nightshade	common velvetgrass
*Oregon ash	native wild rose	Blue Wildrye	English ivy
Oregon oak	oceanspray	cleavers	Himalayan blackberry
pacific yew	*osoberry, indian plum	common beggarticks	morning-glory
red alder	Pacific poison oak	common horsetail	reed canary grass
vine maple	red elderberry	fowl bluegrass	traveler's joy
	red flowering currant	fringecup	
	*red-osier dogwood	horseweed	
	*snowberry	lady fern	
	*tall Oregon grape	nodding onion	
	thimbleberry	slender hairgrass	
	*trailing blackberry	small tarweed	
		spike bentgrass	
		western starflower	
		western swordfern	
		willowherb	

Management Actions

Completed: 2023	Recommended: 2024
☐ Interplant	☑ Interplant
☑ Invasive weed treatment	☑ Invasive weed treatment
☑ Seeding	☐ Seeding
☐ Herbivore Control	☐ Herbivore Control
☐ Other	☐ Other
☑ Monitoring for Adaptive Management	☑ Monitoring for Adaptive Management

Thermal Credit for Shade Enhancement

Project	CWS Program	Stream Length (ft)	Thermal Load Blocked (Baseline Conditions) (million kcal/day)	Thermal Load Blocked (Enhanced Conditions) (million kcal/day)	Thermal Load Reduction (Environmental Benefits) (million kcal/day)	Thermal Credits Available (million kcal/day)	CWS Thermal Credits (million kcal/day)
2522 - TSWCD - Tualatin River	VEGBAC	2,380	16.67	20.01	3.34	1.67	1.67

Shade-a-Lator Input and Output Spreadsheets
Baseline Conditions

	SHADE & HEAT		STREAM INFORMATION					RIPARIAN CODES -- LEFT BANK-- code only vegetation that CWS is responsible for									RIPARIAN CODES -- RIGHT BANK-- code only vegetation that CWS is responsible for								
PROJECT	Effective Shade (%)	Thermal Load Blocked (kcal/d)	Segment Length (ft)	Orientation (0 deg=N)	Wetted Width (ft)	NSDZ Width (ft)	Channel Incision (ft)	LB 0-15 ft	LB 15-30 ft	LB 30-45ft	LB 45-60 ft	LB 60-75 ft	LB 75-90 ft	LB 90-105 ft	LB 105-120 ft	LB 120-135 ft	RB 0-15 ft	RB 15-30 ft	RB 30-45ft	RB 45-60 ft	RB 60-75 ft	RB 75-90 ft	RB 90-105 ft	RB 105-120 ft	RB 120-135 ft
2522 - TSWCD - Tualatin River	40.7%	9.0E+05	100	90.0	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1000
2522 - TSWCD - Tualatin River	23.5%	4.1E+05	80	347.0	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1150	1100	1100	1100	1100	1100	1100
2522 - TSWCD - Tualatin River	22.1%	4.9E+05	100	345.0	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1100	1100	1100	1100	1100	1100	1100
2522 - TSWCD - Tualatin River	20.3%	4.5E+05	100	343.0	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1150	1100	1100	1100	1100	1100	1000	1000
2522 - TSWCD - Tualatin River	23.5%	5.2E+05	100	7.0	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1150	1125	1100	1100	1100	1100	1000	1000
2522 - TSWCD - Tualatin River	36.2%	8.0E+05	100	50.0	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1150	1100	1100	1100	1100	1000	1000
2522 - TSWCD - Tualatin River	37.4%	8.3E+05	100	56.0	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1100	1100	1100	1100	1100	1000	1000
2522 - TSWCD - Tualatin River	40.9%	9.0E+05	100	110.0	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1150	1100	1000	1000	1000	1000	1000
2522 - TSWCD - Tualatin River	29.3%	6.5E+05	100	117.0	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1150	1125	1125	1125	1150	1000	1000	1000	1000
2522 - TSWCD - Tualatin River	17.0%	3.7E+05	100	123.0	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1125	1125	1125	1100	1100	1000	1000	1000	1000
2522 - TSWCD - Tualatin River	21.8%	4.8E+05	100	151.0	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1150	1125	1100	1100	1100	1100	1100	1100	1000
2522 - TSWCD - Tualatin River	37.1%	8.2E+05	100	152.0	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1150	1150	1100	1100	1100	1100	1100
2522 - TSWCD - Tualatin River	32.9%	7.3E+05	100	149.0	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1150	1175	1175	1175	1175	1125	1100	1100	1100
2522 - TSWCD - Tualatin River	11.7%	2.6E+05	100	125.0	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1100	1150	1150	1150	1125	1125	1100	1100	1100
2522 - TSWCD - Tualatin River	30.1%	6.6E+05	100	113.0	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1150	1150	1125	1100	1100	1100	1100	1100	1100
2522 - TSWCD - Tualatin River	40.9%	9.0E+05	100	110.0	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1125	1100	1100	1100	1100	1100	1100
2522 - TSWCD - Tualatin River	28.5%	6.3E+05	100	106.0	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1150	1150	1150	1150	1125	1100	1100	1100	1100
2522 - TSWCD - Tualatin River	38.1%	8.4E+05	100	95.0	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1150	1125	1125	1125	1100	1100	1100	1100
2522 - TSWCD - Tualatin River	37.5%	8.3E+05	100	86.0	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1150	1100	1100	1100	1100
2522 - TSWCD - Tualatin River	29.6%	6.5E+05	100	78.0	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1150	1175	1175	1175	1175	1175	1175	1175	1175
2522 - TSWCD - Tualatin River	39.7%	8.8E+05	100	74.0	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2522 - TSWCD - Tualatin River	40.6%	9.0E+05	100	63.0	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2522 - TSWCD - Tualatin River	39.8%	8.8E+05	100	59.0	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1000	1000	1000
2522 - TSWCD - Tualatin River	40.5%	8.9E+05	100	63.0	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1000	1000	1000

Enhanced Shade Conditions

	SHADE & HEAT		STREAM INFORMATION					RIPARIAN CODES -- LEFT BANK-- *code only vegetation that CWS is responsible for*									RIPARIAN CODES -- RIGHT BANK-- *code only vegetation that CWS is responsible for*								
PROJECT	Effective Shade (%)	Thermal Load Blocked (kcal/d)	Segment Length (ft)	Orientation (0 deg=N)	Wetted Width (ft)	NSDZ Width (ft)	Channel Incision (ft)	LB 0-15 ft	LB 15-30 ft	LB 30-45ft	LB 45-60 ft	LB 60-75 ft	LB 75-90 ft	LB 90-105 ft	LB 105-120 ft	LB 120-135 ft	RB 0-15 ft	RB 15-30 ft	RB 30-45ft	RB 45-60 ft	RB 60-75 ft	RB 75-90 ft	RB 90-105 ft	RB 105-120 ft	RB 120-135 ft
2522 - TSWCD - Tualatin River	40.7%	9.0E+05	100	90	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1000
2522 - TSWCD - Tualatin River	26.4%	4.7E+05	80	347	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2522 - TSWCD - Tualatin River	26.0%	5.7E+05	100	345	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2522 - TSWCD - Tualatin River	25.4%	5.6E+05	100	343	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1000	1000
2522 - TSWCD - Tualatin River	29.2%	6.4E+05	100	7	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1000	1000
2522 - TSWCD - Tualatin River	37.6%	8.3E+05	100	50	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1000	1000
2522 - TSWCD - Tualatin River	39.1%	8.6E+05	100	56	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1000	1000
2522 - TSWCD - Tualatin River	40.9%	9.0E+05	100	110	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1000	1000	1000	1000	1000
2522 - TSWCD - Tualatin River	43.5%	9.6E+05	100	117	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1000	1000	1000	1000
2522 - TSWCD - Tualatin River	43.1%	9.5E+05	100	123	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1000	1000	1000	1000
2522 - TSWCD - Tualatin River	39.2%	8.7E+05	100	151	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1000
2522 - TSWCD - Tualatin River	39.1%	8.6E+05	100	152	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2522 - TSWCD - Tualatin River	39.6%	8.8E+05	100	149	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2522 - TSWCD - Tualatin River	42.9%	9.5E+05	100	125	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2522 - TSWCD - Tualatin River	42.2%	9.3E+05	100	113	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2522 - TSWCD - Tualatin River	40.9%	9.0E+05	100	110	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2522 - TSWCD - Tualatin River	39.6%	8.7E+05	100	106	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2522 - TSWCD - Tualatin River	38.7%	8.5E+05	100	95	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2522 - TSWCD - Tualatin River	37.5%	8.3E+05	100	86	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2522 - TSWCD - Tualatin River	39.2%	8.7E+05	100	78	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2522 - TSWCD - Tualatin River	39.7%	8.8E+05	100	74	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2522 - TSWCD - Tualatin River	40.6%	9.0E+05	100	63	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1175	1175	1175
2522 - TSWCD - Tualatin River	39.8%	8.8E+05	100	59	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1000	1000	1000
2522 - TSWCD - Tualatin River	40.5%	8.9E+05	100	63	46.0	78.0	22.4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1175	1175	1175	1175	1175	1175	1000	1000	1000

2538: TSWCD- West Fork Dairy Creek

Project Summary

Project ID	Acres
2538	1.54
Location	
Private, rural property in Washington County, directly adjacent to West Fork Dairy Creek, located just east of NW Sunset Highway.	
Program	
VEGBAC	
Lat/Long	**Number of Plants Installed**
45.67, -123.18	3,154
Stream Length	**Average Stream Width**
900 feet	23.5 feet
Initial Planting Year/Credit Year	**CWS Thermal Benefits/Credits**
2023/2023	0.61 million kcal/day
Plant Communities	
Riparian Forest (refer to the Site Assessment Report for additional information)	
Partners	
Tualatin Soil and Water Conservation District	
Riparian Planting Activities	
Site preparation, targeted invasive species treatment, riparian plantings	
Instream Enhancement Activities	
None	

Project Number: 2538	Project Name: TSWCD - West Fork Dairy Creek		
Project Acres: 1.54	Initial Planting Year: 2023	Initial Credit Year: 2023	Length of Stream: 900 ft

Summary of Current Conditions by Plant Community Type

* denotes species that are considered diverse

Plant Community: Riparian Forest

Stems per Acre: 333 — Phase: Implementation

Native Tree	Native Shrub	Native Herbaceous	Invasives
Oregon oak	*red-osier dogwood	*Alaska brome	Himalayan blackberry
vine maple	snowberry	*Blue Wildrye	morning-glory
		giant horsetail	reed canary grass
		spike bentgrass	
		western marsh cudweed	

Management Actions

Completed: 2023	Recommended: 2024
☑ Interplant	☑ Interplant
☑ Invasive weed treatment	☑ Invasive weed treatment
☐ Seeding	☑ Seeding
☐ Herbivore Control	☐ Herbivore Control
☐ Other	☐ Other
☑ Monitoring for Adaptive Management	☑ Monitoring for Adaptive Management

Thermal Credit for Shade Enhancement

Project	CWS Program	Stream Length (ft)	Thermal Load Blocked (Baseline Conditions) (million kcal/day)	Thermal Load Blocked (Enhanced Conditions) (million kcal/day)	Thermal Load Reduction (Environmental Benefits) (million kcal/day)	Thermal Credits Available (million kcal/day)	CWS Thermal Credits (million kcal/day)
2538 - TSWCD - West Fork Dairy Creek	VEGBAC	900	0.63	1.84	1.21	0.61	0.61

Shade-a-Lator Input and Output Spreadsheets
Baseline Conditions

	SHADE & HEAT		STREAM INFORMATION					RIPARIAN CODES -- LEFT BANK-- code only vegetation that CWS is responsible for									RIPARIAN CODES -- RIGHT BANK-- code only vegetation that CWS is responsible for								
PROJECT	Effective Shade (%)	Thermal Load Blocked (kcal/d)	Segment Length (ft)	Orientation (0 deg=N)	Wetted Width (ft)	NSDZ Width (ft)	Channel Incision (ft)	LB 0-15 ft	LB 15-30 ft	LB 30-45ft	LB 45-60 ft	LB 60-75 ft	LB 75-90 ft	LB 90-105 ft	LB 105-120 ft	LB 120-135 ft	RB 0-15 ft	RB 15-30 ft	RB 30-45ft	RB 45-60 ft	RB 60-75 ft	RB 75-90 ft	RB 90-105 ft	RB 105-120 ft	RB 120-135 ft
2538 - TSWCD - West Fork Dairy Creek	24.9%	1.6E+05	100	31.0	13.0	36.7	18.3	1175	1125	1100	1100	1000	1000	1000	1100	1100	1000	1000	1000	1000	1000	1000	1000	1000	1000
2538 - TSWCD - West Fork Dairy Creek	0.0%	0.0E+00	100	120.0	13.0	36.7	18.3	1100	1100	1100	1100	1100	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2538 - TSWCD - West Fork Dairy Creek	36.5%	2.3E+05	100	10.0	13.0	36.7	18.3	1150	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2538 - TSWCD - West Fork Dairy Creek	16.6%	1.0E+05	100	347.0	13.0	36.7	18.3	1125	1100	1100	1000	1000	1000	1100	1100	1100	1000	1000	1000	1000	1000	1000	1000	1000	1000
2538 - TSWCD - West Fork Dairy Creek	5.1%	3.2E+04	100	324.0	13.0	36.7	18.3	1100	1125	1100	1100	1100	1100	1100	1100	1100	1000	1000	1000	1000	1000	1000	1000	1000	1000
2538 - TSWCD - West Fork Dairy Creek	0.8%	5.3E+03	100	31.0	13.0	36.7	18.3	1100	1100	1100	1100	1100	1100	1100	1125	1125	1000	1000	1000	1000	1000	1000	1000	1000	1000
2538 - TSWCD - West Fork Dairy Creek	0.0%	0.0E+00	100	41.0	13.0	36.7	18.3	1100	1100	1100	1100	1100	1100	1100	1100	1100	1000	1000	1000	1000	1000	1000	1000	1000	1000
2538 - TSWCD - West Fork Dairy Creek	7.2%	4.5E+04	100	89.0	13.0	36.7	18.3	1150	1100	1100	1100	1100	1100	1100	1100	1100	1000	1000	1000	1000	1000	1000	1000	1000	1000
2538 - TSWCD - West Fork Dairy Creek	9.3%	5.8E+04	100	144.0	13.0	36.7	18.3	1125	1100	1100	1100	1100	1100	1100	1100	1100	1000	1000	1000	1000	1000	1000	1000	1000	1000

Enhanced Shade Conditions

	SHADE & HEAT		STREAM INFORMATION					RIPARIAN CODES -- LEFT BANK-- *code only vegetation that CWS is responsible for*									RIPARIAN CODES -- RIGHT BANK-- *code only vegetation that CWS is responsible for*								
PROJECT	Effective Shade (%)	Thermal Load Blocked (kcal/d)	Segment Length (ft)	Orientation (0 deg=N)	Wetted Width (ft)	NSDZ Width (ft)	Channel Incision (ft)	LB 0-15 ft	LB 15-30 ft	LB 30-45ft	LB 45-60 ft	LB 60-75 ft	LB 75-90 ft	LB 90-105 ft	LB 105-120 ft	LB 120-135 ft	RB 0-15 ft	RB 15-30 ft	RB 30-45ft	RB 45-60 ft	RB 60-75 ft	RB 75-90 ft	RB 90-105 ft	RB 105-120 ft	RB 120-135 ft
2538 - TSWCD - West Fork Dairy Creek	30.5%	1.9E+05	100	31	13.0	36.7	18.3	1175	1175	1175	1175	1000	1000	1000	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000
2538 - TSWCD - West Fork Dairy Creek	19.0%	1.2E+05	100	120	13.0	36.7	18.3	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2538 - TSWCD - West Fork Dairy Creek	40.6%	2.5E+05	100	10	13.0	36.7	18.3	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2538 - TSWCD - West Fork Dairy Creek	52.4%	3.3E+05	100	347	13.0	36.7	18.3	1175	1175	1175	1000	1000	1000	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000
2538 - TSWCD - West Fork Dairy Creek	55.0%	3.4E+05	100	324	13.0	36.7	18.3	1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000
2538 - TSWCD - West Fork Dairy Creek	31.2%	1.9E+05	100	31	13.0	36.7	18.3	1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000
2538 - TSWCD - West Fork Dairy Creek	27.4%	1.7E+05	100	41	13.0	36.7	18.3	1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000
2538 - TSWCD - West Fork Dairy Creek	9.5%	5.9E+04	100	89	13.0	36.7	18.3	1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000
2538 - TSWCD - West Fork Dairy Creek	29.3%	1.8E+05	100	144	13.0	36.7	18.3	1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000

Appendix B

Riparian Shade Planting Projects (2004-2023)

Appendix B: Riparian Shade Planting Projects (2004-2023)

Appendix B presents a summary of the 210 riparian shade projects enrolled in CWS' water quality trading program. The project name, credit year, project characteristics (average wetted width and stream length), and the thermal credit claimed by CWS are presented in Table B. In previous years, the average wetted width and stream length were reported as rounded values. CWS takes thermal credit for those projects for which a valid contract or agreement is in place. For projects that are between landowner contracts, CWS conducts routine shade monitoring using LiDAR and aerial imagery and takes thermal credits if they are providing the expected canopy cover. All projects identified in Table B are active and enrolled in CWS' water quality credit trading program.

Table B: Active Riparian Shade Planting Projects (2004-2023)

Project ID	Project Name*	Project Status	Credit Year	Average Wetted Width (ft)	Segment Length (ft)**	CWS Thermal Credits (million kcal/d)
121	Tualatin River - Thomas Dairy	Active	2004	210	500	3.16
122	Summer Creek - Fowler	Active	2004	9.9	1,600	1.55
123	Fanno Creek - Englewood	Active	2004	8.9	4,400	6.77
126	Rock Creek - Evergreen to Cornell	Active	2004	19.7	2,500	4.41
131	Rock Creek - WWTP	Active	2004	22	700	0.84
136	Johnson Creek South - Summercrest	Active	2004	1.9	1,800	0.60
138	Bronson Creek - W Union to Laidlaw	Active	2004	4.7	5,400	3.15
1166	Fanno Creek - OES Marsh	Active	2004	9.3	1,300	2.04
1767	Cedar Creek - Stella Olsen	Active	2004	15	1,500	4.08
10	Council Creek - Beal Pond	Active	2005	156.1	700	10.40
21	Rock Creek - Amberwood Natural Area	Active	2005	17.7	900	0.19
25	Dawson Creek - Evergreen Blvd	Active	2005	8.3	1,800	1.36
27	Rock Creek - Trail - Evergreen to Hwy 26	Active	2005	20	800	3.07
36	Beaverton Creek - Transit Center	Active	2005	12.4	1,500	2.70
78	North Johnson Creek - Cedar Mill Wetlands	Active	2005	13.2	800	0.08
95	95 - TSWCD - McFee Creek Tributary	Active	2005	2	2,700	0.97
124	Willow Creek - Bronson Rd	Active	2005	4.8	800	0.04
129	Sylvan Creek - Raleighwood Marsh	Active	2005	7	2,100	3.14
141	Fanno Creek - Hall Blvd to Ash Ave	Active	2005	21	2,100	6.45
142	Gales Creek - Tualatin River to Hwy 47	Active	2005	26	4,000	14.60
1040	Rock Creek - Golf Course to Bethany Pond	Active	2005	14.4	2,900	7.62
1421	Hedges Creek - Upper Marsh	Active	2005	12.7	900	1.69
138	Bronson Creek - W Union to Laidlaw	Active	2005	5	900	1.06
126	Rock Creek Evergreen to Cornell	Active	2005	20	3,400	8.69
131	Rock Creek - WWTP	Active	2005	22	2,300	4.27
18	Banks Elementary	Active	2006	1.6	600	0.19
65	Fanno Creek tributary - Downing to 125th	Active	2006	0.9	600	0.11
94	94 - TSWCD - East Fork Dairy Creek	Active	2006	12.3	5,300	4.12
96	96 - TSWCD - Tualatin River	Active	2006	46.9	6,300	25.30
97	97 - TSWCD - West Fork Dairy Creek	Active	2006	20	2,400	4.13

Table B-1: Active Riparian Shade Planting Projects (2004-2023) (Continued)

Project ID	Project Name*	Project Status	Credit Year	Average Wetted Width (ft)	Segment Length (ft)**	CWS Thermal Credits (million kcal/d)
102	102 - TSWCD - West Fork Dairy Creek	Active	2006	8	1,300	0.21
114	114 - TSWCD - Tualatin River	Active	2006	45.4	1,800	7.30
137	Willow Creek - Beaverton Creek Confluence	Active	2006	11.8	1,300	1.43
1020	Dairy Creek - Davis Tool	Active	2006	42	4,900	4.76
1160	Johnson Creek - Lowami Hart Woods	Active	2006	6	500	0.52
1181	1181 - TSWCD - Tualatin River	Active	2006	29.6	10,700	14.90
1422	Beaverton Creek - 153rd to St Marys	Active	2006	9.3	4,900	9.36
10	Council Creek - Beal Pond	Active	2006	156	500	0.11
1767	Cedar Creek - Stella Olsen	Active	2006	15	700	1.12
123	Fanno Creek - Englewood	Active	2006	9	2,500	1.50
1141	1141 - TSWCD - Council Creek Tributary	Active	2007	4	6,300	4.64
104	104 - TSWCD - McFee Creek	Active	2007	7.9	1,500	0.73
105	105 - TSWCD - Tualatin River	Active	2007	33.2	1,800	5.81
109	109 - TSWCD - West Fork Dairy Creek	Active	2007	20	1,600	2.55
110	110 - TSWCD - Chicken Creek Tributary	Active	2007	3	800	0.40
112	112 - TSWCD - Tualatin River	Active	2007	43.3	8,200	31.30
125	Beaverton Creek - Quatama - 205th Ave to 231st Ave	Active	2007	23	7,300	13.90
132	Tualatin River - Gales Creek to Fernhill Rd	Active	2007	44.9	4,300	9.79
1140	1140 - TSWCD - Council Creek Tributary	Active	2007	9.5	1,100	2.18
1522	1522 - TSWCD - Abbey Creek	Active	2007	6.4	1,500	1.58
1524	1524 - TSWCD - Rock Creek	Active	2007	10	1,600	2.57
1767	Cedar Creek - Stella Olsen	Active	2007	15	700	0.34
12	Tualatin River - Metro King	Active	2008	56.8	800	3.61
117	Metro - Lovejoy	Active	2008	44.5	8,100	21.80
128	Bronson Creek - Tanasbrook Ponds	Active	2008	6.7	2,700	3.04
143	Gales Creek - B St to Hwy 47	Active	2008	23	3,300	4.49
1080	Fanno Creek - Greenway Park	Active	2008	10.6	6,000	9.15
1886	1886 - TSWCD - Abbey Creek Tributary	Active	2008	2.6	700	0.22
1907	1907 - TSWCD - West Fork Dairy Creek	Active	2008	10	600	0.01
1910	1910 - TSWCD - Tualatin River	Active	2008	12.6	6,300	4.97
1927	1927 - TSWCD - Cedar Creek	Active	2008	8	900	1.51
1930	1930 - TSWCD - Bledsoe Creek	Active	2008	5	1,100	1.00
103	103 - TSWCD - East Fork Dairy Creek	Active	2009	11.4	3,100	0.81
107	107 - TSWCD - Tualatin River Tributary	Active	2009	5	600	0.03
108	108 - TSWCD - Tualatin River	Active	2009	50	3,600	5.19
113	113 - TSWCD - Chicken Creek	Active	2009	5	500	0.26
100	TRNWR - Dennis	Active	2009	120	4,700	3.48
115	Metro - Munger	Active	2009	120	2,100	0.69
2007	2007 - TSWCD - West Fork Dairy Creek	Active	2009	15	2,800	0.70
1080	Fanno Creek - Greenway Park	Active	2009	9	1,100	0.71

Table B-1: Active Riparian Shade Planting Projects (2004-2023) (Continued)

Project ID	Project Name*	Project Status	Credit Year	Average Wetted Width (ft)	Segment Length (ft)**	CWS Thermal Credits (million kcal/d)
130	Tualatin River - Eagle Woods at Fern Hill	Active	2010	23	1,100	0.69
116	116 - TSWCD - East Fork Dairy Creek	Active	2010	36	2,879	5.38
1906	1906 - TSWCD - McKay Creek	Active	2010	20	5,900	8.74
2049	Rock Creek - Noble Woods	Active	2010	19	1,170	2.39
2051	2051 - TSWCD - Bledsoe Creek	Active	2010	5	2,643	2.36
2052	2052 - TSWCD - Gales Creek	Active	2010	40	900	1.98
2087	Gales Creek - Half Mile Lane	Active	2011	27	1,306	2.62
2097	2097 - TSWCD - Gales Creek	Active	2011	75	3,755	15.70
131	Rock Creek - WWTP	Active	2011	8	3,022	2.15
135	Willow Creek Enhancement	Active	2012	8	1,190	1.55
2105	2105 - TSWCD - Carpenter Creek	Active	2012	4	1,756	0.32
2106	2106 - TSWCD - Tualatin River	Active	2012	30	1,969	2.31
2122	2122 - TSWCD - Gales Creek	Active	2012	7.6	2,800	1.03
1181	1181 - TSWCD - Tualatin River	Active	2012	6	3,300	3.20
2100	2100 - TSWCD - Tualatin River	Active	2013	11.8	4,272	2.76
2101	2101 - TSWCD - Christensen Creek	Active	2013	3	1,693	1.07
2102	2102 - TSWCD - Christensen Creek	Active	2013	3	1,700	0.91
2103	2103 - TSWCD - Tualatin River	Active	2013	16.8	4,082	9.78
2126	2126 - TSWCD - Cedar Creek Tributary	Active	2013	2	587	0.17
2128	2128 - TSWCD - Jackson Creek	Active	2013	5	679	0.28
2129	2129 - TSWCD - Jackson Creek	Active	2013	5	700	0.45
2140	2140 - TSWCD - Gales Creek	Active	2013	40	2,054	5.38
124	Willow Creek - Bronson Rd	Active	2013	7.4	500	0.29
17	Durham City Park	Active	2014	20	4,193	3.48
2093	Barrows Meadows	Active	2014	6	800	0.16
2130	2130 - TSWCD - Gales Creek	Active	2014	35	5,052	11.30
2131	2131 - TSWCD - McKay Creek	Active	2014	30	4,161	5.74
2135	Bronson Creek Greenway	Active	2015	5.8	4,600	0.08
2137	2137 - TSWCD - Gales Creek	Active	2015	25	2,257	2.63
2138	2138 - TSWCD - Little Beaver Creek	Active	2015	7.5	572	0.71
2139	2139 - TSWCD - Carpenter Creek	Active	2015	6	4,023	1.74
2142	2142 - TSWCD - Little Beaver Creek	Active	2015	11.7	5,161	3.30
2168	Tualatin River Farm	Active	2015	66	2,794	0.89
1767	Cedar Creek - Stella Olsen	Active	2015	16	2,027	2.29
2099	2099 - TSWCD - Tualatin River	Active	2016	55	3,700	1.60
2199	TRNWR - Naujock	Active	2016	118	6,400	5.90
2163	2163 - TSWCD - Little Beaver Creek	Active	2016	4	1,350	0.98
2164	2164 - TSWCD - Gales Creek Tributary	Active	2016	25	2,070	0.15
2165	2165 - TSWCD - McKay Creek	Active	2016	12	3,693	0.05
2166	2166 - TSWCD - Dairy Creek	Active	2016	19	1,375	0.06
2184	Metro - Maroon Ponds Natural Area	Active	2016	45	2,700	3.30

Table B-1: Active Riparian Shade Planting Projects (2004-2023) (Continued)

Project ID	Project Name*	Project Status	Credit Year	Average Wetted Width (ft)	Segment Length (ft)**	CWS Thermal Credits (million kcal/d)
2201	2201 - TSWCD - Tualatin River	Active	2016	52	2,247	2.80
2202	2202 - TSWCD - East Fork Dairy Creek	Active	2016	33.1	3,397	3.20
2203	2203 - TSWCD - Council Creek	Active	2016	7	1,071	0.10
2204	2204 - TSWCD - McKay Creek	Active	2016	30	2,500	3.20
2205	2205 - TSWCD - Tualatin River	Active	2016	64	3,000	0.31
2206	2206 - TSWCD - McFee Creek	Active	2016	11	550	0.27
2207	2207 - TSWCD - Tualatin River	Active	2016	50	500	0.26
2208	2208 - TSWCD - McKay Creek Tributary	Active	2016	9.3	2,046	2.20
2209	2209 - TSWCD - McKay Creek	Active	2016	28	1,091	0.32
2216	Beaverton Creek - Quatama - 197th Ave	Active	2016	32	1,676	1.30
2186	Metro - Woodard Natural Area	Active	2017	32	752	0.89***
2190	Metro - Farmington Natural Area	Active	2017	123	599	0.83
2213	2213 - TSWCD - West Fork Dairy Creek	Active	2017	19	7,890	10.43***
2218	Beaverton Creek - Quatama - 185th Ave	Active	2017	18	1,454	1.04
2260	2260 - TSWCD - McFee Creek	Active	2017	15	800	0.22
2261	2261 - TSWCD - Davis Creek	Active	2017	4	1,374	1.05***
2262	2262 - TSWCD - Abbey Creek	Active	2017	4	1,530	0.19
2263	Fanno Creek - Crawford Reach	Active	2017	28	800	1.09
2265	Wapato View	Active	2017	2	5,045	1.41
2345	Metro - Carpenter Creek S	Active	2017	16	1,800	3.95
2346	Metro - Carpenter Creek N	Active	2017	16	382	0.90
1644	Banks High School	Active	2018	4	587	0.17
2043	Gales Creek at B Street Bridge	Active	2018	57	1,400	0.80
2187	Metro - Bonita Natural Area	Active	2018	6.3	1,732	1.57
2210	2210 - TSWCD - East Fork Dairy Creek	Active	2018	21	4,866	2.19
2215	2215 - TSWCD - Graver Creek	Active	2018	4.3	700	0.50
2259	2259 - TSWCD - McFee Creek	Active	2018	16.9	2,100	2.71
2318	2318 - TSWCD - Storey Creek	Active	2018	3	785	0.49
2321	2321 - TSWCD - McKay Creek Tributary	Active	2018	5.7	468	0.31
2322	2322 - TSWCD - Gales Creek	Active	2018	24.5	2,153	1.18
2324	2324 - TSWCD - Iler Creek	Active	2018	8.8	1,900	0.20
2327	2327 - TRNWR - Dennis Expansion Area	Active	2018	127.5	2,000	3.86
2333	2333 - TSWCD - Gales Creek	Active	2018	26.7	1,300	1.13
2414	2414 - TSWCD - East Fork Dairy Creek	Active	2018	32.2	5,089	0.81
2449	2449 - Steed Creek Expansion	Active	2018	4	500	0.41
6701	6701 - Bethany Creek Enhancement	Active	2018	3	1,377	0.45
78	78 - North Johnson Creek - Cedar Mill Wetlands	Active	2019	12.5	887	0.26
98	98 - TSWCD - Tualatin River Tributary	Active	2019	11.0	900	0.06
1807	1807 - Hedges Creek Marsh	Active	2019	49.5	3,395	0.10
2019	2019 - Chicken Creek at Green Heron	Active	2019	17.9	686	0.97
2075	2075 - Summer Creek - 116th to Fowler	Active	2019	15.0	1,000	0.79
2081	2081 - Grace Johnson	Active	2019	33.1	4,500	5.00
2116	2116 - Jack Park	Active	2019	1.8	2,253	0.18

Table B-1: Active Riparian Shade Planting Projects (2004-2023) (Continued)

Project ID	Project Name*	Project Status	Credit Year	Average Wetted Width (ft)	Segment Length (ft)**	CWS Thermal Credits (million kcal/d)
2144	2144 - Fanno Creek - Ash Ave to Main St	Active	2019	13.0	1,400	1.85
2145	2145 - Woodhaven Park	Active	2019	2.1	700	0.16
2235	2235 - THPRD - Whispering Woods	Active	2019	26.6	2,200	5.27
2264	2264 - TRNWR - Oleson	Active	2019	30.0	1,400	0.26
2277	2277 - Spring Hill	Active	2019	23.4	9,527	15.9
2320	2320 - TSWCD - McKay Creek	Active	2019	24.8	393	0.02
2325	2325 - TSWCD - McKay Creek	Active	2019	50.0	575	0.06
2326	2326 - TSWCD - McKay Creek	Active	2019	40.0	383	0.16
2335	2335 - Metro - Baker Heaton	Active	2019	11.3	5,041	3.71
2336	2336 - Metro - Middle Baker	Active	2019	11.0	3,350	2.59
2351	2351 - Metro - River's Bend Munger	Active	2019	115.6	3,559	1.17
2379	2379 - Nyberg Creek - Stafford	Active	2020	9.3	800	0.99
2410	2410 - Upper Hedges Creek	Active	2019	19.9	1,200	0.15
2365	2365 - West Tributary Abbey Creek	Active	2020	14.7	2,720	1.04
2403	2403 - Fanno Creek - Felton Floodplain	Active	2020	23.8	1,700	0.68
2406	2406 - TSWCD - McFee Creek Tributary	Active	2020	7	1,965	0.40
2407	2407 - TSWCD - East Fork Dairy Creek	Active	2020	27	2,956	1.59
2408	2408 - TSWCD - Tualatin River	Active	2020	6	1,300	0.52
2411	2411 - Fanno Creek - Crawford Extension	Active	2020	33	961	1.39
2429	2429 - Metro - Carpenter Creek at SW Anderson Rd	Active	2020	8	800	1.00
2444	2444 - TSWCD - Dairy Creek	Active	2020	22	3,676	1.29
2445	2445 - TSWCD - Dairy Creek	Active	2020	55	1,000	0.16
2447	2447 - TSWCD - Tualatin River	Active	2020	123	2,195	0.37
2052	2052 - TSWCD - Gales Creek	Active	2021	29.5	3,519	9.02
2183	2183 - Fanno Creek - Denney Rd to Hall Blvd	Active	2021	8.5	4,385	3.25
2332	2332 - TRNWR - Bump - Brennar	Active	2021	125	2,089	0.11
2353	2353 - Metro - Dairy McKay - RF	Active	2021	32.5	5,195	2.43
2424	2424 - Bronson Creek - NW Bethany Blvd to NW 147th Pl	Active	2021	5	14,650	0.19
2443	2443 - Bronson Creek - OHSU	Active	2021	12.3	3,086	2.35
2448	2448 - NRCS - Hutchinson Wetland Reserve - O'Neil Creek	Active	2021	5.5	3,294	1.83
2485	2485 - TSWCD - McKay Creek	Active	2021	16	9,184	9.71
2492	2492 - Bronson Creek Park	Active	2021	33	851	0.96
2502	2502 - TSWCD - Dairy Creek	Active	2021	30.4	6,600	2.40
2175	2175 - McKay Creek - Swallowtail Farm	Active	2022	29.4	3,800	2.03
2283	2283 - TRNWR - Chicken Creek	Active	2022	23	14,315	16.76
2319	2319 - TSWCD - Tualatin River Tributary	Active	2022	12.8	1,072	0.16
2360	2360 - Fanno Creek - Brown Natural Area	Active	2022	17.3	51,109	5.19
2376	2376 - Dawson Creek - DVIR Daycare	Active	2022	14.3	452	0.42
2404	2404 - Dawson Creek - Port of Portland	Active	2022	11.2	4,951	0.44
2409	2409 - Lower Hedges Creek	Active	2022	68.4	2,965	0.10
2457	2457 - Glencoe Creek - Corridor	Active	2022	23.5	10,405	12.90
2469	2469 - TSWCD - Tualatin River Tributary	Active	2022	4.2	5,936	4.69
2472	2472 - Cedar Creek - Sunset	Active	2022	10.7	3,420	2.19

Table B-1: Active Riparian Shade Planting Projects (2004-2023) (Continued)

Project ID	Project Name*	Project Status	Credit Year	Average Wetted Width (ft)	Segment Length (ft)**	CWS Thermal Credits (million kcal/d)
2486	2486 - TSWCD - Christensen Creek	Active	2022	7.2	2,666	1.19
2487	2487 - TSWCD - Tualatin River Tributary	Active	2022	4.3	648	0.51
2506	2506 - TSWCD - Clear Creek	Active	2022	10.7	599	0.25
2375	2375 - West Bethany Creek	Active	2023	2.3	3,595	0.97
2420	2420 - Balm Grove	Active	2023	28.3	1,188	2.11
2439	2439 - Ghost Creek - Sunset Creek	Active	2023	4.6	500	0.49
2501	2501 - TSWCD - McKay Creek	Active	2023	30.0	2,865	0.74
2503	2503 - Butternut Creek at 198th Ave	Active	2023	11.7	1,157	1.83
2519	2519 - TSWCD - Tualatin River	Active	2023	46.6	400	0.03
2520	2520 - TSWCD - Tualatin River	Active	2023	46.7	791	0.08
2521	2521 - TSWCD - Tualatin River	Active	2023	45.0	1,900	0.26
2522	2522 - TSWCD - Tualatin River	Active	2023	46.0	2,380	1.67
2538	2538 - TSWCD - West Fork Dairy Creek	Active	2023	23.5	900	0.61

*Some project names have changed since their enrollment in the trading program to better reflect their location in the watershed. The project numbers have not changed.

**Segment Length: Some projects were enrolled over multiple years. The segment length planted each year is presented in this table.

***This number has been revised to reflect the correct thermal credits for the project.

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Appendix C

Additional Management Actions

Appendix C – Additional Management Actions

The following is a summary of actions at sites that have been enrolled in the trading program for 10 years or more and did not provide anticipated shade as noted in previous annual reports. These sites will continue to be monitored for invasive species, and plant diversity and density. CWS' project managers evaluate project performance to determine the additional management actions to implement, including the number of plants planted each year. In 2021, CWS began aggregating plant data for riparian planting projects on the fiscal year, July 1 to June 30. Previously, calculations were performed from January 1 to December 31. As a result, plant numbers listed below may differ from previous annual reports. Completed and recommended management actions and detailed monitoring data such as recent stem density, canopy cover, and observed species can be found in CWS' site assessment reports, which are available upon request.

Project 1421: Hedges Creek – Upper Marsh

This project was planted with 1,480 native shrubs and trees in 2006 and has extensive wetland complexes, significant beaver activity, and ongoing challenges with invasive reed canary grass. This site has had focused attention including invasive weed treatment and inter-planting:

2007: 1,362 plants
2009: 770 plants
2010: 1,450 plants
2012: 1,400 plants
2013: 1,500 plants
2015: 1,450 plants
2017: 10,050 plants
2018: 20,296 plants
2019: 9,100 plants
2020: 3,250 plants
2021: 7,500 plants
2022: 1,545 plants
2023: 4,000 plants

Targeted invasive species treatment and inter-planting were completed in 2023. Additional invasive species treatment and inter-planting are planned for 2024. This project will continue to be monitored for invasive species cover, and plant diversity and density.

Project 135: Willow Creek Enhancement

This project was planted with 700 native shrubs and trees in 2006 and has extensive wetland complexes, significant beaver activity, and ongoing challenges with invasive yellow flag iris. Attention has been focused on this project including invasive weed treatment and inter-planting:

2007: 75 plants
2008: 2,100 plants
2011: 300 plants
2020: 3,100 plants
2023: 2,000 plants

Targeted invasive treatment and interplanting was completed in 2023. This project will continue to be monitored for invasive species cover, and plant diversity and density as the project transitions from ash forested wetland to scrub shrub.

Project 2128: TSWCD – Jackson Creek

This project was planted with 4,000 native shrubs and trees in 2013 and has extensive wetland complexes, significant beaver activity, and ongoing challenges with deer, elk, and beaver browsing. Attention has been focused on this project including invasive weed treatment and inter-planting:

2015: 1,014 plants
2016: 4,800 plants
2017: 1,000 plants
2018: 1,000 plants
2019: 1,000 plants

This project will continue to be monitored for invasive species cover, and plant diversity and density. An interplanting of trees and shrubs is planned for 2024. Tree tubes will be used to protect trees from herbivory. In the future, strategic caging of trees along the creek could assist in the establishment of a tall canopy.

Project 2093: Barrows Meadows

This project was planted with 2,450 native shrubs and trees in 2011 and has extensive wetland complexes, significant beaver activity, and ongoing challenges with herbivory. This site has focused attention including invasive weed treatment and inter-planting:

2012: 3,300 plants
2013: 3,500 plants
2014: 2,050 plants
2015: 1,500 plants
2016: 1,400 plants
2017: 1,450 plants
2018: 1,350 plants
2019: 1,500 plants
2020: 1,200 plants

Targeted invasive species treatment and interplanting was completed in 2023. This project will continue to be monitored for invasive species cover, and plant diversity and density.

Project 108: TSWCD – Tualatin River

This project was planted with 22,100 native shrubs and trees in 2007. The project is establishing well as most tree species are over 10 years old. Attention has been focused on this project including invasive weed treatment and inter-planting:

2008: 9,700 plants
2009: 3,400 plants
2010: 4,000 plants
2014: 26,400 plants
2019: 3,000 plants
2022: 4,000 plants

This project will continue to be monitored for invasive species cover, and plant diversity and density.

Project 2051: TSWCD - Bledsoe Creek

This project was planted with 29,200 native shrubs and trees in 2010. The project is establishing well as most tree species are over 10 years old. Attention has been focused on this project including invasive weed treatment and inter-planting:

2011: 11,050 plants
2014: 5000 plants

This project will continue to be monitored for invasive species cover, and plant diversity and density.

Project 1422: Beaverton Creek - 153rd to St Mary's

This project was planted with 20,390 native shrubs and trees in 2007. The project has extensive wetland complexes and significant beaver activity. Adaptive management efforts are ongoing to address natural changes to the project's plant communities. Attention has been focused on this project including invasive weed treatment and inter-planting:

2008: 12,462 plants
2009: 3,970 plants
2010: 3,000 plants
2011: 14,000 plants
2012: 15,000 plants
2013: 1,743 plants
2014: 5,227 plants

This project will continue to be monitored for invasive species cover, and plant diversity and density.

Project 2137: TSWCD - Gales Creek

This project was planted with 12,000 native shrubs and trees in 2015. Initially, it was difficult for the landowner to keep cattle out of the stream and project area. TSWCD is assisting with fencing and monitoring, and trees and shrubs are establishing. Attention has been focused on this project including invasive weed treatment and inter-planting:

2018: 11,650 plants
2019: 2,132 plants
2020: 2,500 plants

This project will continue to be monitored for invasive species cover, and plant diversity and density.

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Appendix D

Identification of Trading Baselines for Flow Enhancement

Appendix D: Identification of Trading Baselines for Flow Enhancement

The following tables present the daily average effluent flow and daily maximum effluent temperature from the Rock Creek WRRF, Durham WRRF, and Forest Grove WRRF and NTS; daily average Tualatin River flow at the Farmington Bridge (River Mile 33) and at Golf Course Road; and daily average flow enhancement rate from Hagg Lake and Barney Reservoir and the Wapato instream lease rate for July and August 2023. This information is used to calculate the allowable thermal loads, the excess thermal loads discharged, and flow enhancement credit for the Rock Creek WRRF, Durham WRRF, and Forest Grove WRRF and NTS.

Table D-1: Trading Baseline for Flow Enhancement for July 2023

Date	Durham WWTF Effluent Flow (MGD)	Durham WWTF Effluent Temperature (C)	Rock Creek WWTF Effluent Flow (MGD)	Rock Creek WWTF Effluent Temperature (C)	Forest Grove NTS Effluent Flow (MGD)	Forest Grove NTS Effluent Temperature (C)	Golf Course Flow (cfs)	Farmington Flow (cfs)	CWS Hagg Release Rate (cfs)	Wapato Instream Lease (cfs)	CWS Barney Release Rate (cfs)
7/1/2023	15.1	22.2	23.90	21.6	2.59	27.0	120	188	40	5.4	0
7/2/2023	15.0	22.3	24.13	21.5	2.56	27.0	117	195	40	5.4	0
7/3/2023	15.1	22.2	23.64	21.6	2.53	27.0	115	190	40	5.4	0
7/4/2023	14.9	22.3	22.94	21.7	2.52	28.0	114	185	40	5.4	0
7/5/2023	15.4	22.5	23.17	21.8	2.75	29.0	108	184	40	5.4	0
7/6/2023	15.7	22.5	24.03	21.9	3.12	29.0	97.3	175	40	5.4	0
7/7/2023	15.2	22.4	23.96	21.7	3.11	26.0	107	170	40	5.4	0
7/8/2023	15.2	22.1	24.05	21.6	3.04	24.0	100	177	40	5.4	0
7/9/2023	15.5	22.4	24.80	21.8	3.07	27.0	105	178	40	5.4	0
7/10/2023	15.4	21.9	25.93	21.4	3.10	23.0	110	191	40	5.4	0
7/11/2023	15.5	22.5	24.89	21.8	3.15	26.0	105	184	40	5.4	0
7/12/2023	15.6	22.7	24.41	22.1	3.05	27.0	105	179	40	5.4	0
7/13/2023	15.3	22.9	24.65	22.1	2.89	27.0	105	184	40	5.4	0
7/14/2023	14.9	23.0	24.15	22.3	3.07	28.0	102	180	40	5.4	0
7/15/2023	14.6	23.3	23.16	22.6	2.94	28.0	100	173	40	5.4	0
7/16/2023	15.2	23.2	24.28	22.6	2.94	28.0	95	168	40	5.4	0
7/17/2023	15.2	22.7	24.77	22.2	3.04	25.0	98	170	40	5.4	0
7/18/2023	15.2	22.9	23.96	22.3	3.05	26.0	100	170	45	5.4	0
7/19/2023	14.8	23.0	23.74	22.4	3.00	27.0	105	175	45	5.4	0
7/20/2023	15.2	23.3	23.18	22.6	3.01	28.0	92.3	166	45	5.4	0
7/21/2023	14.7	23.4	23.73	22.7	2.97	27.0	111	166	45	5.4	0
7/22/2023	14.6	23.5	23.43	22.7	2.83	27.0	110	178	45	5.4	0
7/23/2023	14.8	23.5	23.24	22.7	2.85	27.0	115	180	45	5.4	0
7/24/2023	15.3	22.9	24.62	22.2	3.00	23.0	114	186	45	5.4	0
7/25/2023	15.0	23.0	23.93	22.3	3.04	26.0	99.2	183	40	5.4	0
7/26/2023	15.1	23.2	24.48	22.4	2.95	25.0	96.1	170	40	5.4	0
7/27/2023	14.5	23.1	23.66	22.5	2.91	26.0	98.6	167	40	5.4	0
7/28/2023	14.3	23.2	24.37	22.4	2.89	26.0	111	172	45	5.4	0
7/29/2023	14.3	23.1	23.32	22.6	2.80	25.0	115	179	45	5.4	0
7/30/2023	14.6	23.1	23.92	22.4	2.80	25.0	116	180	45	5.4	0
7/31/2023	14.7	23.0	23.46	22.3	2.95	26.0	110	181	45	5.4	0

Table D-2: Trading Baseline for Flow Enhancement for August 2023

Date	Durham WWTF Effluent Flow (MGD)	Durham WWTF Effluent Temperature (C)	Rock Creek WWTF Effluent Flow (MGD)	Rock Creek WWTF Effluent Temperature (C)	Forest Grove NTS Effluent Flow (MGD)	Forest Grove NTS Effluent Temperature (C)	Golf Course Flow (cfs)	Farmington Flow (cfs)	CWS Hagg Release Rate (cfs)	CWS Barney Release Rate (cfs)	Wapato Instream Lease (cfs)
8/1/2023	14.4	23.1	22.37	22.6	2.96	26.0	93	173	35	0	5.4
8/2/2023	14.5	23.1	23.43	22.7	3.40	26.0	106	159	35	0	5.4
8/3/2023	14.5	23.3	23.27	22.8	3.45	26.0	114	168	40	0	5.4
8/4/2023	14.2	23.1	23.62	22.8	3.39	26.0	120	173	45	0	5.4
8/5/2023	14.0	23.0	22.98	22.8	3.20	25.0	133	178	45	0	5.4
8/6/2023	14.6	23.2	24.15	22.8	3.40	25.0	146	194	45	0	5.4
8/7/2023	14.9	23.4	23.77	23.0	3.41	26.0	137	205	45	0	5.4
8/8/2023	14.8	23.5	23.38	23.0	3.45	26.0	90	191	35	0	5.4
8/9/2023	14.8	23.4	24.11	22.8	3.06	24.0	92.5	157	30	0	5.4
8/10/2023	14.6	23.5	22.99	22.9	3.69	24.0	97.6	158	40	0	5.4
8/11/2023	14.5	23.5	22.48	22.9	3.74	24.0	107	170	45	0	5.4
8/12/2023	14.2	23.6	22.25	23.0	3.49	24.0	128	176	50	0	5.4
8/13/2023	14.7	23.8	21.81	23.2	3.56	25.0	125	183	50	0	5.4
8/14/2023	14.5	24.0	21.83	23.4	3.75	26.0	110	180	50	0	5.4
8/15/2023	14.6	24.2	21.60	23.6	3.66	27.0	103	169	50	0	5.4
8/16/2023	14.6	24.5	22.02	23.8	3.62	27.0	113	166	50	0	5.4
8/17/2023	14.8	24.1	22.06	23.6	3.71	26.0	110	168	50	0	5.4
8/18/2023	14.5	24.0	21.97	23.3	3.45	24.0	108	167	50	0	5.4
8/19/2023	14.3	23.7	21.84	22.8	3.45	23.0	97.4	164	40	0	5.4
8/20/2023	14.7	23.3	22.19	22.7	3.54	22.0	106	159	40	0	5.4
8/21/2023	15.1	23.5	23.11	22.8	3.52	22.0	102	171	40	0	5.4
8/22/2023	14.8	23.2	22.80	22.6	3.47	21.0	87.3	164	40	0	5.4
8/23/2023	14.7	23.3	23.28	22.7	3.56	21.0	84.9	148	40	0	5.4
8/24/2023	14.7	23.4	23.73	22.8	3.62	23.0	90.1	146	40	0	5.4
8/25/2023	15.1	23.7	23.46	23.2	3.53	24.0	99.3	154	50	0	5.4
8/26/2023	15.3	23.9	23.31	23.4	3.49	24.0	119	167	50	0	5.4
8/27/2023	15.1	24.0	24.41	23.4	3.65	24.0	133	186	50	0	5.4
8/28/2023	15.4	23.4	23.86	23.1	3.86	22.0	132	199	50	0	5.4
8/29/2023	15.6	23.2	24.19	23.0	3.45	22.0	95.5	191	40	0	5.4
8/30/2023	15.7	23.4	23.31	23.1	3.41	22.0	99.1	165	40	0	5.4
8/31/2023	18.4	23.0	29.68	22.8	4.34	19.0	112	184	40	0	5.4

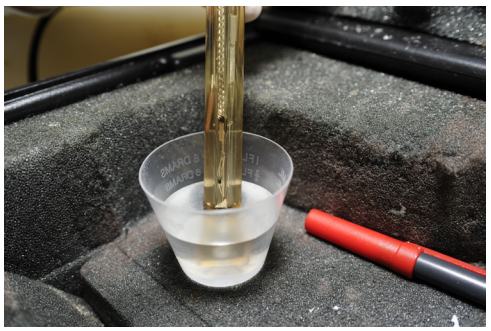
Appendix E

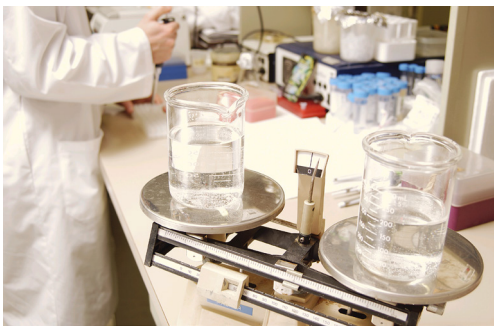
Riparian Codes for Shade-a-Lator

Appendix E: Riparian Codes for Shade-a-Lator

Code	Description	Height (m)	Density (%)	Overhang (m)
1000	Not in project	0.0	0%	0.0
1175	Forest fully vegetated	18.3	75%	3.0
1150	Forest partially vegetated	18.3	50%	3.0
1125	Forest partially vegetated	18.3	25%	3.0
1100	No existing forest vegetation	0.0	0%	0.0
1375	Wetland fully vegetated	6.1	75%	0.6
1350	Wetland partially vegetated	6.1	50%	0.6
1325	Wetland partially vegetated	6.1	25%	0.6
1300	No existing wetland vegetation	0.0	0%	0.0

Source: Clean Water Services





2024 Annual Report

PRETREATMENT PROGRAM

Clean Water Services

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Form 1 – Cover Sheet

Control Authority Name: Clean Water Services

Treatment Plant Name(s) and Addresses:

Durham Water Resource Recovery Facility
16580 SW 85th Avenue, Tigard, Oregon 97224

		Expiration Date:
EPA Number:	OR-0028118	November 30, 2027
DEQ permit Number:	101141	
DEQ File Number:	90735	
Population Served:	190,588	
Pretreatment Contact:	Bob Baumgartner	
Title:	Regulatory Affairs Director	
Address:	2550 SW Hillsboro Highway	
City, State, Zip Code:	Hillsboro, Oregon, 97123-9379	
Telephone:	503.681.4464	
Fax:	503.681.5138	
Email:	baumgartnerb@cleanwaterservices.org	

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

POTW Authorized Signatory	March 20, 2024 Date
Diane Taniguchi-Dennis Print Name	Chief Executive Officer Title

Form 1 – Cover Sheet

Control Authority Name: Clean Water Services

Treatment Plant Name(s) and Addresses:

Forest Grove Water Resource Recovery Facility with Natural Treatment System
1345 SW Fern Hill Road, Forest Grove, Oregon 97116

		Expiration Date:
EPA Number:	OR-0020168	November 30, 2027
DEQ permit Number:	101142	
DEQ File Number:	90745	
Population Served:	45,332	
Pretreatment Contact:	Bob Baumgartner	
Title:	Regulatory Affairs Director	
Address:	2550 SW Hillsboro Highway	
City, State, Zip Code:	Hillsboro, Oregon, 97123-9379	
Telephone:	503.681.4464	
Fax:	503.681.5138	
Email:	baumgartnerb@cleanwaterservices.org	

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

POTW Authorized Signatory	March 20, 2024 Date
Diane Taniguchi-Dennis Print Name	Chief Executive Officer Title

Form 1 – Cover Sheet

Control Authority Name: Clean Water Services

Treatment Plant Name(s) and Addresses:

Hillsboro Water Resource Recovery Facility
770 South First Avenue, Hillsboro, Oregon 97123

		Expiration Date:
EPA Number:	OR-0023345	November 30, 2027
DEQ permit Number:	101143	
DEQ File Number:	90752	
Population Served:	42,606	
Pretreatment Contact:	Bob Baumgartner	
Title:	Regulatory Affairs Director	
Address:	2550 SW Hillsboro Highway	
City, State, Zip Code:	Hillsboro, Oregon, 97123-9379	
Telephone:	503.681.4464	
Fax:	503.681.5138	
Email:	baumgartnerb@cleanwaterservices.org	

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

POTW Authorized Signatory	March 20, 2024
	Date
Diane Taniguchi-Dennis	Chief Executive Officer
Print Name	Title

Form 1 – Cover Sheet

Control Authority Name: Clean Water Services

Treatment Plant Name(s) and Addresses:

Rock Creek Water Resource Recovery Facility
3235 SE River Road, Hillsboro, Oregon 97123

		Expiration Date:
EPA Number:	OR-0029777	November 30, 2027
DEQ permit Number:	101144	
DEQ File Number:	90770	
Population Served:	287,006	
Pretreatment Contact:	Bob Baumgartner	
Title:	Regulatory Affairs Director	
Address:	2550 SW Hillsboro Highway	
City, State, Zip Code:	Hillsboro, Oregon, 97123-9379	
Telephone:	503.681.4464	
Fax:	503.681.5138	
Email:	baumgartnerb@cleanwaterservices.org	

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Diane Taniguchi-Dennis — March 20, 2024

POTW Authorized Signatory — Date

Diane Taniguchi-Dennis — Chief Executive Officer

Print Name — Title

Form 2 – Program Status and Update

1. Approval Date of Original Pretreatment Program and date incorporated into NPDES/WPCF permit:

   Initial date of Pretreatment Program approval: August 22, 1978

   Date incorporated into NPDES permit: March 13, 1983

2. Program Materials Under Development (Date Planned for Submission):

   None are under development at the time of this report.

3. Program Materials Submitted for Review/Approval (Date Submitted):

   None have been submitted at the time of this report.

4. Program Materials Approved Since Original Pretreatment Program Approval

Date Approved	Description of Modification	Date Incorporated into NPDES/WPCF Permit
February 28, 2022	Local Limits	January 1, 2023
December 8, 2022	Mercury Minimization Plan	January 1, 2023
January 29, 2021	Nondomestic Waste Ordinance 42	January 1, 2023
June 22, 2021	Industrial Pretreatment Program Implementation Manual	January 1, 2023

5. Date of last Pretreatment Compliance Audit: April 21-24, 2021 (virtual), September 16, 2021 (site visits)

6. Local Limits:

   a) Date of most recent technical evaluation for local limits: Date: May 28, 2021

   b) Date of most recent adopted technically based local limits: Date: February 28, 2022

   c) Pollutants for which local limits have been established: See table below.

Pollutant	Limit (mg/L, except pH)
Arsenic	0.23
Cadmium	0.13
Chromium	6.17
Copper	2.71 at Durham, Hillsboro, and Rock Creek. Rock Creek has a mass limit of 8.00 ppd to be distributed to the two semiconductor facilities that discharge to the Rock Creek facility. 1.15 at Forest Grove, which also has a mass limit of 1.24 lb/day for the only contributory SIU.
Cyanide	1.17
Lead	0.7
Mercury	0.006
Molybdenum	0.56. 4.26 lb/day to be distributed to two semiconductor facilities that discharge to the Rock Creek facility and a metal finisher that discharges to the Hillsboro facility.
Nickel	2.26
Selenium	0.35
Silver	0.06
Zinc	1.87
pH	6 – 11 (S.U.)
Fats, oil, and grease	BMP (unitless)

7. Additional Noteworthy Pretreatment Activities/Accomplishments: (include extra pages as needed)

In 2023, Clean Water Services (CWS) continued efforts to understand per- and polyfluoroalkyl substances (PFAS) within its service area. These efforts included quarterly sampling of influent, effluent, and biosolids at CWS water resource recovery facilities and quarterly sampling of previously identified key industries. To better understand contributions and opportunities for reduction from the industrial sources of PFAS, CWS developed a PFAS Management Plan template that requires facility information related to PFAS. The PFAS Management Plan is a site-specific plan that identifies actions for the facility to characterize discharges to the POTW and evaluate potential strategies to reduce the presence of PFAS in waste streams. Two industrial users have voluntarily elected treatment, one of which has implemented treatment.

The Environmental Services program updated its Industrial Waste Discharge permits to include additional monitoring requirements and PFAS Management Plan implementation requirements for NSU (local program permits) and SIU permits. The added monitoring requirements are to understand the loading of industrial waste and to identify possible impacts to future CWS water reuse program treatment strategies. The implementation of PFAS Management Plans by Industrial Users will identify the scope of PFAS related to industrial wastewater, provide strategies for reduction, and identify instances where developing industrial outreach material would be beneficial.

CWS' Environmental Services program continued its annual Industrial Pretreatment Recognition Program. Industries that had no pretreatment violations for the previous calendar year and demonstrated compliance with pretreatment requirements spanning several categories were honored.

Form 3 – Treatment Plant Monitoring

Provide all treatment plant influent, effluent and biosolids (sludge) data for toxic pollutants and non- conventional pollutants collected during the calendar year. Discuss all data anomalies including cause and actions taken to prevent recurrence. Include all re-sampling results for samples taken to meet NPDES/WPCF permit monitoring requirements because of monitoring that was invalidated for any reason. ***(See Instructions for completing FORM).***

All effluent data collected and analyzed must be in accordance with 40 CFR 136; and 40 CFR Part 503 for Biosolids.

Removal efficiencies were calculated using the measured concentrations of pollutants at the facility influent and effluent sampling locations designated on CWS' NPDES watershed-based permit. Concentration-based percent removals were calculated in the following manner: percent removal = (influent concentration – effluent concentration)/influent concentration, expressed as a percentage, for each date and parameter, by facility. Load-based percent removals were calculated in the following manner: percent removal = (influent load – effluent load)/influent load, expressed as a percentage, for each date and parameter, by facility.

Table 3-1. Qualifier codes used in Form 3

Qualifier	Description
<	Less than specified value
E	Estimated due to relatively minor sampling or analytical/QC anomalies
NA	Not available

Percent removal rate computations using values preceded by a '<' qualifier were performed using the following procedure:

(1) If the influent test data included a '<' qualifier, the percent removal was not calculated.

(2) If the influent test data did not include a '<' qualifier but the effluent test data did include a '<' qualifier, a value of half the Method Reporting Limit (MRL) was used for the effluent value in the calculation.

(3) Values preceded by the 'E' qualifier were not changed from reported values in the percent removal calculations.

When the flow from the Forest Grove and Hillsboro facilities is routed to the Rock Creek facility for treatment, the effluent flows for the Forest Grove and Hillsboro facilities are reported as zero, and no percent removal is calculated. If the influent or effluent data were not available concurrently, no percent removal was calculated and "NA" was entered instead.

CWS estimates that the concentration-based negative removal rates, between 0 to -25%, are presumed to be indicating zero removal. The concurrent flow-based removal rates range between -20% to 29%, indicating that there are positive removal rates even if the calculated concentration-based removal is negative. The load-based removal rates are shown in Treatment Plant Monitoring Data tables below. The hardness removal rates are shown, but there is no local limit for hardness. The hardness data are collected to support calculating any hardness-dependent metals criteria. Hardness is expected to increase across the facilities due to chemical addition in treatment processes. One potential explanation for the apparent negative removal when calculated using concentration occurs when the influent and/or effluent concentrations are within the margin of error of the laboratory analytical test, essentially showing zero removal. For the three cases where the influent and effluent concentrations produced negative removal rates that were not within the margin of

error, two of the cases showed positive load-based percent removal rates when accounting for flow. For the third case, molybdenum at Durham WRRF on July 11, 2023, the influent concentrations over the three consecutive days of sampling show an elevated concentration that decreases over the next two days (Table 3-2). The effluent molybdenum concentrations show a corresponding lag, probably due to the travel time across the treatment plant.

Table 3-2. Durham WRRF molybdenum concentrations during July 2023 pretreatment monitoring event

Sample Date	Conc. Units	Molybdenum Influent Concentration	Molybdenum Effluent Concentration
7/9/2023	µg/L	26.40	13.00
7/10/2023	µg/L	19.70	19.50
7/11/2023	µg/L	6.84	21.60

All influent and effluent samples represented in this report were 24-hour flow composite samples gathered and analyzed in accordance with 40 CFR Part 136, except grab samples that are required for cyanide analyses. All biosolids samples were grab samples gathered and analyzed per 40 CFR Part 503 protocols.

The data reported in Form 3 includes the monitoring required by Table B11 of CWS' NDPES permit, as well as additional sampling events that were conducted at each of CWS' facilities beyond what is required in the permit.

When the Natural Treatment System (NTS) was in operation, samples from the Forest Grove facility were collected from the plant effluent prior to discharge to the NTS, and additional removal occurred through the NTS prior to discharge to the Tualatin River. Data from the NTS metals monitoring required by Table B8 in the NPDES permit are attached to this report at Appendix A.

The data for the Hillsboro and Forest Grove facilities do not include biosolids concentration values as the solids from these facilities are transferred to the Rock Creek facility for treatment. The biosolids concentration values reported for the Rock Creek facility provide the measure of biosolids derived from all three of these treatment facilities.

Form 3 – Treatment Plant Monitoring Data - Durham

Influent-Effluent Metals & Cyanide: Durham Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	1/16/2023	33.92	32.32	µg/L	0.919	0.779	15%	0.26	0.21	19%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	1/17/2023	31.17	28.77	µg/L	1.03	0.780	24%	0.27	0.19	30%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	1/18/2023	30.98	30.48	µg/L	1.11	0.787	29%	0.29	0.20	30%
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	2/7/2023	22.64	21.44	µg/L	NA	0.855	NA	NA	0.15	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	3/7/2023	26.27	25.47	µg/L	NA	0.728	NA	NA	0.15	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	4/4/2023	29.61	28.21	µg/L	NA	0.759	NA	NA	0.18	NA
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	4/9/2023	36.00	34.10	µg/L	0.948	0.708	25%	0.28	0.20	29%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	4/10/2023	57.25	56.45	µg/L	1.08	0.768	29%	0.52	0.36	30%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	4/11/2023	48.98	46.78	µg/L	0.870	0.755	13%	0.36	0.29	17%
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	4/30/2023	24.96	22.36	µg/L	NA	< 0.508	NA	NA	0.095	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	5/1/2023	24.41	21.41	µg/L	NA	< 0.508	NA	NA	0.091	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	5/2/2023	23.12	21.12	µg/L	NA	< 0.508	NA	NA	0.089	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	5/7/2023	25.27	21.37	µg/L	NA	< 0.508	NA	NA	0.091	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	5/9/2023	30.91	27.40	µg/L	NA	< 0.508	NA	NA	0.12	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	5/14/2023	23.21	20.65	µg/L	NA	< 0.508	NA	NA	0.087	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	6/6/2023	20.68	16.91	µg/L	NA	0.529	NA	NA	0.075	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	6/20/2023	19.86	17.18	µg/L	NA	< 0.508	NA	NA	0.073	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	7/5/2023	18.60	15.44	µg/L	NA	0.530	NA	NA	0.068	NA
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	7/9/2023	18.73	15.51	µg/L	1.43	0.586	59%	0.22	0.076	66%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	7/10/2023	18.77	15.44	µg/L	1.55	0.524	66%	0.24	0.067	72%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	7/11/2023	18.59	15.49	µg/L	1.60	0.519	68%	0.25	0.067	73%
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	7/18/2023	17.82	15.17	µg/L	NA	0.527	NA	NA	0.067	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	7/25/2023	19.05	15.01	µg/L	NA	< 0.508	NA	NA	0.064	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	8/2/2023	17.91	14.50	µg/L	NA	< 0.508	NA	NA	0.061	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	9/12/2023	17.48	15.73	µg/L	NA	< 0.508	NA	NA	0.067	NA
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	10/1/2023	18.82	17.02	µg/L	1.32	1.17	11%	0.21	0.17	20%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	10/2/2023	19.61	17.61	µg/L	1.41	1.07	24%	0.23	0.16	32%

Influent-Effluent Metals & Cyanide: Durham Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	10/3/2023	18.55	17.15	µg/L	1.57	0.983	37%	0.24	0.14	42%
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	10/17/2023	20.72	18.82	µg/L	NA	1.01	NA	NA	0.16	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	10/24/2023	21.42	20.11	µg/L	NA	0.972	NA	NA	0.16	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	11/21/2023	21.08	18.48	µg/L	NA	1.00	NA	NA	0.15	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	12/12/2023	32.66	29.66	µg/L	NA	0.866	NA	NA	0.21	NA
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/16/2023	33.92	32.32	µg/L	< 0.102	< 0.102	NA	0.029	0.027	5%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/17/2023	31.17	28.77	µg/L	< 0.102	< 0.102	NA	0.027	0.024	8%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/18/2023	30.98	30.48	µg/L	< 0.102	< 0.102	NA	0.026	0.026	2%
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	2/7/2023	22.64	21.44	µg/L	NA	< 0.102	NA	NA	0.018	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	3/7/2023	26.27	25.47	µg/L	NA	< 0.102	NA	NA	0.022	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	4/4/2023	29.61	28.21	µg/L	NA	< 0.102	NA	NA	0.024	NA
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/9/2023	36.00	34.10	µg/L	< 0.102	< 0.102	NA	0.031	0.029	5%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/10/2023	57.25	56.45	µg/L	< 0.102	< 0.102	NA	0.049	0.048	1%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/11/2023	48.98	46.78	µg/L	< 0.102	< 0.102	NA	0.042	0.040	5%
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	4/30/2023	24.96	22.36	µg/L	NA	< 0.102	NA	NA	0.019	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	5/1/2023	24.41	21.41	µg/L	NA	< 0.102	NA	NA	0.018	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	5/2/2023	23.12	21.12	µg/L	NA	< 0.102	NA	NA	0.018	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	5/7/2023	25.27	21.37	µg/L	NA	< 0.102	NA	NA	0.018	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	5/9/2023	30.91	27.40	µg/L	NA	< 0.102	NA	NA	0.023	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	5/14/2023	23.21	20.65	µg/L	NA	< 0.102	NA	NA	0.018	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	6/6/2023	20.68	16.91	µg/L	NA	< 0.102	NA	NA	0.014	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	6/20/2023	19.86	17.18	µg/L	NA	< 0.102	NA	NA	0.015	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	7/5/2023	18.60	15.44	µg/L	NA	< 0.102	NA	NA	0.013	NA
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	7/9/2023	18.73	15.51	µg/L	0.133	< 0.102	62%	0.021	0.013	36%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	7/10/2023	18.77	15.44	µg/L	0.148	< 0.102	66%	0.023	0.013	43%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	7/11/2023	18.59	15.49	µg/L	0.134	< 0.102	62%	0.021	0.013	37%
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	7/18/2023	17.82	15.17	µg/L	NA	< 0.102	NA	NA	0.013	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	7/25/2023	19.05	15.01	µg/L	NA	< 0.102	NA	NA	0.013	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	8/2/2023	17.91	14.50	µg/L	NA	< 0.102	NA	NA	0.012	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	9/12/2023	17.48	15.73	µg/L	NA	< 0.102	NA	NA	0.013	NA

Influent-Effluent Metals & Cyanide: Durham Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	10/1/2023	18.82	17.02	µg/L	0.150	< 0.102	66%	0.024	0.014	39%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	10/2/2023	19.61	17.61	µg/L	0.113	< 0.102	55%	0.018	0.015	19%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	10/3/2023	18.55	17.15	µg/L	0.157	< 0.102	68%	0.024	0.015	40%
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	10/17/2023	20.72	18.82	µg/L	NA	< 0.102	NA	NA	0.016	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	10/24/2023	21.42	20.11	µg/L	NA	< 0.102	NA	NA	0.017	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	11/21/2023	21.08	18.48	µg/L	NA	< 0.102	NA	NA	0.016	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	12/12/2023	32.66	29.66	µg/L	NA	< 0.102	NA	NA	0.025	NA
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	1/16/2023	33.92	32.32	µg/L	1.40	< 0.406	86%	0.40	0.11	72%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	1/17/2023	31.17	28.77	µg/L	1.59	< 0.406	87%	0.41	0.097	76%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	1/18/2023	30.98	30.48	µg/L	1.62	< 0.406	88%	0.42	0.10	75%
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	2/7/2023	22.64	21.44	µg/L	NA	< 0.406	NA	NA	0.073	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	3/7/2023	26.27	25.47	µg/L	NA	< 0.406	NA	NA	0.086	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	4/4/2023	29.61	28.21	µg/L	NA	< 0.406	NA	NA	0.096	NA
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	4/9/2023	36.00	34.10	µg/L	1.15	< 0.406	82%	0.35	0.12	67%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	4/10/2023	57.25	56.45	µg/L	1.59	< 0.406	87%	0.76	0.19	75%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	4/11/2023	48.98	46.78	µg/L	1.45	< 0.406	86%	0.59	0.16	73%
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	4/30/2023	24.96	22.36	µg/L	NA	< 0.406	NA	NA	0.076	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	5/1/2023	24.41	21.41	µg/L	NA	< 0.406	NA	NA	0.072	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	5/2/2023	23.12	21.12	µg/L	NA	< 0.406	NA	NA	0.072	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	5/7/2023	25.27	21.37	µg/L	NA	< 0.406	NA	NA	0.072	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	5/9/2023	30.91	27.40	µg/L	NA	< 0.406	NA	NA	0.093	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	5/14/2023	23.21	20.65	µg/L	NA	< 0.406	NA	NA	0.070	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	6/6/2023	20.68	16.91	µg/L	NA	< 0.406	NA	NA	0.057	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	6/20/2023	19.86	17.18	µg/L	NA	< 0.406	NA	NA	0.058	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	7/5/2023	18.60	15.44	µg/L	NA	< 0.406	NA	NA	0.052	NA
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	7/9/2023	18.73	15.51	µg/L	1.37	< 0.406	85%	0.21	0.053	75%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	7/10/2023	18.77	15.44	µg/L	1.84	< 0.406	89%	0.29	0.052	82%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	7/11/2023	18.59	15.49	µg/L	1.96	< 0.406	90%	0.30	0.052	83%
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	7/18/2023	17.82	15.17	µg/L	NA	< 0.406	NA	NA	0.051	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	7/25/2023	19.05	15.01	µg/L	NA	< 0.406	NA	NA	0.051	NA

Influent-Effluent Metals & Cyanide: Durham Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	8/2/2023	17.91	14.50	µg/L	NA	< 0.406	NA	NA	0.049	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	9/12/2023	17.48	15.73	µg/L	NA	< 0.406	NA	NA	0.053	NA
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	10/1/2023	18.82	17.02	µg/L	1.07	< 0.406	81%	0.17	0.058	66%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	10/2/2023	19.61	17.61	µg/L	1.33	< 0.406	85%	0.22	0.060	73%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	10/3/2023	18.55	17.15	µg/L	1.74	< 0.406	88%	0.27	0.058	78%
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	10/17/2023	20.72	18.82	µg/L	NA	< 0.406	NA	NA	0.064	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	10/24/2023	21.42	20.11	µg/L	NA	< 0.406	NA	NA	0.068	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	11/21/2023	21.08	18.48	µg/L	NA	0.445	NA	NA	0.069	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	12/12/2023	32.66	29.66	µg/L	NA	< 0.406	NA	NA	0.10	NA
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	1/16/2023	33.92	32.32	µg/L	16.0	2.44	85%	4.5	0.66	85%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	1/17/2023	31.17	28.77	µg/L	16.4	1.79	89%	4.3	0.43	90%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	1/18/2023	30.98	30.48	µg/L	19.1	1.65	91%	4.9	0.42	92%
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	2/7/2023	22.64	21.44	µg/L	NA	2.71	NA	NA	0.48	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	3/7/2023	26.27	25.47	µg/L	NA	1.66	NA	NA	0.35	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	4/4/2023	29.61	28.21	µg/L	NA	1.71	NA	NA	0.40	NA
Copper	ICP/MS Metals, Total Recoverable	0.406	NA	4/9/2023	36.00	34.10	µg/L	13.0	NA	NA	3.9	NA	NA
Copper	ICP/MS Metals, Total Recoverable	0.406	NA	4/10/2023	57.25	56.45	µg/L	13.3	NA	NA	6.4	NA	NA
Copper	ICP/MS Metals, Total Recoverable	0.406	NA	4/11/2023	48.98	46.78	µg/L	11.1	NA	NA	4.5	NA	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	4/30/2023	24.96	22.36	µg/L	NA	2.97	NA	NA	0.55	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	5/1/2023	24.41	21.41	µg/L	NA	1.59	NA	NA	0.28	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	5/2/2023	23.12	21.12	µg/L	NA	1.93	NA	NA	0.34	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	5/7/2023	25.27	21.37	µg/L	NA	0.980	NA	NA	0.17	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	5/9/2023	30.91	27.40	µg/L	NA	1.03	NA	NA	0.24	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	5/11/2023	25.47	22.64	µg/L	NA	1.13	NA	NA	0.21	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	5/14/2023	23.21	20.65	µg/L	NA	1.22	NA	NA	0.21	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	5/16/2023	25.13	22.37	µg/L	NA	1.44	NA	NA	0.27	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	5/18/2023	23.16	20.36	µg/L	NA	1.17	NA	NA	0.20	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	5/21/2023	21.80	18.62	µg/L	NA	1.27	NA	NA	0.20	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	5/23/2023	22.58	18.83	µg/L	NA	1.32	NA	NA	0.21	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	5/25/2023	21.28	17.79	µg/L	NA	1.36	NA	NA	0.20	NA

Influent-Effluent Metals & Cyanide: Durham Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	5/28/2023	20.32	16.63	µg/L	NA	1.34	NA	NA	0.19	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	5/30/2023	20.58	17.52	µg/L	NA	1.31	NA	NA	0.19	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	6/1/2023	20.75	17.28	µg/L	NA	1.26	NA	NA	0.18	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	6/4/2023	20.99	17.31	µg/L	NA	1.56	NA	NA	0.23	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	6/6/2023	20.68	16.91	µg/L	NA	1.43	NA	NA	0.20	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	6/8/2023	21.68	18.48	µg/L	NA	1.28	NA	NA	0.20	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	6/11/2023	20.41	17.46	µg/L	NA	1.29	NA	NA	0.19	NA
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	6/13/2023	20.05	16.82	µg/L	27.0	1.31	95%	4.5	0.18	96%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	6/15/2023	19.21	16.72	µg/L	34.1	1.21	96%	5.5	0.17	97%
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	6/18/2023	20.39	17.75	µg/L	NA	1.20	NA	NA	0.18	NA
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	6/20/2023	19.86	17.18	µg/L	22.0	2.85	87%	3.6	0.41	89%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	6/22/2023	20.03	17.15	µg/L	44.4	1.39	97%	7.4	0.20	97%
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	6/25/2023	19.74	16.57	µg/L	NA	1.53	NA	NA	0.21	NA
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	6/27/2023	19.17	16.23	µg/L	29.9	1.70	94%	4.8	0.23	95%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	6/29/2023	19.24	15.82	µg/L	34.2	1.61	95%	5.5	0.21	96%
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	7/2/2023	18.26	15.00	µg/L	NA	1.81	NA	NA	0.23	NA
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	7/4/2023	17.33	14.93	µg/L	23.2	1.87	92%	3.4	0.23	93%
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	7/5/2023	18.60	15.44	µg/L	NA	1.64	NA	NA	0.21	NA
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	7/6/2023	18.93	15.65	µg/L	27.7	1.81	94%	4.4	0.24	95%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	7/9/2023	18.73	15.51	µg/L	26.3	2.04	92%	4.1	0.26	94%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	7/10/2023	18.77	15.44	µg/L	33.7	2.04	94%	5.3	0.26	95%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	7/11/2023	18.59	15.49	µg/L	29.1	1.85	94%	4.5	0.24	95%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	7/13/2023	18.43	15.34	µg/L	32.3	1.62	95%	5.0	0.21	96%
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	7/16/2023	18.59	15.20	µg/L	NA	2.25	NA	NA	0.29	NA
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	7/18/2023	17.82	15.17	µg/L	27.5	2.02	93%	4.1	0.26	94%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	7/20/2023	17.15	15.16	µg/L	55.5	1.88	97%	7.9	0.24	97%
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	7/23/2023	18.58	14.79	µg/L	NA	2.00	NA	NA	0.25	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	7/25/2023	19.05	15.01	µg/L	NA	2.04	NA	NA	0.26	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	7/27/2023	18.63	14.53	µg/L	NA	1.77	NA	NA	0.21	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	7/30/2023	17.83	14.64	µg/L	NA	1.55	NA	NA	0.19	NA

Influent-Effluent Metals & Cyanide: Durham Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/1/2023	17.58	14.42	µg/L	NA	1.61	NA	NA	0.19	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/2/2023	17.91	14.50	µg/L	NA	1.54	NA	NA	0.19	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/3/2023	17.48	14.47	µg/L	NA	1.44	NA	NA	0.17	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/6/2023	18.09	14.61	µg/L	NA	1.50	NA	NA	0.18	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/8/2023	17.90	14.77	µg/L	NA	1.66	NA	NA	0.20	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/10/2023	17.78	14.58	µg/L	NA	2.72	NA	NA	0.33	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/13/2023	18.05	14.66	µg/L	NA	1.52	NA	NA	0.19	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/15/2023	17.91	14.55	µg/L	NA	1.63	NA	NA	0.20	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/17/2023	17.80	14.79	µg/L	NA	1.56	NA	NA	0.19	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/20/2023	18.26	14.68	µg/L	NA	2.04	NA	NA	0.25	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/22/2023	17.73	14.77	µg/L	NA	1.91	NA	NA	0.24	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/24/2023	17.37	14.67	µg/L	NA	2.01	NA	NA	0.25	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/27/2023	17.86	15.09	µg/L	NA	2.15	NA	NA	0.27	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/29/2023	17.82	15.59	µg/L	NA	1.77	NA	NA	0.23	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/31/2023	21.41	18.38	µg/L	NA	2.11	NA	NA	0.32	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	9/3/2023	18.09	15.58	µg/L	NA	1.87	NA	NA	0.24	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	9/5/2023	19.17	16.12	µg/L	NA	1.89	NA	NA	0.25	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	9/7/2023	19.09	15.31	µg/L	NA	1.71	NA	NA	0.22	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	9/10/2023	18.31	15.65	µg/L	NA	1.71	NA	NA	0.22	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	9/12/2023	17.48	15.73	µg/L	NA	2.09	NA	NA	0.27	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	9/14/2023	17.98	14.92	µg/L	NA	1.83	NA	NA	0.23	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	9/17/2023	18.16	15.52	µg/L	NA	2.05	NA	NA	0.27	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	9/19/2023	17.61	15.30	µg/L	NA	2.06	NA	NA	0.26	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	9/26/2023	20.70	18.90	µg/L	NA	2.07	NA	NA	0.33	NA
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	10/1/2023	18.82	17.02	µg/L	22.8	2.35	90%	3.6	0.33	91%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	10/2/2023	19.61	17.61	µg/L	44.6	2.56	94%	7.3	0.38	95%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	10/3/2023	18.55	17.15	µg/L	31.3	2.61	92%	4.8	0.37	92%
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	10/17/2023	20.72	18.82	µg/L	NA	2.10	NA	NA	0.33	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	10/24/2023	21.42	20.11	µg/L	NA	2.96	NA	NA	0.50	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	11/21/2023	21.08	18.48	µg/L	NA	4.26	NA	NA	0.66	NA

Influent-Effluent Metals & Cyanide: Durham Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	12/12/2023	32.66	29.66	µg/L	NA	1.92	NA	NA	0.47	NA
Cyanide	Cyanide, Total	1	1	1/17/2023	31.17	28.77	µg/L	2.82	2.21	22%	0.73	0.53	28%
Cyanide	Cyanide, Total	1	1	1/18/2023	30.98	30.48	µg/L	1.12	2.17	-94%	0.29	0.55	-91%
Cyanide	Cyanide, Total	1	1	1/19/2023	28.58	27.18	µg/L	1.19	2.20	-85%	0.28	0.50	-76%
Cyanide	Cyanide, Total	1	1	4/10/2023	57.25	56.45	µg/L	3.47	2.21	36%	1.7	1.0	37%
Cyanide	Cyanide, Total	1	1	4/11/2023	48.98	46.78	µg/L	1.10	1.97	-79%	0.45	0.77	-71%
Cyanide	Cyanide, Total	1	1	4/12/2023	41.03	39.13	µg/L	1.59	1.91	-20%	0.54	0.62	-15%
Cyanide	Cyanide, Total	1	1	7/10/2023	18.77	15.44	µg/L	3.49	3.12	11%	0.55	0.40	26%
Cyanide	Cyanide, Total	1	1	7/11/2023	18.59	15.49	µg/L	5.41	3.46	36%	0.84	0.45	47%
Cyanide	Cyanide, Total	1	1	7/12/2023	18.96	15.56	µg/L	22.3	3.50	84%	3.5	0.45	87%
Cyanide	Cyanide, Total	1	1	10/2/2023	19.61	17.61	µg/L	5.14	5.13	0%	0.84	0.75	10%
Cyanide	Cyanide, Total	1	1	10/3/2023	18.55	17.15	µg/L	3.04	3.37	-11%	0.47	0.48	-3%
Cyanide	Cyanide, Total	1	1	10/4/2023	18.24	16.54	µg/L	3.31	3.87	-17%	0.50	0.53	-6%
Cyanide	Cyanide, Total	NA	1	11/8/2023	25.64	22.84	µg/L	NA	2.45	NA	NA	0.47	NA
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	1/16/2023	33.92	32.32	mg/L	83.2	82.8	1%	24000	22000	5%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	1/17/2023	31.17	28.77	mg/L	87.5	86.0	2%	23000	21000	9%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	1/18/2023	30.98	30.48	mg/L	89.3	86.4	3%	23000	22000	5%
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	2/7/2023	22.64	21.44	mg/L	NA	101	NA	NA	18000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	3/7/2023	26.27	25.47	mg/L	NA	99.5	NA	NA	21000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	4/4/2023	29.61	28.21	mg/L	NA	95.4	NA	NA	22000	NA
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	4/9/2023	36.00	34.10	mg/L	86.9	93.1	-7%	26000	26000	-2%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	4/10/2023	57.25	56.45	mg/L	79.3	86.3	-9%	38000	41000	-7%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	4/11/2023	48.98	46.78	mg/L	80.7	80.0	1%	33000	31000	5%
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	4/30/2023	24.96	22.36	mg/L	NA	125	NA	NA	23000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	5/1/2023	24.41	21.41	mg/L	NA	130	NA	NA	23000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	5/2/2023	23.12	21.12	mg/L	NA	128	NA	NA	23000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	5/7/2023	25.27	21.37	mg/L	NA	133	NA	NA	24000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	5/9/2023	30.91	27.40	mg/L	NA	120	NA	NA	27000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	5/11/2023	25.47	22.64	mg/L	NA	132	NA	NA	25000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	5/14/2023	23.21	20.65	mg/L	NA	147	NA	NA	25000	NA

Influent-Effluent Metals & Cyanide: Durham Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	5/16/2023	25.13	22.37	mg/L	NA	147	NA	NA	27000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	5/18/2023	23.16	20.36	mg/L	NA	146	NA	NA	25000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	5/21/2023	21.80	18.62	mg/L	NA	152	NA	NA	24000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	5/23/2023	22.58	18.83	mg/L	NA	152	NA	NA	24000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	5/25/2023	21.28	17.79	mg/L	NA	152	NA	NA	23000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	5/28/2023	20.32	16.63	mg/L	NA	156	NA	NA	22000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	5/30/2023	20.58	17.52	mg/L	NA	145	NA	NA	21000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	6/1/2023	20.75	17.28	mg/L	NA	123	NA	NA	18000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	6/4/2023	20.99	17.31	mg/L	NA	123	NA	NA	18000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	6/6/2023	20.68	16.91	mg/L	NA	148	NA	NA	21000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	6/8/2023	21.68	18.48	mg/L	NA	151	NA	NA	23000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	6/11/2023	20.41	17.46	mg/L	NA	136	NA	NA	20000	NA
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	6/13/2023	20.05	16.82	mg/L	105	139	-32%	18000	19000	-11%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	6/15/2023	19.21	16.72	mg/L	123	144	-17%	20000	20000	-2%
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	6/18/2023	20.39	17.75	mg/L	NA	141	NA	NA	21000	NA
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	6/20/2023	19.86	17.18	mg/L	98.0	129	-32%	16000	18000	-14%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	6/22/2023	20.03	17.15	mg/L	112	125	-12%	19000	18000	4%
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	6/25/2023	19.74	16.57	mg/L	NA	118	NA	NA	16000	NA
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	6/27/2023	19.17	16.23	mg/L	102	145	-42%	16000	20000	-20%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	6/29/2023	19.24	15.82	mg/L	104	147	-41%	17000	19000	-16%
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	7/2/2023	18.26	15.00	mg/L	NA	141	NA	NA	18000	NA
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	7/4/2023	17.33	14.93	mg/L	104	147	-41%	15000	18000	-22%
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	7/5/2023	18.60	15.44	mg/L	NA	147	NA	NA	19000	NA
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	7/6/2023	18.93	15.65	mg/L	100	145	-45%	16000	19000	-20%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	7/9/2023	18.73	15.51	mg/L	99.0	138	-39%	15000	18000	-15%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	7/10/2023	18.77	15.44	mg/L	104	135	-30%	16000	17000	-7%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	7/11/2023	18.59	15.49	mg/L	106	137	-29%	16000	18000	-8%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	7/13/2023	18.43	15.34	mg/L	106	130	-23%	16000	17000	-2%
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	7/16/2023	18.59	15.20	mg/L	NA	136	NA	NA	17000	NA
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	7/18/2023	17.82	15.17	mg/L	109	136	-25%	16000	17000	-6%

Influent-Effluent Metals & Cyanide: Durham Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	7/20/2023	17.15	15.16	mg/L	95.6	125	-31%	14000	16000	-16%
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	7/23/2023	18.58	14.79	mg/L	NA	130	NA	NA	16000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	7/25/2023	19.05	15.01	mg/L	NA	137	NA	NA	17000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	7/27/2023	18.63	14.53	mg/L	NA	142	NA	NA	17000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	7/30/2023	17.83	14.64	mg/L	NA	140	NA	NA	17000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/1/2023	17.58	14.42	mg/L	NA	139	NA	NA	17000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/2/2023	17.91	14.50	mg/L	NA	141	NA	NA	17000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/3/2023	17.48	14.47	mg/L	NA	142	NA	NA	17000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/6/2023	18.09	14.61	mg/L	NA	140	NA	NA	17000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/8/2023	17.90	14.77	mg/L	NA	144	NA	NA	18000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/10/2023	17.78	14.58	mg/L	NA	142	NA	NA	17000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/13/2023	18.05	14.66	mg/L	NA	142	NA	NA	17000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/15/2023	17.91	14.55	mg/L	NA	158	NA	NA	19000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/17/2023	17.80	14.79	mg/L	NA	135	NA	NA	17000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/20/2023	18.26	14.68	mg/L	NA	128	NA	NA	16000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/22/2023	17.73	14.77	mg/L	NA	130	NA	NA	16000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/24/2023	17.37	14.67	mg/L	NA	135	NA	NA	17000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/27/2023	17.86	15.09	mg/L	NA	128	NA	NA	16000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/29/2023	17.82	15.59	mg/L	NA	134	NA	NA	17000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/31/2023	21.41	18.38	mg/L	NA	136	NA	NA	21000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	9/3/2023	18.09	15.58	mg/L	NA	128	NA	NA	17000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	9/5/2023	19.17	16.12	mg/L	NA	133	NA	NA	18000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	9/7/2023	19.09	15.31	mg/L	NA	135	NA	NA	17000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	9/10/2023	18.31	15.65	mg/L	NA	138	NA	NA	18000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	9/12/2023	17.48	15.73	mg/L	NA	141	NA	NA	18000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	9/14/2023	17.98	14.92	mg/L	NA	138	NA	NA	17000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	9/17/2023	18.16	15.52	mg/L	NA	132	NA	NA	17000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	9/19/2023	17.61	15.30	mg/L	NA	133	NA	NA	17000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	9/26/2023	20.70	18.90	mg/L	NA	123	NA	NA	19000	NA
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	10/1/2023	18.82	17.02	mg/L	103	111	-8%	16000	16000	3%

Influent-Effluent Metals & Cyanide: Durham Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	10/2/2023	19.61	17.61	mg/L	100	111	-11%	16000	16000	0%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	10/3/2023	18.55	17.15	mg/L	107	110	-3%	17000	16000	5%
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	10/17/2023	20.72	18.82	mg/L	NA	104	NA	NA	16000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	10/24/2023	21.42	20.11	mg/L	NA	109	NA	NA	18000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	11/21/2023	21.08	18.48	mg/L	NA	101	NA	NA	16000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	12/12/2023	32.66	29.66	mg/L	NA	91.3	NA	NA	23000	NA
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/16/2023	33.92	32.32	µg/L	0.631	0.103	84%	0.18	0.028	84%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/17/2023	31.17	28.77	µg/L	0.716	0.123	83%	0.19	0.030	84%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/18/2023	30.98	30.48	µg/L	0.873	0.587	33%	0.23	0.15	34%
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	2/7/2023	22.64	21.44	µg/L	NA	0.292	NA	NA	0.052	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	3/7/2023	26.27	25.47	µg/L	NA	0.116	NA	NA	0.025	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	4/4/2023	29.61	28.21	µg/L	NA	< 0.102	NA	NA	0.024	NA
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/9/2023	36.00	34.10	µg/L	0.599	< 0.102	92%	0.18	0.029	84%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/10/2023	57.25	56.45	µg/L	0.962	< 0.102	95%	0.46	0.048	90%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/11/2023	48.98	46.78	µg/L	0.671	< 0.102	92%	0.27	0.040	85%
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	4/30/2023	24.96	22.36	µg/L	NA	0.194	NA	NA	0.036	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	5/1/2023	24.41	21.41	µg/L	NA	0.195	NA	NA	0.035	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	5/2/2023	23.12	21.12	µg/L	NA	0.207	NA	NA	0.036	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	5/7/2023	25.27	21.37	µg/L	NA	0.119	NA	NA	0.021	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	5/9/2023	30.91	27.40	µg/L	NA	0.105	NA	NA	0.024	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	5/14/2023	23.21	20.65	µg/L	NA	0.163	NA	NA	0.028	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	6/6/2023	20.68	16.91	µg/L	NA	0.142	NA	NA	0.020	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	6/20/2023	19.86	17.18	µg/L	NA	0.107	NA	NA	0.015	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	7/5/2023	18.60	15.44	µg/L	NA	0.168	NA	NA	0.022	NA
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	7/9/2023	18.73	15.51	µg/L	0.864	0.205	76%	0.13	0.027	80%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	7/10/2023	18.77	15.44	µg/L	1.13	0.210	81%	0.18	0.027	85%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	7/11/2023	18.59	15.49	µg/L	0.919	0.218	76%	0.14	0.028	80%
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	7/18/2023	17.82	15.17	µg/L	NA	0.180	NA	NA	0.023	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	7/25/2023	19.05	15.01	µg/L	NA	0.179	NA	NA	0.022	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	8/2/2023	17.91	14.50	µg/L	NA	0.175	NA	NA	0.021	NA

Influent-Effluent Metals & Cyanide: Durham Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	9/12/2023	17.48	15.73	µg/L	NA	0.132	NA	NA	0.017	NA
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	10/1/2023	18.82	17.02	µg/L	1.25	0.113	91%	0.20	0.016	92%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	10/2/2023	19.61	17.61	µg/L	0.958	< 0.102	95%	0.16	0.015	90%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	10/3/2023	18.55	17.15	µg/L	1.42	< 0.102	96%	0.22	0.015	93%
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	10/17/2023	20.72	18.82	µg/L	NA	< 0.102	NA	NA	0.016	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	10/24/2023	21.42	20.11	µg/L	NA	0.115	NA	NA	0.019	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	11/21/2023	21.08	18.48	µg/L	NA	< 0.102	NA	NA	0.016	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	12/12/2023	32.66	29.66	µg/L	NA	< 0.102	NA	NA	0.025	NA
Mercury	Mercury by Purge & Trap, Total	1	0.2	1/16/2023	33.92	32.32	ng/L	31.1	1.83	94%	0.0088	0.00049	94%
Mercury	Mercury by Purge & Trap, Total	1	0.2	1/17/2023	31.17	28.77	ng/L	25.7	1.51	94%	0.0067	0.00036	95%
Mercury	Mercury by Purge & Trap, Total	1	0.2	1/18/2023	30.98	30.48	ng/L	24.4	1.51	94%	0.0063	0.00038	94%
Mercury	Mercury by Purge & Trap, Total	1	0.2	4/9/2023	36.00	34.10	ng/L	34.1	1.90	94%	0.010	0.00054	95%
Mercury	Mercury by Purge & Trap, Total	1	0.2	4/10/2023	57.25	56.45	ng/L	16.6	1.67	90%	0.0079	0.00079	90%
Mercury	Mercury by Purge & Trap, Total	1	0.2	4/11/2023	48.98	46.78	ng/L	26.5	1.55	94%	0.011	0.00060	94%
Mercury	Mercury by Purge & Trap, Total	1	0.2	7/9/2023	18.73	15.51	ng/L	24.6	0.888	96%	0.0038	0.00011	97%
Mercury	Mercury by Purge & Trap, Total	1	0.2	7/10/2023	18.77	15.44	ng/L	46.1	0.806	98%	0.0072	0.00010	99%
Mercury	Mercury by Purge & Trap, Total	1	0.2	7/11/2023	18.59	15.49	ng/L	44.9	0.742	98%	0.0070	0.000096	99%
Mercury	Mercury by Purge & Trap, Total	1	0.2	10/1/2023	18.82	17.02	ng/L	41.6	1.54	96%	0.0065	0.00022	97%
Mercury	Mercury by Purge & Trap, Total	1	0.2	10/2/2023	19.61	17.61	ng/L	50.9	1.21	98%	0.0083	0.00018	98%
Mercury	Mercury by Purge & Trap, Total	1	0.2	10/3/2023	18.55	17.15	ng/L	71.2	1.26	98%	0.011	0.00018	98%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/16/2023	33.92	32.32	µg/L	1.58	1.02	35%	0.45	0.27	38%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/17/2023	31.17	28.77	µg/L	1.51	1.12	26%	0.39	0.27	32%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/18/2023	30.98	30.48	µg/L	1.58	1.21	23%	0.41	0.31	25%
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	2/7/2023	22.64	21.44	µg/L	NA	1.33	NA	NA	0.24	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	3/7/2023	26.27	25.47	µg/L	NA	1.14	NA	NA	0.24	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	4/4/2023	29.61	28.21	µg/L	NA	0.975	NA	NA	0.23	NA
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/9/2023	36.00	34.10	µg/L	1.11	2.09	-88%	0.33	0.59	-78%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/10/2023	57.25	56.45	µg/L	1.08	1.31	-21%	0.52	0.62	-20%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/11/2023	48.98	46.78	µg/L	0.900	0.760	16%	0.37	0.30	19%
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	4/30/2023	24.96	22.36	µg/L	NA	1.17	NA	NA	0.22	NA

Influent-Effluent Metals & Cyanide: Durham Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	5/1/2023	24.41	21.41	µg/L	NA	1.11	NA	NA	0.20	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	5/2/2023	23.12	21.12	µg/L	NA	1.18	NA	NA	0.21	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	5/7/2023	25.27	21.37	µg/L	NA	1.86	NA	NA	0.33	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	5/9/2023	30.91	27.40	µg/L	NA	1.02	NA	NA	0.23	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	5/14/2023	23.21	20.65	µg/L	NA	1.44	NA	NA	0.25	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	6/6/2023	20.68	16.91	µg/L	NA	2.12	NA	NA	0.30	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	6/20/2023	19.86	17.18	µg/L	NA	1.43	NA	NA	0.20	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	7/5/2023	18.60	15.44	µg/L	NA	1.03	NA	NA	0.13	NA
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	7/9/2023	18.73	15.51	µg/L	26.4	13.0	51%	4.1	1.7	59%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	7/10/2023	18.77	15.44	µg/L	19.7	19.5	1%	3.1	2.5	19%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	7/11/2023	18.59	15.49	µg/L	6.84	21.6	-220%	1.1	2.8	-160%
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	7/18/2023	17.82	15.17	µg/L	NA	2.40	NA	NA	0.30	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	7/25/2023	19.05	15.01	µg/L	NA	1.27	NA	NA	0.16	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	8/2/2023	17.91	14.50	µg/L	NA	18.6	NA	NA	2.2	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	9/12/2023	17.48	15.73	µg/L	NA	1.88	NA	NA	0.25	NA
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	10/1/2023	18.82	17.02	µg/L	1.79	1.26	30%	0.28	0.18	36%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	10/2/2023	19.61	17.61	µg/L	1.84	1.19	35%	0.30	0.17	42%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	10/3/2023	18.55	17.15	µg/L	1.89	1.23	35%	0.29	0.18	40%
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	10/17/2023	20.72	18.82	µg/L	NA	1.40	NA	NA	0.22	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	10/24/2023	21.42	20.11	µg/L	NA	1.57	NA	NA	0.26	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	11/21/2023	21.08	18.48	µg/L	NA	3.16	NA	NA	0.49	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	12/12/2023	32.66	29.66	µg/L	NA	2.54	NA	NA	0.63	NA
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	1/16/2023	33.92	32.32	µg/L	3.41	1.48	57%	0.96	0.40	59%
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	1/17/2023	31.17	28.77	µg/L	3.12	1.70	46%	0.81	0.41	50%
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	1/18/2023	30.98	30.48	µg/L	3.46	1.68	51%	0.89	0.43	52%
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	2/7/2023	22.64	21.44	µg/L	NA	1.80	NA	NA	0.32	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	3/7/2023	26.27	25.47	µg/L	NA	1.76	NA	NA	0.37	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	4/4/2023	29.61	28.21	µg/L	NA	1.56	NA	NA	0.37	NA
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	4/9/2023	36.00	34.10	µg/L	2.01	1.57	22%	0.60	0.45	26%
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	4/10/2023	57.25	56.45	µg/L	2.60	1.24	52%	1.2	0.58	53%

Influent-Effluent Metals & Cyanide: Durham Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	4/11/2023	48.98	46.78	µg/L	2.51	1.07	57%	1.0	0.42	59%
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	4/30/2023	24.96	22.36	µg/L	NA	1.80	NA	NA	0.34	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	5/1/2023	24.41	21.41	µg/L	NA	1.79	NA	NA	0.32	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	5/2/2023	23.12	21.12	µg/L	NA	1.78	NA	NA	0.31	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	5/7/2023	25.27	21.37	µg/L	NA	1.69	NA	NA	0.30	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	5/9/2023	30.91	27.40	µg/L	NA	1.46	NA	NA	0.33	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	5/14/2023	23.21	20.65	µg/L	NA	1.72	NA	NA	0.30	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	6/6/2023	20.68	16.91	µg/L	NA	1.82	NA	NA	0.26	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	6/20/2023	19.86	17.18	µg/L	NA	1.79	NA	NA	0.26	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	7/5/2023	18.60	15.44	µg/L	NA	1.91	NA	NA	0.25	NA
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	7/9/2023	18.73	15.51	µg/L	3.05	2.01	34%	0.48	0.26	45%
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	7/10/2023	18.77	15.44	µg/L	4.11	1.85	55%	0.64	0.24	63%
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	7/11/2023	18.59	15.49	µg/L	4.31	1.86	57%	0.67	0.24	64%
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	7/18/2023	17.82	15.17	µg/L	NA	2.76	NA	NA	0.35	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	7/25/2023	19.05	15.01	µg/L	NA	2.01	NA	NA	0.25	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	8/2/2023	17.91	14.50	µg/L	NA	2.06	NA	NA	0.25	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	9/12/2023	17.48	15.73	µg/L	NA	2.00	NA	NA	0.26	NA
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	10/1/2023	18.82	17.02	µg/L	2.85	1.93	32%	0.45	0.27	39%
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	10/2/2023	19.61	17.61	µg/L	3.23	1.82	44%	0.53	0.27	49%
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	10/3/2023	18.55	17.15	µg/L	4.12	1.75	57%	0.64	0.25	61%
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	10/17/2023	20.72	18.82	µg/L	NA	1.75	NA	NA	0.27	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	10/24/2023	21.42	20.11	µg/L	NA	2.14	NA	NA	0.36	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	11/21/2023	21.08	18.48	µg/L	NA	2.02	NA	NA	0.31	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	12/12/2023	32.66	29.66	µg/L	NA	1.52	NA	NA	0.38	NA
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	1/16/2023	33.92	32.32	µg/L	< 0.508	< 0.508	NA	0.14	0.14	5%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	1/17/2023	31.17	28.77	µg/L	< 0.508	< 0.508	NA	0.13	0.12	8%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	1/18/2023	30.98	30.48	µg/L	< 0.508	< 0.508	NA	0.13	0.13	2%
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	2/7/2023	22.64	21.44	µg/L	NA	< 0.508	NA	NA	0.091	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	3/7/2023	26.27	25.47	µg/L	NA	< 0.508	NA	NA	0.11	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	4/4/2023	29.61	28.21	µg/L	NA	< 0.508	NA	NA	0.12	NA

Influent-Effluent Metals & Cyanide: Durham Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	4/9/2023	36.00	34.10	µg/L	< 0.508	< 0.508	NA	0.15	0.14	5%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	4/10/2023	57.25	56.45	µg/L	< 0.508	< 0.508	NA	0.24	0.24	1%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	4/11/2023	48.98	46.78	µg/L	< 0.508	< 0.508	NA	0.21	0.20	5%
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	4/30/2023	24.96	22.36	µg/L	NA	< 0.508	NA	NA	0.095	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	5/1/2023	24.41	21.41	µg/L	NA	< 0.508	NA	NA	0.091	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	5/2/2023	23.12	21.12	µg/L	NA	< 0.508	NA	NA	0.089	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	5/7/2023	25.27	21.37	µg/L	NA	< 0.508	NA	NA	0.091	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	5/9/2023	30.91	27.40	µg/L	NA	< 0.508	NA	NA	0.12	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	5/14/2023	23.21	20.65	µg/L	NA	< 0.508	NA	NA	0.087	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	6/6/2023	20.68	16.91	µg/L	NA	< 0.508	NA	NA	0.072	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	6/20/2023	19.86	17.18	µg/L	NA	< 0.508	NA	NA	0.073	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	7/5/2023	18.60	15.44	µg/L	NA	< 0.508	NA	NA	0.065	NA
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	7/9/2023	18.73	15.51	µg/L	< 0.508	< 0.508	NA	0.079	0.066	17%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	7/10/2023	18.77	15.44	µg/L	< 0.508	< 0.508	NA	0.080	0.065	18%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	7/11/2023	18.59	15.49	µg/L	0.578	< 0.508	56%	0.090	0.066	27%
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	7/18/2023	17.82	15.17	µg/L	NA	< 0.508	NA	NA	0.064	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	7/25/2023	19.05	15.01	µg/L	NA	< 0.508	NA	NA	0.064	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	8/2/2023	17.91	14.50	µg/L	NA	< 0.508	NA	NA	0.061	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	9/12/2023	17.48	15.73	µg/L	NA	< 0.508	NA	NA	0.067	NA
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	10/1/2023	18.82	17.02	µg/L	< 0.508	< 0.508	NA	0.080	0.072	10%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	10/2/2023	19.61	17.61	µg/L	< 0.508	< 0.508	NA	0.083	0.075	10%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	10/3/2023	18.55	17.15	µg/L	0.584	< 0.508	56%	0.090	0.073	20%
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	10/17/2023	20.72	18.82	µg/L	NA	< 0.508	NA	NA	0.080	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	10/24/2023	21.42	20.11	µg/L	NA	< 0.508	NA	NA	0.085	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	11/21/2023	21.08	18.48	µg/L	NA	< 0.508	NA	NA	0.078	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	12/12/2023	32.66	29.66	µg/L	NA	< 0.508	NA	NA	0.13	NA
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/16/2023	33.92	32.32	µg/L	0.147	< 0.102	66%	0.042	0.027	34%
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/17/2023	31.17	28.77	µg/L	0.178	< 0.102	72%	0.046	0.024	47%
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/18/2023	30.98	30.48	µg/L	0.133	< 0.102	62%	0.034	0.026	25%
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	2/7/2023	22.64	21.44	µg/L	NA	< 0.102	NA	NA	0.018	NA

Influent-Effluent Metals & Cyanide: Durham Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	3/7/2023	26.27	25.47	µg/L	NA	< 0.102	NA	NA	0.022	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	4/4/2023	29.61	28.21	µg/L	NA	< 0.102	NA	NA	0.024	NA
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/9/2023	36.00	34.10	µg/L	0.166	< 0.102	69%	0.050	0.029	42%
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/10/2023	57.25	56.45	µg/L	0.200	< 0.102	75%	0.095	0.048	50%
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/11/2023	48.98	46.78	µg/L	< 0.102	< 0.102	NA	0.042	0.040	5%
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	4/30/2023	24.96	22.36	µg/L	NA	< 0.102	NA	NA	0.019	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	5/1/2023	24.41	21.41	µg/L	NA	< 0.102	NA	NA	0.018	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	5/2/2023	23.12	21.12	µg/L	NA	< 0.102	NA	NA	0.018	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	5/7/2023	25.27	21.37	µg/L	NA	< 0.102	NA	NA	0.018	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	5/9/2023	30.91	27.40	µg/L	NA	< 0.102	NA	NA	0.023	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	5/14/2023	23.21	20.65	µg/L	NA	< 0.102	NA	NA	0.018	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	6/6/2023	20.68	16.91	µg/L	NA	< 0.102	NA	NA	0.014	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	6/20/2023	19.86	17.18	µg/L	NA	< 0.102	NA	NA	0.015	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	7/5/2023	18.60	15.44	µg/L	NA	< 0.102	NA	NA	0.013	NA
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	7/9/2023	18.73	15.51	µg/L	0.217	< 0.102	77%	0.034	0.013	61%
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	7/10/2023	18.77	15.44	µg/L	0.227	< 0.102	78%	0.036	0.013	63%
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	7/11/2023	18.59	15.49	µg/L	0.281	< 0.102	82%	0.044	0.013	70%
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	7/18/2023	17.82	15.17	µg/L	NA	< 0.102	NA	NA	0.013	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	7/25/2023	19.05	15.01	µg/L	NA	< 0.102	NA	NA	0.013	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	8/2/2023	17.91	14.50	µg/L	NA	< 0.102	NA	NA	0.012	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	9/12/2023	17.48	15.73	µg/L	NA	< 0.102	NA	NA	0.013	NA
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	10/1/2023	18.82	17.02	µg/L	0.165	< 0.102	69%	0.026	0.014	44%
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	10/2/2023	19.61	17.61	µg/L	0.206	< 0.102	75%	0.034	0.015	56%
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	10/3/2023	18.55	17.15	µg/L	0.367	< 0.102	86%	0.057	0.015	74%
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	10/17/2023	20.72	18.82	µg/L	NA	< 0.102	NA	NA	0.016	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	10/24/2023	21.42	20.11	µg/L	NA	< 0.102	NA	NA	0.017	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	11/21/2023	21.08	18.48	µg/L	NA	< 0.102	NA	NA	0.016	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	12/12/2023	32.66	29.66	µg/L	NA	< 0.102	NA	NA	0.025	NA
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	1/16/2023	33.92	32.32	µg/L	74.9	51.7	31%	21	14	34%
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	1/17/2023	31.17	28.77	µg/L	77.8	41.8	46%	20	10	50%

Influent-Effluent Metals & Cyanide: Durham Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	1/18/2023	30.98	30.48	µg/L	95.5	35.0	63%	25	8.9	64%
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	2/7/2023	22.64	21.44	µg/L	NA	37.5	NA	NA	6.7	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	3/7/2023	26.27	25.47	µg/L	NA	32.8	NA	NA	7.0	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	4/4/2023	29.61	28.21	µg/L	NA	27.3	NA	NA	6.4	NA
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	4/9/2023	36.00	34.10	µg/L	73.1	36.0	51%	22	10	53%
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	4/10/2023	57.25	56.45	µg/L	69.5	26.4	62%	33	12	63%
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	4/11/2023	48.98	46.78	µg/L	54.1	21.1	61%	22	8.2	63%
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	4/30/2023	24.96	22.36	µg/L	NA	136	NA	NA	25	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	5/1/2023	24.41	21.41	µg/L	NA	56.7	NA	NA	10	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	5/2/2023	23.12	21.12	µg/L	NA	46.7	NA	NA	8.2	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	5/7/2023	25.27	21.37	µg/L	NA	53.6	NA	NA	9.6	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	5/9/2023	30.91	27.40	µg/L	NA	35.9	NA	NA	8.2	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	5/14/2023	23.21	20.65	µg/L	NA	48.8	NA	NA	8.4	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	6/6/2023	20.68	16.91	µg/L	NA	121	NA	NA	17	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	6/20/2023	19.86	17.18	µg/L	NA	30.2	NA	NA	4.3	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	7/5/2023	18.60	15.44	µg/L	NA	43.5	NA	NA	5.6	NA
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	7/9/2023	18.73	15.51	µg/L	132	86.7	34%	21	11	46%
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	7/10/2023	18.77	15.44	µg/L	149	52.4	65%	23	6.7	71%
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	7/11/2023	18.59	15.49	µg/L	130	43.9	66%	20	5.7	72%
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	7/18/2023	17.82	15.17	µg/L	NA	49.8	NA	NA	6.3	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	7/25/2023	19.05	15.01	µg/L	NA	44.5	NA	NA	5.6	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	8/2/2023	17.91	14.50	µg/L	NA	48.5	NA	NA	5.9	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	9/12/2023	17.48	15.73	µg/L	NA	39.9	NA	NA	5.2	NA
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	10/1/2023	18.82	17.02	µg/L	119	54.2	55%	19	7.7	59%
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	10/2/2023	19.61	17.61	µg/L	123	44.5	64%	20	6.5	68%
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	10/3/2023	18.55	17.15	µg/L	139	41.0	70%	22	5.9	73%
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	10/17/2023	20.72	18.82	µg/L	NA	63.8	NA	NA	10	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	10/24/2023	21.42	20.11	µg/L	NA	34.6	NA	NA	5.8	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	11/21/2023	21.08	18.48	µg/L	NA	39.6	NA	NA	6.1	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	12/12/2023	32.66	29.66	µg/L	NA	30.3	NA	NA	7.5	NA

Form 3 – Treatment Plant Monitoring Data – Durham Biosolids

Biosolids: Durham Water Resource Recovery Facility

Sample Point Description	Pollutant Parameter	Analysis Description	MRL	Sample Date	Biosolids Concentration (mg/kg)
Durham Centrifuge Cake	Arsenic	ICP/MS Metals, Dry	2.11	1/17/2023	2.96
Durham Centrifuge Cake	Arsenic	ICP/MS Metals, Dry	2.21	1/18/2023	3.34
Durham Centrifuge Cake	Arsenic	ICP/MS Metals, Dry	2.17	1/19/2023	3.15
Durham Centrifuge Cake	Arsenic	ICP/MS Metals, Dry	2.31	2/16/2023	2.39
Durham Centrifuge Cake	Arsenic	ICP/MS Metals, Dry	2.24	3/14/2023	2.97
Durham Centrifuge Cake	Arsenic	ICP/MS Metals, Dry	2.25	4/10/2023	2.99
Durham Centrifuge Cake	Arsenic	ICP/MS Metals, Dry	2.20	4/11/2023	3.00
Durham Centrifuge Cake	Arsenic	ICP/MS Metals, Dry	2.34	4/12/2023	2.97
Durham Centrifuge Cake	Arsenic	ICP/MS Metals, Dry	2.13	5/9/2023	3.48
Durham Centrifuge Cake	Arsenic	ICP/MS Metals, Dry	2.14	6/13/2023	4.25
Durham Centrifuge Cake	Arsenic	ICP/MS Metals, Dry	2.26	7/18/2023	3.68
Durham Centrifuge Cake	Arsenic	ICP/MS Metals, Dry	2.10	7/19/2023	4.37
Durham Centrifuge Cake	Arsenic	ICP/MS Metals, Dry	2.17	7/20/2023	4.04
Durham Centrifuge Cake	Arsenic	ICP/MS Metals, Dry	2.04	8/8/2023	3.66
Durham Centrifuge Cake	Arsenic	ICP/MS Metals, Dry	2.21	9/12/2023	3.97
Durham Centrifuge Cake	Arsenic	ICP/MS Metals, Dry	2.50	10/16/2023	3.46
Durham Centrifuge Cake	Arsenic	ICP/MS Metals, Dry	2.65	10/17/2023	3.95
Durham Centrifuge Cake	Arsenic	ICP/MS Metals, Dry	2.80	10/18/2023	4.84
Durham Centrifuge Cake	Arsenic	ICP/MS Metals, Dry	2.42	11/16/2023	3.61
Durham Centrifuge Cake	Arsenic	ICP/MS Metals, Dry	2.35	12/5/2023	3.38
Durham Centrifuge Cake	Cadmium	ICP/MS Metals, Dry	0.42	1/17/2023	0.807
Durham Centrifuge Cake	Cadmium	ICP/MS Metals, Dry	0.44	1/18/2023	0.867
Durham Centrifuge Cake	Cadmium	ICP/MS Metals, Dry	0.43	1/19/2023	0.812
Durham Centrifuge Cake	Cadmium	ICP/MS Metals, Dry	0.46	2/16/2023	0.756
Durham Centrifuge Cake	Cadmium	ICP/MS Metals, Dry	0.45	3/14/2023	0.895
Durham Centrifuge Cake	Cadmium	ICP/MS Metals, Dry	0.45	4/10/2023	0.881
Durham Centrifuge Cake	Cadmium	ICP/MS Metals, Dry	0.44	4/11/2023	0.782

Biosolids: Durham Water Resource Recovery Facility

Sample Point Description	Pollutant Parameter	Analysis Description	MRL	Sample Date	Biosolids Concentration (mg/kg)
Durham Centrifuge Cake	Cadmium	ICP/MS Metals, Dry	0.47	4/12/2023	0.869
Durham Centrifuge Cake	Cadmium	ICP/MS Metals, Dry	0.43	5/9/2023	0.861
Durham Centrifuge Cake	Cadmium	ICP/MS Metals, Dry	0.43	6/13/2023	0.878
Durham Centrifuge Cake	Cadmium	ICP/MS Metals, Dry	0.45	7/18/2023	0.942
Durham Centrifuge Cake	Cadmium	ICP/MS Metals, Dry	0.42	7/19/2023	0.864
Durham Centrifuge Cake	Cadmium	ICP/MS Metals, Dry	0.43	7/20/2023	0.833
Durham Centrifuge Cake	Cadmium	ICP/MS Metals, Dry	0.41	8/8/2023	0.753
Durham Centrifuge Cake	Cadmium	ICP/MS Metals, Dry	0.44	9/12/2023	0.654
Durham Centrifuge Cake	Cadmium	ICP/MS Metals, Dry	0.50	10/16/2023	0.691
Durham Centrifuge Cake	Cadmium	ICP/MS Metals, Dry	0.53	10/17/2023	0.859
Durham Centrifuge Cake	Cadmium	ICP/MS Metals, Dry	0.56	10/18/2023	0.795
Durham Centrifuge Cake	Cadmium	ICP/MS Metals, Dry	0.48	11/16/2023	0.921
Durham Centrifuge Cake	Cadmium	ICP/MS Metals, Dry	0.47	12/5/2023	0.868
Durham Centrifuge Cake	Chromium	ICP/MS Metals, Dry	1.69	1/17/2023	22.0
Durham Centrifuge Cake	Chromium	ICP/MS Metals, Dry	1.77	1/18/2023	26.1
Durham Centrifuge Cake	Chromium	ICP/MS Metals, Dry	1.73	1/19/2023	24.2
Durham Centrifuge Cake	Chromium	ICP/MS Metals, Dry	1.85	2/16/2023	25.6
Durham Centrifuge Cake	Chromium	ICP/MS Metals, Dry	1.79	3/14/2023	28.8
Durham Centrifuge Cake	Chromium	ICP/MS Metals, Dry	1.80	4/10/2023	27.3
Durham Centrifuge Cake	Chromium	ICP/MS Metals, Dry	1.76	4/11/2023	25.7
Durham Centrifuge Cake	Chromium	ICP/MS Metals, Dry	1.87	4/12/2023	25.7
Durham Centrifuge Cake	Chromium	ICP/MS Metals, Dry	1.70	5/9/2023	24.0
Durham Centrifuge Cake	Chromium	ICP/MS Metals, Dry	1.71	6/13/2023	24.6
Durham Centrifuge Cake	Chromium	ICP/MS Metals, Dry	1.81	7/18/2023	21.8
Durham Centrifuge Cake	Chromium	ICP/MS Metals, Dry	1.68	7/19/2023	24.5
Durham Centrifuge Cake	Chromium	ICP/MS Metals, Dry	1.74	7/20/2023	21.9
Durham Centrifuge Cake	Chromium	ICP/MS Metals, Dry	1.63	8/8/2023	19.3
Durham Centrifuge Cake	Chromium	ICP/MS Metals, Dry	1.77	9/12/2023	19.2
Durham Centrifuge Cake	Chromium	ICP/MS Metals, Dry	2.00	10/16/2023	18.4
Durham Centrifuge Cake	Chromium	ICP/MS Metals, Dry	2.12	10/17/2023	21.5

Biosolids: Durham Water Resource Recovery Facility

Sample Point Description	Pollutant Parameter	Analysis Description	MRL	Sample Date	Biosolids Concentration (mg/kg)
Durham Centrifuge Cake	Chromium	ICP/MS Metals, Dry	2.24	10/18/2023	21.3
Durham Centrifuge Cake	Chromium	ICP/MS Metals, Dry	1.94	11/16/2023	20.1
Durham Centrifuge Cake	Chromium	ICP/MS Metals, Dry	1.88	12/5/2023	20.8
Durham Centrifuge Cake	Copper	ICP/MS Metals, Dry	1.69	1/17/2023	198
Durham Centrifuge Cake	Copper	ICP/MS Metals, Dry	1.77	1/18/2023	227
Durham Centrifuge Cake	Copper	ICP/MS Metals, Dry	1.73	1/19/2023	274
Durham Centrifuge Cake	Copper	ICP/MS Metals, Dry	1.85	2/16/2023	199
Durham Centrifuge Cake	Copper	ICP/MS Metals, Dry	1.79	3/14/2023	220
Durham Centrifuge Cake	Copper	ICP/MS Metals, Dry	1.80	4/10/2023	227
Durham Centrifuge Cake	Copper	ICP/MS Metals, Dry	1.76	4/11/2023	217
Durham Centrifuge Cake	Copper	ICP/MS Metals, Dry	1.87	4/12/2023	238
Durham Centrifuge Cake	Copper	ICP/MS Metals, Dry	1.70	5/9/2023	215
Durham Centrifuge Cake	Copper	ICP/MS Metals, Dry	1.71	6/13/2023	208
Durham Centrifuge Cake	Copper	ICP/MS Metals, Dry	1.81	7/18/2023	192
Durham Centrifuge Cake	Copper	ICP/MS Metals, Dry	1.68	7/19/2023	224
Durham Centrifuge Cake	Copper	ICP/MS Metals, Dry	1.74	7/20/2023	208
Durham Centrifuge Cake	Copper	ICP/MS Metals, Dry	1.63	8/8/2023	211
Durham Centrifuge Cake	Copper	ICP/MS Metals, Dry	1.77	9/12/2023	221
Durham Centrifuge Cake	Copper	ICP/MS Metals, Dry	2.00	10/16/2023	207
Durham Centrifuge Cake	Copper	ICP/MS Metals, Dry	2.12	10/17/2023	238
Durham Centrifuge Cake	Copper	ICP/MS Metals, Dry	2.24	10/18/2023	230
Durham Centrifuge Cake	Copper	ICP/MS Metals, Dry	1.94	11/16/2023	233
Durham Centrifuge Cake	Copper	ICP/MS Metals, Dry	1.88	12/5/2023	240
Durham Centrifuge Cake	Cyanide	Cyanide, Dry (Contract Lab)	0.78	1/17/2023	0.830
Durham Centrifuge Cake	Cyanide	Cyanide, Dry (Contract Lab)	0.79	1/18/2023	1.72
Durham Centrifuge Cake	Cyanide	Cyanide, Dry (Contract Lab)	0.99	1/19/2023	1.15
Durham Centrifuge Cake	Cyanide	Cyanide, Dry (Contract Lab)	0.76	4/10/2023	1.79
Durham Centrifuge Cake	Cyanide	Cyanide, Dry (Contract Lab)	0.80	4/11/2023	2.26
Durham Centrifuge Cake	Cyanide	Cyanide, Dry (Contract Lab)	0.80	4/12/2023	2.25
Durham Centrifuge Cake	Cyanide	Cyanide, Dry	2.33	7/18/2023	9.85

Biosolids: Durham Water Resource Recovery Facility

Sample Point Description	Pollutant Parameter	Analysis Description	MRL	Sample Date	Biosolids Concentration (mg/kg)
Durham Centrifuge Cake	Cyanide	Cyanide, Dry	2.15	7/19/2023	9.97
Durham Centrifuge Cake	Cyanide	Cyanide, Dry	2.29	7/20/2023	9.81
Durham Centrifuge Cake	Cyanide	Cyanide, Dry	2.68	10/16/2023	9.37
Durham Centrifuge Cake	Cyanide	Cyanide, Dry	2.76	10/17/2023	9.57
Durham Centrifuge Cake	Cyanide	Cyanide, Dry	2.81	10/18/2023	8.64
Durham Centrifuge Cake	Hardness	ICP/MS Metals, Dry	0.00	1/17/2023	61600
Durham Centrifuge Cake	Hardness	ICP/MS Metals, Dry	0.00	1/18/2023	69900
Durham Centrifuge Cake	Hardness	ICP/MS Metals, Dry	0.00	1/19/2023	64800
Durham Centrifuge Cake	Hardness	ICP/MS Metals, Dry	0.00	2/16/2023	58600
Durham Centrifuge Cake	Hardness	ICP/MS Metals, Dry	0.00	3/14/2023	64400
Durham Centrifuge Cake	Hardness	ICP/MS Metals, Dry	0.00	4/10/2023	72800
Durham Centrifuge Cake	Hardness	ICP/MS Metals, Dry	0.00	4/11/2023	65800
Durham Centrifuge Cake	Hardness	ICP/MS Metals, Dry	0.00	4/12/2023	83400
Durham Centrifuge Cake	Hardness	ICP/MS Metals, Dry	0.00	5/9/2023	71600
Durham Centrifuge Cake	Hardness	ICP/MS Metals, Dry	0.00	6/13/2023	73100
Durham Centrifuge Cake	Hardness	ICP/MS Metals, Dry	0.00	7/18/2023	65900
Durham Centrifuge Cake	Hardness	ICP/MS Metals, Dry	0.00	7/19/2023	79300
Durham Centrifuge Cake	Hardness	ICP/MS Metals, Dry	0.00	7/20/2023	73800
Durham Centrifuge Cake	Hardness	ICP/MS Metals, Dry	0.00	8/8/2023	71600
Durham Centrifuge Cake	Hardness	ICP/MS Metals, Dry	0.00	9/12/2023	74600
Durham Centrifuge Cake	Hardness	ICP/MS Metals, Dry	0.00	10/16/2023	64000
Durham Centrifuge Cake	Hardness	ICP/MS Metals, Dry	0.00	10/17/2023	73500
Durham Centrifuge Cake	Hardness	ICP/MS Metals, Dry	0.00	10/18/2023	72700
Durham Centrifuge Cake	Hardness	ICP/MS Metals, Dry	0.00	11/16/2023	66500
Durham Centrifuge Cake	Hardness	ICP/MS Metals, Dry	0.00	12/5/2023	66900
Durham Centrifuge Cake	Lead	ICP/MS Metals, Dry	0.42	1/17/2023	8.83
Durham Centrifuge Cake	Lead	ICP/MS Metals, Dry	0.44	1/18/2023	9.46
Durham Centrifuge Cake	Lead	ICP/MS Metals, Dry	0.43	1/19/2023	9.03
Durham Centrifuge Cake	Lead	ICP/MS Metals, Dry	0.46	2/16/2023	8.57
Durham Centrifuge Cake	Lead	ICP/MS Metals, Dry	0.45	3/14/2023	8.05

Biosolids: Durham Water Resource Recovery Facility

Sample Point Description	Pollutant Parameter	Analysis Description	MRL	Sample Date	Biosolids Concentration (mg/kg)
Durham Centrifuge Cake	Lead	ICP/MS Metals, Dry	0.45	4/10/2023	9.27
Durham Centrifuge Cake	Lead	ICP/MS Metals, Dry	0.44	4/11/2023	9.12
Durham Centrifuge Cake	Lead	ICP/MS Metals, Dry	0.47	4/12/2023	9.15
Durham Centrifuge Cake	Lead	ICP/MS Metals, Dry	0.43	5/9/2023	8.56
Durham Centrifuge Cake	Lead	ICP/MS Metals, Dry	0.43	6/13/2023	6.92
Durham Centrifuge Cake	Lead	ICP/MS Metals, Dry	0.45	7/18/2023	6.07
Durham Centrifuge Cake	Lead	ICP/MS Metals, Dry	0.42	7/19/2023	7.65
Durham Centrifuge Cake	Lead	ICP/MS Metals, Dry	0.43	7/20/2023	7.46
Durham Centrifuge Cake	Lead	ICP/MS Metals, Dry	0.41	8/8/2023	6.62
Durham Centrifuge Cake	Lead	ICP/MS Metals, Dry	0.44	9/12/2023	7.64
Durham Centrifuge Cake	Lead	ICP/MS Metals, Dry	0.49	10/16/2023	9.23
Durham Centrifuge Cake	Lead	ICP/MS Metals, Dry	0.53	10/17/2023	8.37
Durham Centrifuge Cake	Lead	ICP/MS Metals, Dry	0.56	10/18/2023	8.22
Durham Centrifuge Cake	Lead	ICP/MS Metals, Dry	0.48	11/16/2023	8.76
Durham Centrifuge Cake	Lead	ICP/MS Metals, Dry	0.47	12/5/2023	8.12
Durham Centrifuge Cake	Mercury	ICP/MS Metals, Dry	0.08	1/17/2023	0.729
Durham Centrifuge Cake	Mercury	ICP/MS Metals, Dry	0.09	1/18/2023	0.369
Durham Centrifuge Cake	Mercury	ICP/MS Metals, Dry	0.09	1/19/2023	0.378
Durham Centrifuge Cake	Mercury	ICP/MS Metals, Dry	0.09	2/16/2023	1.070
Durham Centrifuge Cake	Mercury	ICP/MS Metals, Dry	0.09	3/14/2023	0.501
Durham Centrifuge Cake	Mercury	ICP/MS Metals, Dry	0.09	4/10/2023	0.458
Durham Centrifuge Cake	Mercury	ICP/MS Metals, Dry	0.09	4/11/2023	0.348
Durham Centrifuge Cake	Mercury	ICP/MS Metals, Dry	0.09	4/12/2023	0.424
Durham Centrifuge Cake	Mercury	ICP/MS Metals, Dry	0.09	5/9/2023	0.325
Durham Centrifuge Cake	Mercury	ICP/MS Metals, Dry	0.09	6/13/2023	0.312
Durham Centrifuge Cake	Mercury	ICP/MS Metals, Dry	0.09	7/18/2023	0.336
Durham Centrifuge Cake	Mercury	ICP/MS Metals, Dry	0.08	7/19/2023	0.326
Durham Centrifuge Cake	Mercury	ICP/MS Metals, Dry	0.09	7/20/2023	0.388
Durham Centrifuge Cake	Mercury	ICP/MS Metals, Dry	0.08	8/8/2023	0.340
Durham Centrifuge Cake	Mercury	ICP/MS Metals, Dry	0.09	9/12/2023	0.579

Biosolids: Durham Water Resource Recovery Facility

Sample Point Description	Pollutant Parameter	Analysis Description	MRL	Sample Date	Biosolids Concentration (mg/kg)
Durham Centrifuge Cake	Mercury	ICP/MS Metals, Dry	0.10	10/16/2023	0.394
Durham Centrifuge Cake	Mercury	ICP/MS Metals, Dry	0.11	10/17/2023	0.425
Durham Centrifuge Cake	Mercury	ICP/MS Metals, Dry	0.11	10/18/2023	0.448
Durham Centrifuge Cake	Mercury	ICP/MS Metals, Dry	0.10	11/16/2023	0.853
Durham Centrifuge Cake	Mercury	ICP/MS Metals, Dry	0.09	12/5/2023	0.433
Durham Centrifuge Cake	Molybdenum	ICP/MS Metals, Dry	0.42	1/17/2023	5.97
Durham Centrifuge Cake	Molybdenum	ICP/MS Metals, Dry	0.44	1/18/2023	6.38
Durham Centrifuge Cake	Molybdenum	ICP/MS Metals, Dry	0.43	1/19/2023	6.34
Durham Centrifuge Cake	Molybdenum	ICP/MS Metals, Dry	0.46	2/16/2023	5.37
Durham Centrifuge Cake	Molybdenum	ICP/MS Metals, Dry	0.45	3/14/2023	6.75
Durham Centrifuge Cake	Molybdenum	ICP/MS Metals, Dry	0.45	4/10/2023	6.37
Durham Centrifuge Cake	Molybdenum	ICP/MS Metals, Dry	0.44	4/11/2023	6.22
Durham Centrifuge Cake	Molybdenum	ICP/MS Metals, Dry	0.47	4/12/2023	6.36
Durham Centrifuge Cake	Molybdenum	ICP/MS Metals, Dry	0.43	5/9/2023	5.84
Durham Centrifuge Cake	Molybdenum	ICP/MS Metals, Dry	0.43	6/13/2023	7.59
Durham Centrifuge Cake	Molybdenum	ICP/MS Metals, Dry	0.45	7/18/2023	6.88
Durham Centrifuge Cake	Molybdenum	ICP/MS Metals, Dry	0.42	7/19/2023	7.99
Durham Centrifuge Cake	Molybdenum	ICP/MS Metals, Dry	0.43	7/20/2023	7.57
Durham Centrifuge Cake	Molybdenum	ICP/MS Metals, Dry	0.41	8/8/2023	7.31
Durham Centrifuge Cake	Molybdenum	ICP/MS Metals, Dry	0.44	9/12/2023	7.32
Durham Centrifuge Cake	Molybdenum	ICP/MS Metals, Dry	0.50	10/16/2023	6.49
Durham Centrifuge Cake	Molybdenum	ICP/MS Metals, Dry	0.53	10/17/2023	7.38
Durham Centrifuge Cake	Molybdenum	ICP/MS Metals, Dry	0.56	10/18/2023	7.19
Durham Centrifuge Cake	Molybdenum	ICP/MS Metals, Dry	0.48	11/16/2023	7.06
Durham Centrifuge Cake	Molybdenum	ICP/MS Metals, Dry	0.47	12/5/2023	7.78
Durham Centrifuge Cake	Nickel	ICP/MS Metals, Dry	1.69	1/17/2023	15.4
Durham Centrifuge Cake	Nickel	ICP/MS Metals, Dry	1.77	1/18/2023	19.9
Durham Centrifuge Cake	Nickel	ICP/MS Metals, Dry	1.73	1/19/2023	16.6
Durham Centrifuge Cake	Nickel	ICP/MS Metals, Dry	1.85	2/16/2023	16.3
Durham Centrifuge Cake	Nickel	ICP/MS Metals, Dry	1.79	3/14/2023	20.9

Biosolids: Durham Water Resource Recovery Facility

Sample Point Description	Pollutant Parameter	Analysis Description	MRL	Sample Date	Biosolids Concentration (mg/kg)
Durham Centrifuge Cake	Nickel	ICP/MS Metals, Dry	1.80	4/10/2023	19.8
Durham Centrifuge Cake	Nickel	ICP/MS Metals, Dry	1.76	4/11/2023	18.8
Durham Centrifuge Cake	Nickel	ICP/MS Metals, Dry	1.87	4/12/2023	18.5
Durham Centrifuge Cake	Nickel	ICP/MS Metals, Dry	1.70	5/9/2023	17.2
Durham Centrifuge Cake	Nickel	ICP/MS Metals, Dry	1.71	6/13/2023	16.9
Durham Centrifuge Cake	Nickel	ICP/MS Metals, Dry	1.81	7/18/2023	14.0
Durham Centrifuge Cake	Nickel	ICP/MS Metals, Dry	1.68	7/19/2023	16.5
Durham Centrifuge Cake	Nickel	ICP/MS Metals, Dry	1.74	7/20/2023	15.2
Durham Centrifuge Cake	Nickel	ICP/MS Metals, Dry	1.63	8/8/2023	14.3
Durham Centrifuge Cake	Nickel	ICP/MS Metals, Dry	1.77	9/12/2023	14.7
Durham Centrifuge Cake	Nickel	ICP/MS Metals, Dry	2.00	10/16/2023	14.3
Durham Centrifuge Cake	Nickel	ICP/MS Metals, Dry	2.12	10/17/2023	18.2
Durham Centrifuge Cake	Nickel	ICP/MS Metals, Dry	2.24	10/18/2023	18.2
Durham Centrifuge Cake	Nickel	ICP/MS Metals, Dry	1.94	11/16/2023	16.5
Durham Centrifuge Cake	Nickel	ICP/MS Metals, Dry	1.88	12/5/2023	15.9
Durham Centrifuge Cake	Selenium	ICP/MS Metals, Dry	2.11	1/17/2023	4.28
Durham Centrifuge Cake	Selenium	ICP/MS Metals, Dry	2.21	1/18/2023	4.73
Durham Centrifuge Cake	Selenium	ICP/MS Metals, Dry	2.17	1/19/2023	4.54
Durham Centrifuge Cake	Selenium	ICP/MS Metals, Dry	2.31	2/16/2023	3.72
Durham Centrifuge Cake	Selenium	ICP/MS Metals, Dry	2.24	3/14/2023	5.16
Durham Centrifuge Cake	Selenium	ICP/MS Metals, Dry	2.25	4/10/2023	4.91
Durham Centrifuge Cake	Selenium	ICP/MS Metals, Dry	2.20	4/11/2023	4.78
Durham Centrifuge Cake	Selenium	ICP/MS Metals, Dry	2.34	4/12/2023	4.81
Durham Centrifuge Cake	Selenium	ICP/MS Metals, Dry	2.13	5/9/2023	4.55
Durham Centrifuge Cake	Selenium	ICP/MS Metals, Dry	2.14	6/13/2023	4.15
Durham Centrifuge Cake	Selenium	ICP/MS Metals, Dry	2.26	7/18/2023	3.84
Durham Centrifuge Cake	Selenium	ICP/MS Metals, Dry	2.10	7/19/2023	4.35
Durham Centrifuge Cake	Selenium	ICP/MS Metals, Dry	2.17	7/20/2023	4.12
Durham Centrifuge Cake	Selenium	ICP/MS Metals, Dry	2.04	8/8/2023	3.73
Durham Centrifuge Cake	Selenium	ICP/MS Metals, Dry	2.21	9/12/2023	4.08

Biosolids: Durham Water Resource Recovery Facility

Sample Point Description	Pollutant Parameter	Analysis Description	MRL	Sample Date	Biosolids Concentration (mg/kg)
Durham Centrifuge Cake	Selenium	ICP/MS Metals, Dry	2.50	10/16/2023	4.05
Durham Centrifuge Cake	Selenium	ICP/MS Metals, Dry	2.65	10/17/2023	4.64
Durham Centrifuge Cake	Selenium	ICP/MS Metals, Dry	2.80	10/18/2023	4.57
Durham Centrifuge Cake	Selenium	ICP/MS Metals, Dry	2.42	11/16/2023	4.69
Durham Centrifuge Cake	Selenium	ICP/MS Metals, Dry	2.35	12/5/2023	4.81
Durham Centrifuge Cake	Silver	ICP/MS Metals, Dry	0.42	1/17/2023	2.14
Durham Centrifuge Cake	Silver	ICP/MS Metals, Dry	0.44	1/18/2023	2.03
Durham Centrifuge Cake	Silver	ICP/MS Metals, Dry	0.43	1/19/2023	1.90
Durham Centrifuge Cake	Silver	ICP/MS Metals, Dry	0.46	2/16/2023	2.65
Durham Centrifuge Cake	Silver	ICP/MS Metals, Dry	0.45	3/14/2023	2.41
Durham Centrifuge Cake	Silver	ICP/MS Metals, Dry	0.45	4/10/2023	2.03
Durham Centrifuge Cake	Silver	ICP/MS Metals, Dry	0.44	4/11/2023	1.95
Durham Centrifuge Cake	Silver	ICP/MS Metals, Dry	0.47	4/12/2023	3.27
Durham Centrifuge Cake	Silver	ICP/MS Metals, Dry	0.43	5/9/2023	2.55
Durham Centrifuge Cake	Silver	ICP/MS Metals, Dry	0.43	6/13/2023	1.71
Durham Centrifuge Cake	Silver	ICP/MS Metals, Dry	0.45	7/18/2023	1.75
Durham Centrifuge Cake	Silver	ICP/MS Metals, Dry	0.42	7/19/2023	2.52
Durham Centrifuge Cake	Silver	ICP/MS Metals, Dry	0.43	7/20/2023	1.89
Durham Centrifuge Cake	Silver	ICP/MS Metals, Dry	0.41	8/8/2023	1.90
Durham Centrifuge Cake	Silver	ICP/MS Metals, Dry	0.44	9/12/2023	2.07
Durham Centrifuge Cake	Silver	ICP/MS Metals, Dry	0.50	10/16/2023	2.17
Durham Centrifuge Cake	Silver	ICP/MS Metals, Dry	0.53	10/17/2023	2.16
Durham Centrifuge Cake	Silver	ICP/MS Metals, Dry	0.56	10/18/2023	2.10
Durham Centrifuge Cake	Silver	ICP/MS Metals, Dry	0.48	11/16/2023	3.89
Durham Centrifuge Cake	Silver	ICP/MS Metals, Dry	0.47	12/5/2023	2.93
Durham Centrifuge Cake	Zinc	ICP/MS Metals, Dry	10.53	1/17/2023	622
Durham Centrifuge Cake	Zinc	ICP/MS Metals, Dry	11.06	1/18/2023	690
Durham Centrifuge Cake	Zinc	ICP/MS Metals, Dry	10.84	1/19/2023	662
Durham Centrifuge Cake	Zinc	ICP/MS Metals, Dry	11.57	2/16/2023	561
Durham Centrifuge Cake	Zinc	ICP/MS Metals, Dry	11.22	3/14/2023	670

Biosolids: Durham Water Resource Recovery Facility

Sample Point Description	Pollutant Parameter	Analysis Description	MRL	Sample Date	Biosolids Concentration (mg/kg)
Durham Centrifuge Cake	Zinc	ICP/MS Metals, Dry	11.25	4/10/2023	693
Durham Centrifuge Cake	Zinc	ICP/MS Metals, Dry	11.02	4/11/2023	686
Durham Centrifuge Cake	Zinc	ICP/MS Metals, Dry	11.69	4/12/2023	701
Durham Centrifuge Cake	Zinc	ICP/MS Metals, Dry	10.65	5/9/2023	608
Durham Centrifuge Cake	Zinc	ICP/MS Metals, Dry	10.69	6/13/2023	614
Durham Centrifuge Cake	Zinc	ICP/MS Metals, Dry	11.29	7/18/2023	568
Durham Centrifuge Cake	Zinc	ICP/MS Metals, Dry	10.51	7/19/2023	667
Durham Centrifuge Cake	Zinc	ICP/MS Metals, Dry	10.86	7/20/2023	623
Durham Centrifuge Cake	Zinc	ICP/MS Metals, Dry	10.18	8/8/2023	593
Durham Centrifuge Cake	Zinc	ICP/MS Metals, Dry	11.07	9/12/2023	601
Durham Centrifuge Cake	Zinc	ICP/MS Metals, Dry	12.50	10/16/2023	574
Durham Centrifuge Cake	Zinc	ICP/MS Metals, Dry	13.26	10/17/2023	667
Durham Centrifuge Cake	Zinc	ICP/MS Metals, Dry	14.02	10/18/2023	653
Durham Centrifuge Cake	Zinc	ICP/MS Metals, Dry	12.11	11/16/2023	723
Durham Centrifuge Cake	Zinc	ICP/MS Metals, Dry	11.75	12/5/2023	724

Form 3 – Treatment Plant Monitoring Data – Rock Creek

Influent-Effluent Metals & Cyanide: Rock Creek Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	1/16/2023	56.70	54.83	µg/L	1.40	1.11	21%	0.66	0.51	23%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	1/17/2023	50.17	46.72	µg/L	1.85	1.15	38%	0.77	0.45	42%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	1/18/2023	53.03	49.08	µg/L	1.60	1.10	31%	0.71	0.45	36%
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	2/7/2023	35.50	32.00	µg/L	NA	1.40	NA	NA	0.37	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	3/7/2023	43.93	40.48	µg/L	NA	0.812	NA	NA	0.27	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	4/4/2023	43.62	39.92	µg/L	NA	0.963	NA	NA	0.32	NA
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	4/9/2023	50.83	47.98	µg/L	1.09	0.849	22%	0.46	0.34	26%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	4/10/2023	90.90	90.90	µg/L	1.53	1.05	31%	1.2	0.80	31%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	4/11/2023	79.65	79.65	µg/L	1.33	0.939	29%	0.88	0.62	29%
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	5/2/2023	35.13	31.70	µg/L	NA	0.631	NA	NA	0.17	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	5/9/2023	39.00	35.20	µg/L	NA	0.718	NA	NA	0.21	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	6/6/2023	33.05	29.53	µg/L	NA	0.703	NA	NA	0.17	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	6/20/2023	32.90	28.39	µg/L	NA	0.774	NA	NA	0.18	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	7/5/2023	27.67	23.17	µg/L	NA	0.600	NA	NA	0.12	NA
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	7/9/2023	28.75	24.80	µg/L	1.36	0.571	58%	0.33	0.12	64%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	7/10/2023	29.61	25.93	µg/L	1.64	0.532	68%	0.40	0.12	72%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	7/11/2023	28.60	24.89	µg/L	1.46	0.515	65%	0.35	0.11	69%
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	7/18/2023	27.89	23.96	µg/L	NA	0.593	NA	NA	0.12	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	7/25/2023	27.90	23.93	µg/L	NA	0.548	NA	NA	0.11	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	8/2/2023	29.18	23.43	µg/L	NA	0.743	NA	NA	0.15	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	9/12/2023	28.54	25.45	µg/L	NA	0.800	NA	NA	0.17	NA
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	10/1/2023	32.23	28.76	µg/L	1.51	0.981	35%	0.41	0.24	42%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	10/2/2023	33.63	30.35	µg/L	1.59	1.00	37%	0.45	0.25	43%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	10/3/2023	32.78	29.59	µg/L	2.01	1.19	41%	0.55	0.29	47%
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	10/17/2023	36.58	33.17	µg/L	NA	1.35	NA	NA	0.37	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	10/24/2023	38.61	34.55	µg/L	NA	1.25	NA	NA	0.36	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	11/21/2023	37.75	33.14	µg/L	NA	1.14	NA	NA	0.32	NA

Influent-Effluent Metals & Cyanide: Rock Creek Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	12/11/2023	66.53	66.53	µg/L	1.32	1.05	20%	0.73	0.58	20%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	12/12/2023	56.68	56.68	µg/L	1.40	1.14	19%	0.66	0.54	19%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	12/13/2023	50.83	50.83	µg/L	1.39	1.10	21%	0.59	0.47	21%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/16/2023	56.70	54.83	µg/L	< 0.102	< 0.102	NA	0.048	0.047	3%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/17/2023	50.17	46.72	µg/L	< 0.102	< 0.102	NA	0.043	0.040	7%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/18/2023	53.03	49.08	µg/L	0.110	< 0.102	54%	0.049	0.042	14%
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	2/7/2023	35.50	32.00	µg/L	NA	< 0.102	NA	NA	0.027	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	3/7/2023	43.93	40.48	µg/L	NA	< 0.102	NA	NA	0.034	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	4/4/2023	43.62	39.92	µg/L	NA	< 0.102	NA	NA	0.034	NA
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/9/2023	50.83	47.98	µg/L	< 0.102	< 0.102	NA	0.043	0.041	6%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/10/2023	90.90	90.90	µg/L	0.113	< 0.102	55%	0.086	0.077	10%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/11/2023	79.65	79.65	µg/L	< 0.102	< 0.102	NA	0.068	0.068	0%
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	5/2/2023	35.13	31.70	µg/L	NA	< 0.102	NA	NA	0.027	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	5/9/2023	39.00	35.20	µg/L	NA	< 0.102	NA	NA	0.030	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	6/6/2023	33.05	29.53	µg/L	NA	< 0.102	NA	NA	0.025	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	6/20/2023	32.90	28.39	µg/L	NA	< 0.102	NA	NA	0.024	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	7/5/2023	27.67	23.17	µg/L	NA	< 0.102	NA	NA	0.020	NA
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	7/9/2023	28.75	24.80	µg/L	0.113	< 0.102	55%	0.027	0.021	22%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	7/10/2023	29.61	25.93	µg/L	0.150	< 0.102	66%	0.037	0.022	40%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	7/11/2023	28.60	24.89	µg/L	0.117	< 0.102	57%	0.028	0.021	24%
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	7/18/2023	27.89	23.96	µg/L	NA	< 0.102	NA	NA	0.020	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	7/25/2023	27.90	23.93	µg/L	NA	< 0.102	NA	NA	0.020	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	8/2/2023	29.18	23.43	µg/L	NA	< 0.102	NA	NA	0.020	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	9/12/2023	28.54	25.45	µg/L	NA	< 0.102	NA	NA	0.022	NA
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	10/1/2023	32.23	28.76	µg/L	0.117	< 0.102	57%	0.031	0.024	22%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	10/2/2023	33.63	30.35	µg/L	0.109	< 0.102	53%	0.031	0.026	16%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	10/3/2023	32.78	29.59	µg/L	0.219	< 0.102	77%	0.060	0.025	58%
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	10/17/2023	36.58	33.17	µg/L	NA	< 0.102	NA	NA	0.028	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	10/24/2023	38.61	34.55	µg/L	NA	< 0.102	NA	NA	0.029	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	11/21/2023	37.75	33.14	µg/L	NA	< 0.102	NA	NA	0.028	NA

Influent-Effluent Metals & Cyanide: Rock Creek Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	12/11/2023	66.53	66.53	µg/L	< 0.102	< 0.102	NA	0.057	0.057	0%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	12/12/2023	56.68	56.68	µg/L	< 0.102	< 0.102	NA	0.048	0.048	0%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	12/13/2023	50.83	50.83	µg/L	0.308	< 0.102	84%	0.13	0.043	67%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	1/16/2023	56.70	54.83	µg/L	1.84	0.507	72%	0.87	0.23	73%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	1/17/2023	50.17	46.72	µg/L	2.17	0.568	74%	0.91	0.22	76%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	1/18/2023	53.03	49.08	µg/L	2.09	0.546	74%	0.92	0.22	76%
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	2/7/2023	35.50	32.00	µg/L	NA	0.879	NA	NA	0.23	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	3/7/2023	43.93	40.48	µg/L	NA	< 0.406	NA	NA	0.14	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	4/4/2023	43.62	39.92	µg/L	NA	0.470	NA	NA	0.16	NA
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	4/9/2023	50.83	47.98	µg/L	1.65	0.433	74%	0.70	0.17	75%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	4/10/2023	90.90	90.90	µg/L	2.14	0.497	77%	1.6	0.38	77%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	4/11/2023	79.65	79.65	µg/L	1.65	0.449	73%	1.1	0.30	73%
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	5/2/2023	35.13	31.70	µg/L	NA	< 0.406	NA	NA	0.11	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	5/9/2023	39.00	35.20	µg/L	NA	< 0.406	NA	NA	0.12	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	6/6/2023	33.05	29.53	µg/L	NA	< 0.406	NA	NA	0.10	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	6/20/2023	32.90	28.39	µg/L	NA	< 0.406	NA	NA	0.096	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	7/5/2023	27.67	23.17	µg/L	NA	< 0.406	NA	NA	0.078	NA
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	7/9/2023	28.75	24.80	µg/L	1.60	< 0.406	87%	0.38	0.084	78%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	7/10/2023	29.61	25.93	µg/L	1.99	< 0.406	90%	0.49	0.088	82%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	7/11/2023	28.60	24.89	µg/L	1.83	< 0.406	89%	0.44	0.084	81%
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	7/18/2023	27.89	23.96	µg/L	NA	< 0.406	NA	NA	0.081	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	7/25/2023	27.90	23.93	µg/L	NA	< 0.406	NA	NA	0.081	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	8/2/2023	29.18	23.43	µg/L	NA	< 0.406	NA	NA	0.079	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	9/12/2023	28.54	25.45	µg/L	NA	< 0.406	NA	NA	0.086	NA
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	10/1/2023	32.23	28.76	µg/L	1.35	< 0.406	85%	0.36	0.097	73%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	10/2/2023	33.63	30.35	µg/L	1.39	< 0.406	85%	0.39	0.10	74%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	10/3/2023	32.78	29.59	µg/L	1.90	< 0.406	89%	0.52	0.10	81%
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	10/17/2023	36.58	33.17	µg/L	NA	0.463	NA	NA	0.13	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	10/24/2023	38.61	34.55	µg/L	NA	0.419	NA	NA	0.12	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	11/21/2023	37.75	33.14	µg/L	NA	0.438	NA	NA	0.12	NA

Influent-Effluent Metals & Cyanide: Rock Creek Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	12/11/2023	66.53	66.53	µg/L	1.58	0.451	72%	0.88	0.25	71%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	12/12/2023	56.68	56.68	µg/L	1.77	0.431	76%	0.84	0.20	76%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	12/13/2023	50.83	50.83	µg/L	1.79	0.413	77%	0.76	0.18	77%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	1/16/2023	56.70	54.83	µg/L	25.1	1.31	95%	12	0.60	95%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	1/17/2023	50.17	46.72	µg/L	27.5	1.32	95%	12	0.51	96%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	1/18/2023	53.03	49.08	µg/L	28.9	1.36	95%	13	0.56	96%
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	2/7/2023	35.50	32.00	µg/L	NA	2.05	NA	NA	0.55	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	3/7/2023	43.93	40.48	µg/L	NA	1.92	NA	NA	0.65	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	4/4/2023	43.62	39.92	µg/L	NA	1.73	NA	NA	0.58	NA
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	4/9/2023	50.83	47.98	µg/L	22.1	1.69	92%	9.4	0.68	93%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	4/10/2023	90.90	90.90	µg/L	54.0	2.19	96%	41	1.7	96%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	4/11/2023	79.65	79.65	µg/L	18.0	1.50	92%	12	1.0	92%
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	5/2/2023	35.13	31.70	µg/L	NA	0.923	NA	NA	0.24	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	5/7/2023	35.91	31.97	µg/L	NA	1.00	NA	NA	0.27	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	5/9/2023	39.00	35.20	µg/L	NA	0.991	NA	NA	0.29	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	5/11/2023	35.05	31.51	µg/L	NA	0.919	NA	NA	0.24	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	5/14/2023	35.33	31.39	µg/L	NA	1.33	NA	NA	0.35	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	5/16/2023	35.47	32.26	µg/L	NA	1.00	NA	NA	0.27	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	5/18/2023	34.32	30.18	µg/L	NA	1.64	NA	NA	0.41	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	5/21/2023	34.14	29.51	µg/L	NA	1.01	NA	NA	0.25	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	5/23/2023	33.89	29.78	µg/L	NA	1.03	NA	NA	0.26	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	5/25/2023	35.67	31.49	µg/L	NA	1.00	NA	NA	0.26	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	5/28/2023	32.47	28.66	µg/L	NA	0.833	NA	NA	0.20	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	5/30/2023	34.44	31.04	µg/L	NA	0.967	NA	NA	0.25	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	6/1/2023	33.69	29.73	µg/L	NA	0.910	NA	NA	0.23	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	6/4/2023	33.64	29.84	µg/L	NA	1.14	NA	NA	0.28	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	6/6/2023	33.05	29.53	µg/L	NA	2.14	NA	NA	0.53	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	6/8/2023	33.15	29.27	µg/L	NA	1.26	NA	NA	0.31	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	6/11/2023	31.57	28.09	µg/L	NA	1.52	NA	NA	0.36	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	6/13/2023	32.01	27.41	µg/L	NA	1.44	NA	NA	0.33	NA

Influent-Effluent Metals & Cyanide: Rock Creek Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	6/15/2023	31.37	26.77	µg/L	NA	1.30	NA	NA	0.29	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	6/18/2023	32.63	26.49	µg/L	NA	1.16	NA	NA	0.26	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	6/20/2023	32.90	28.39	µg/L	NA	1.42	NA	NA	0.34	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	6/22/2023	31.02	27.53	µg/L	NA	1.22	NA	NA	0.28	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	6/25/2023	30.08	25.69	µg/L	NA	1.21	NA	NA	0.26	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	6/27/2023	30.31	25.71	µg/L	NA	1.25	NA	NA	0.27	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	6/29/2023	29.23	25.02	µg/L	NA	1.21	NA	NA	0.25	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	7/2/2023	28.49	24.13	µg/L	NA	1.27	NA	NA	0.26	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	7/4/2023	27.25	22.94	µg/L	NA	1.22	NA	NA	0.23	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	7/5/2023	27.67	23.17	µg/L	NA	1.16	NA	NA	0.22	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	7/6/2023	28.74	24.03	µg/L	NA	1.24	NA	NA	0.25	NA
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	7/9/2023	28.75	24.80	µg/L	36.6	1.04	97%	8.8	0.22	98%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	7/10/2023	29.61	25.93	µg/L	68.2	0.999	98%	17	0.22	99%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	7/11/2023	28.60	24.89	µg/L	45.6	0.960	98%	11	0.20	98%
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	7/13/2023	28.28	24.65	µg/L	NA	1.00	NA	NA	0.21	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	7/16/2023	28.01	24.28	µg/L	NA	0.962	NA	NA	0.19	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	7/18/2023	27.89	23.96	µg/L	NA	0.954	NA	NA	0.19	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	7/20/2023	27.30	23.18	µg/L	NA	0.932	NA	NA	0.18	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	7/23/2023	27.67	23.24	µg/L	NA	0.973	NA	NA	0.19	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	7/25/2023	27.90	23.93	µg/L	NA	1.13	NA	NA	0.23	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	7/27/2023	27.71	23.66	µg/L	NA	1.35	NA	NA	0.27	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	7/30/2023	27.60	23.92	µg/L	NA	1.47	NA	NA	0.29	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/1/2023	30.26	22.37	µg/L	NA	1.36	NA	NA	0.25	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/2/2023	29.18	23.43	µg/L	NA	1.56	NA	NA	0.30	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/3/2023	29.71	23.27	µg/L	NA	1.31	NA	NA	0.25	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/6/2023	30.11	24.15	µg/L	NA	1.21	NA	NA	0.24	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/8/2023	29.53	23.38	µg/L	NA	1.03	NA	NA	0.20	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/10/2023	29.35	22.99	µg/L	NA	1.08	NA	NA	0.21	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/13/2023	27.85	21.81	µg/L	NA	1.14	NA	NA	0.21	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/15/2023	28.06	21.60	µg/L	NA	1.30	NA	NA	0.23	NA

Influent-Effluent Metals & Cyanide: Rock Creek Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/17/2023	28.44	22.06	µg/L	NA	1.27	NA	NA	0.23	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/20/2023	28.28	22.19	µg/L	NA	1.37	NA	NA	0.25	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/22/2023	29.06	22.80	µg/L	NA	1.29	NA	NA	0.25	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/24/2023	28.55	23.73	µg/L	NA	1.26	NA	NA	0.25	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/27/2023	30.29	24.41	µg/L	NA	1.47	NA	NA	0.30	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/29/2023	28.95	24.19	µg/L	NA	1.60	NA	NA	0.32	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/31/2023	34.51	29.68	µg/L	NA	1.79	NA	NA	0.44	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	9/5/2023	28.67	25.63	µg/L	NA	1.67	NA	NA	0.36	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	9/7/2023	27.67	24.39	µg/L	NA	1.58	NA	NA	0.32	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	9/10/2023	29.65	26.56	µg/L	NA	1.58	NA	NA	0.35	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	9/12/2023	28.54	25.45	µg/L	NA	1.66	NA	NA	0.35	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	9/14/2023	28.17	24.98	µg/L	NA	1.64	NA	NA	0.34	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	9/17/2023	28.59	25.21	µg/L	NA	1.99	NA	NA	0.42	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	9/19/2023	28.62	25.19	µg/L	NA	1.92	NA	NA	0.40	NA
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	10/1/2023	32.23	28.76	µg/L	39.0	2.24	94%	10	0.54	95%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	10/2/2023	33.63	30.35	µg/L	39.4	2.34	94%	11	0.59	95%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	10/3/2023	32.78	29.59	µg/L	49.8	2.18	96%	14	0.54	96%
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	10/17/2023	36.58	33.17	µg/L	NA	2.77	NA	NA	0.77	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	10/24/2023	38.61	34.55	µg/L	NA	2.88	NA	NA	0.83	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	11/21/2023	37.75	33.14	µg/L	NA	2.51	NA	NA	0.69	NA
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	12/11/2023	66.53	66.53	µg/L	20.8	1.86	91%	12	1.0	91%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	12/12/2023	56.68	56.68	µg/L	25.5	1.96	92%	12	0.93	92%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	12/13/2023	50.83	50.83	µg/L	30.7	1.85	94%	13	0.78	94%
Cyanide	Cyanide, Total	1	1	1/17/2023	50.17	46.72	µg/L	1.61	1.38	14%	0.67	0.54	20%
Cyanide	Cyanide, Total	1	1	1/18/2023	53.03	49.08	µg/L	1.52	1.66	-9%	0.67	0.68	-1%
Cyanide	Cyanide, Total	1	1	1/19/2023	47.48	43.56	µg/L	1.01	1.53	-52%	0.40	0.56	-39%
Cyanide	Cyanide, Total	1	1	4/10/2023	90.90	90.90	µg/L	1.49	1.48	1%	1.1	1.1	1%
Cyanide	Cyanide, Total	1	1	4/11/2023	79.65	79.65	µg/L	1.49	1.21	19%	0.99	0.80	19%
Cyanide	Cyanide, Total	1	1	4/12/2023	66.54	66.54	µg/L	1.26	1.38	-10%	0.70	0.77	-10%
Cyanide	Cyanide, Total	1	1	7/10/2023	29.61	25.93	µg/L	2.73	1.82	33%	0.67	0.39	42%

Influent-Effluent Metals & Cyanide: Rock Creek Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Cyanide	Cyanide, Total	1	1	7/11/2023	28.60	24.89	µg/L	2.41	2.00	17%	0.57	0.42	28%
Cyanide	Cyanide, Total	1	1	7/12/2023	28.37	24.41	µg/L	3.49	2.19	37%	0.83	0.45	46%
Cyanide	Cyanide, Total	1	1	10/2/2023	33.63	30.35	µg/L	2.38	1.68	29%	0.67	0.43	36%
Cyanide	Cyanide, Total	1	1	10/3/2023	32.78	29.59	µg/L	2.18	1.86	15%	0.60	0.46	23%
Cyanide	Cyanide, Total	1	1	10/4/2023	31.92	28.94	µg/L	2.70	1.85	32%	0.72	0.45	38%
Cyanide	Cyanide, Total	1	1	12/4/2023	56.58	53.13	µg/L	1.25	1.28	-2%	0.59	0.57	4%
Cyanide	Cyanide, Total	1	1	12/5/2023	81.16	81.16	µg/L	1.30	1.51	-16%	0.88	1.0	-16%
Cyanide	Cyanide, Total	1	1	12/6/2023	105.30	105.30	µg/L	< 1	1.04	NA	0.88	0.91	-4%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	1/16/2023	56.70	54.83	mg/L	94.0	102	-9%	44000	47000	-5%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	1/17/2023	50.17	46.72	mg/L	95.7	100	-5%	40000	39000	3%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	1/18/2023	53.03	49.08	mg/L	102	102	0%	45000	42000	7%
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	2/7/2023	35.50	32.00	mg/L	NA	109	NA	NA	29000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	3/7/2023	43.93	40.48	mg/L	NA	105	NA	NA	35000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	4/4/2023	43.62	39.92	mg/L	NA	114	NA	NA	38000	NA
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	4/9/2023	50.83	47.98	mg/L	114	106	7%	48000	42000	12%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	4/10/2023	90.90	90.90	mg/L	92.7	107	-15%	70000	81000	-15%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	4/11/2023	79.65	79.65	mg/L	98.0	98.8	-1%	65000	66000	-1%
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	5/2/2023	35.13	31.70	mg/L	NA	116	NA	NA	31000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	5/7/2023	35.91	31.97	mg/L	NA	126	NA	NA	34000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	5/9/2023	39.00	35.20	mg/L	NA	115	NA	NA	34000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	5/11/2023	35.05	31.51	mg/L	NA	126	NA	NA	33000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	5/14/2023	35.33	31.39	mg/L	NA	133	NA	NA	35000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	5/16/2023	35.47	32.26	mg/L	NA	119	NA	NA	32000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	5/18/2023	34.32	30.18	mg/L	NA	118	NA	NA	30000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	5/21/2023	34.14	29.51	mg/L	NA	122	NA	NA	30000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	5/23/2023	33.89	29.78	mg/L	NA	121	NA	NA	30000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	5/25/2023	35.67	31.49	mg/L	NA	115	NA	NA	30000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	5/28/2023	32.47	28.66	mg/L	NA	128	NA	NA	31000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	5/30/2023	34.44	31.04	mg/L	NA	111	NA	NA	29000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	6/1/2023	33.69	29.73	mg/L	NA	126	NA	NA	31000	NA

Influent-Effluent Metals & Cyanide: Rock Creek Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	6/4/2023	33.64	29.84	mg/L	NA	123	NA	NA	31000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	6/6/2023	33.05	29.53	mg/L	NA	126	NA	NA	31000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	6/8/2023	33.15	29.27	mg/L	NA	118	NA	NA	29000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	6/11/2023	31.57	28.09	mg/L	NA	139	NA	NA	33000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	6/13/2023	32.01	27.41	mg/L	NA	154	NA	NA	35000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	6/15/2023	31.37	26.77	mg/L	NA	146	NA	NA	33000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	6/18/2023	32.63	26.49	mg/L	NA	137	NA	NA	30000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	6/20/2023	32.90	28.39	mg/L	NA	149	NA	NA	35000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	6/22/2023	31.02	27.53	mg/L	NA	152	NA	NA	35000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	6/25/2023	30.08	25.69	mg/L	NA	160	NA	NA	34000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	6/27/2023	30.31	25.71	mg/L	NA	156	NA	NA	33000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	6/29/2023	29.23	25.02	mg/L	NA	148	NA	NA	31000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	7/2/2023	28.49	24.13	mg/L	NA	132	NA	NA	27000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	7/4/2023	27.25	22.94	mg/L	NA	137	NA	NA	26000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	7/5/2023	27.67	23.17	mg/L	NA	129	NA	NA	25000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	7/6/2023	28.74	24.03	mg/L	NA	129	NA	NA	26000	NA
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	7/9/2023	28.75	24.80	mg/L	98.2	138	-40%	24000	29000	-21%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	7/10/2023	29.61	25.93	mg/L	114	148	-30%	28000	32000	-14%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	7/11/2023	28.60	24.89	mg/L	102	156	-53%	24000	32000	-33%
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	7/13/2023	28.28	24.65	mg/L	NA	141	NA	NA	29000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	7/16/2023	28.01	24.28	mg/L	NA	135	NA	NA	27000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	7/18/2023	27.89	23.96	mg/L	NA	137	NA	NA	27000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	7/20/2023	27.30	23.18	mg/L	NA	132	NA	NA	26000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	7/23/2023	27.67	23.24	mg/L	NA	132	NA	NA	26000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	7/25/2023	27.90	23.93	mg/L	NA	126	NA	NA	25000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	7/27/2023	27.71	23.66	mg/L	NA	129	NA	NA	25000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	7/30/2023	27.60	23.92	mg/L	NA	130	NA	NA	26000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/1/2023	30.26	22.37	mg/L	NA	140	NA	NA	26000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/2/2023	29.18	23.43	mg/L	NA	138	NA	NA	27000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/3/2023	29.71	23.27	mg/L	NA	131	NA	NA	25000	NA

Influent-Effluent Metals & Cyanide: Rock Creek Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/6/2023	30.11	24.15	mg/L	NA	139	NA	NA	28000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/8/2023	29.53	23.38	mg/L	NA	153	NA	NA	30000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/10/2023	29.35	22.99	mg/L	NA	145	NA	NA	28000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/13/2023	27.85	21.81	mg/L	NA	146	NA	NA	27000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/15/2023	28.06	21.60	mg/L	NA	142	NA	NA	26000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/17/2023	28.44	22.06	mg/L	NA	145	NA	NA	27000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/20/2023	28.28	22.19	mg/L	NA	142	NA	NA	26000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/22/2023	29.06	22.80	mg/L	NA	148	NA	NA	28000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/24/2023	28.55	23.73	mg/L	NA	149	NA	NA	29000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/27/2023	30.29	24.41	mg/L	NA	137	NA	NA	28000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/29/2023	28.95	24.19	mg/L	NA	137	NA	NA	28000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/31/2023	34.51	29.68	mg/L	NA	126	NA	NA	31000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	9/3/2023	28.02	25.27	mg/L	NA	146	NA	NA	31000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	9/5/2023	28.67	25.63	mg/L	NA	140	NA	NA	30000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	9/7/2023	27.67	24.39	mg/L	NA	140	NA	NA	28000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	9/10/2023	29.65	26.56	mg/L	NA	148	NA	NA	33000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	9/12/2023	28.54	25.45	mg/L	NA	140	NA	NA	30000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	9/14/2023	28.17	24.98	mg/L	NA	148	NA	NA	31000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	9/17/2023	28.59	25.21	mg/L	NA	151	NA	NA	32000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	9/19/2023	28.62	25.19	mg/L	NA	144	NA	NA	30000	NA
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	10/1/2023	32.23	28.76	mg/L	119	138	-16%	32000	33000	-4%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	10/2/2023	33.63	30.35	mg/L	110	144	-31%	31000	36000	-18%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	10/3/2023	32.78	29.59	mg/L	124	145	-17%	34000	36000	-6%
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	10/17/2023	36.58	33.17	mg/L	NA	128	NA	NA	35000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	10/24/2023	38.61	34.55	mg/L	NA	141	NA	NA	41000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	11/21/2023	37.75	33.14	mg/L	NA	128	NA	NA	35000	NA
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	12/11/2023	66.53	66.53	mg/L	109	114	-5%	60000	63000	-5%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	12/12/2023	56.68	56.68	mg/L	113	119	-5%	53000	56000	-5%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	12/13/2023	50.83	50.83	mg/L	121	124	-3%	51000	53000	-3%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/16/2023	56.70	54.83	µg/L	0.742	0.112	85%	0.35	0.051	85%

Influent-Effluent Metals & Cyanide: Rock Creek Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/17/2023	50.17	46.72	µg/L	0.815	0.196	76%	0.34	0.076	78%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/18/2023	53.03	49.08	µg/L	0.845	0.185	78%	0.37	0.076	80%
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	2/7/2023	35.50	32.00	µg/L	NA	< 0.102	NA	NA	0.027	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	3/7/2023	43.93	40.48	µg/L	NA	< 0.102	NA	NA	0.034	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	4/4/2023	43.62	39.92	µg/L	NA	0.102	NA	NA	0.034	NA
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/9/2023	50.83	47.98	µg/L	0.619	< 0.102	92%	0.26	0.041	84%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/10/2023	90.90	90.90	µg/L	1.79	< 0.102	97%	1.4	0.077	94%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/11/2023	79.65	79.65	µg/L	0.583	< 0.102	91%	0.39	0.068	83%
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	5/2/2023	35.13	31.70	µg/L	NA	0.122	NA	NA	0.032	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	5/9/2023	39.00	35.20	µg/L	NA	< 0.102	NA	NA	0.030	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	6/6/2023	33.05	29.53	µg/L	NA	0.207	NA	NA	0.051	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	6/20/2023	32.90	28.39	µg/L	NA	0.113	NA	NA	0.027	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	7/5/2023	27.67	23.17	µg/L	NA	0.106	NA	NA	0.020	NA
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	7/9/2023	28.75	24.80	µg/L	0.751	0.195	74%	0.18	0.040	78%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	7/10/2023	29.61	25.93	µg/L	1.24	0.141	89%	0.31	0.030	90%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	7/11/2023	28.60	24.89	µg/L	0.776	0.141	82%	0.19	0.029	84%
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	7/18/2023	27.89	23.96	µg/L	NA	0.133	NA	NA	0.027	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	7/25/2023	27.90	23.93	µg/L	NA	0.161	NA	NA	0.032	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	8/2/2023	29.18	23.43	µg/L	NA	0.175	NA	NA	0.034	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	9/12/2023	28.54	25.45	µg/L	NA	< 0.102	NA	NA	0.022	NA
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	10/1/2023	32.23	28.76	µg/L	0.793	< 0.102	94%	0.21	0.024	89%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	10/2/2023	33.63	30.35	µg/L	0.868	< 0.102	94%	0.24	0.026	89%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	10/3/2023	32.78	29.59	µg/L	1.26	< 0.102	96%	0.34	0.025	93%
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	10/17/2023	36.58	33.17	µg/L	NA	0.160	NA	NA	0.044	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	10/24/2023	38.61	34.55	µg/L	NA	< 0.102	NA	NA	0.029	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	11/21/2023	37.75	33.14	µg/L	NA	< 0.102	NA	NA	0.028	NA
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	12/11/2023	66.53	66.53	µg/L	0.541	< 0.102	91%	0.30	0.057	81%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	12/12/2023	56.68	56.68	µg/L	0.629	< 0.102	92%	0.30	0.048	84%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	12/13/2023	50.83	50.83	µg/L	0.794	< 0.102	94%	0.34	0.043	87%
Mercury	Mercury by Purge & Trap, Total	1	0.2	1/16/2023	56.70	54.83	ng/L	15.9	0.728	95%	0.0075	0.00033	96%

Influent-Effluent Metals & Cyanide: Rock Creek Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Mercury	Mercury by Purge & Trap, Total	1	0.2	1/17/2023	50.17	46.72	ng/L	81.3	0.696	99%	0.034	0.00027	99%
Mercury	Mercury by Purge & Trap, Total	1	0.2	1/18/2023	53.03	49.08	ng/L	30.1	0.733	98%	0.013	0.00030	98%
Mercury	Mercury by Purge & Trap, Total	1	0.2	4/9/2023	50.83	47.98	ng/L	28.0	0.880	97%	0.012	0.00035	97%
Mercury	Mercury by Purge & Trap, Total	1	0.2	4/10/2023	90.90	90.90	ng/L	28.8	1.35	95%	0.022	0.0010	95%
Mercury	Mercury by Purge & Trap, Total	1	0.2	4/11/2023	79.65	79.65	ng/L	18.8	1.15	94%	0.012	0.00076	94%
Mercury	Mercury by Purge & Trap, Total	1	0.2	7/9/2023	28.75	24.80	ng/L	59.5	0.390	99%	0.014	0.000081	99%
Mercury	Mercury by Purge & Trap, Total	1	0.2	7/10/2023	29.61	25.93	ng/L	40.9	0.397	99%	0.010	0.000086	99%
Mercury	Mercury by Purge & Trap, Total	1	0.2	7/11/2023	28.60	24.89	ng/L	40.6	0.384	99%	0.0097	0.000080	99%
Mercury	Mercury by Purge & Trap, Total	1	0.2	10/1/2023	32.23	28.76	ng/L	15.1	0.549	96%	0.0041	0.00013	97%
Mercury	Mercury by Purge & Trap, Total	1	0.2	10/2/2023	33.63	30.35	ng/L	33.8	0.576	98%	0.0095	0.00015	98%
Mercury	Mercury by Purge & Trap, Total	1	0.2	10/3/2023	32.78	29.59	ng/L	35.6	0.568	98%	0.0097	0.00014	99%
Mercury	Mercury by Purge & Trap, Total	1	0.2	12/11/2023	66.53	66.53	ng/L	16.4	0.829	95%	0.0091	0.00046	95%
Mercury	Mercury by Purge & Trap, Total	1	0.2	12/12/2023	56.68	56.68	ng/L	63.0	0.927	98%	0.030	0.00044	99%
Mercury	Mercury by Purge & Trap, Total	1	0.2	12/13/2023	50.83	50.83	ng/L	75.3	0.814	99%	0.032	0.00035	99%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/16/2023	56.70	54.83	µg/L	2.12	1.27	40%	1.0	0.58	42%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/17/2023	50.17	46.72	µg/L	2.17	1.55	29%	0.91	0.60	33%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/18/2023	53.03	49.08	µg/L	2.20	1.52	31%	0.97	0.62	36%
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	2/7/2023	35.50	32.00	µg/L	NA	1.35	NA	NA	0.36	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	3/7/2023	43.93	40.48	µg/L	NA	1.47	NA	NA	0.50	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	4/4/2023	43.62	39.92	µg/L	NA	1.29	NA	NA	0.43	NA
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/9/2023	50.83	47.98	µg/L	1.42	1.00	30%	0.60	0.40	34%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/10/2023	90.90	90.90	µg/L	1.85	1.08	42%	1.4	0.82	42%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/11/2023	79.65	79.65	µg/L	1.44	1.07	26%	0.96	0.71	26%
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	5/2/2023	35.13	31.70	µg/L	NA	1.93	NA	NA	0.51	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	5/9/2023	39.00	35.20	µg/L	NA	1.79	NA	NA	0.53	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	6/6/2023	33.05	29.53	µg/L	NA	2.04	NA	NA	0.50	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	6/20/2023	32.90	28.39	µg/L	NA	1.62	NA	NA	0.38	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	7/5/2023	27.67	23.17	µg/L	NA	1.32	NA	NA	0.26	NA
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	7/9/2023	28.75	24.80	µg/L	1.97	1.12	43%	0.47	0.23	51%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	7/10/2023	29.61	25.93	µg/L	2.57	1.16	55%	0.63	0.25	60%

Influent-Effluent Metals & Cyanide: Rock Creek Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	7/11/2023	28.60	24.89	µg/L	2.51	1.31	48%	0.60	0.27	55%
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	7/18/2023	27.89	23.96	µg/L	NA	3.01	NA	NA	0.60	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	7/25/2023	27.90	23.93	µg/L	NA	2.23	NA	NA	0.45	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	8/2/2023	29.18	23.43	µg/L	NA	1.94	NA	NA	0.38	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	9/12/2023	28.54	25.45	µg/L	NA	2.38	NA	NA	0.51	NA
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	10/1/2023	32.23	28.76	µg/L	3.44	3.49	-2%	0.92	0.84	10%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	10/2/2023	33.63	30.35	µg/L	3.19	2.87	10%	0.89	0.73	19%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	10/3/2023	32.78	29.59	µg/L	3.44	2.54	26%	0.94	0.63	33%
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	10/17/2023	36.58	33.17	µg/L	NA	3.36	NA	NA	0.93	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	10/24/2023	38.61	34.55	µg/L	NA	5.84	NA	NA	1.7	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	11/21/2023	37.75	33.14	µg/L	NA	5.51	NA	NA	1.5	NA
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	12/11/2023	66.53	66.53	µg/L	3.48	2.53	27%	1.9	1.4	27%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	12/12/2023	56.68	56.68	µg/L	2.84	2.49	12%	1.3	1.2	12%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	12/13/2023	50.83	50.83	µg/L	3.61	2.49	31%	1.5	1.1	31%
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	1/16/2023	56.70	54.83	µg/L	3.11	1.22	61%	1.5	0.56	62%
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	1/17/2023	50.17	46.72	µg/L	3.41	1.37	60%	1.4	0.53	63%
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	1/18/2023	53.03	49.08	µg/L	4.78	1.42	70%	2.1	0.58	73%
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	2/7/2023	35.50	32.00	µg/L	NA	2.09	NA	NA	0.56	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	3/7/2023	43.93	40.48	µg/L	NA	1.34	NA	NA	0.45	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	4/4/2023	43.62	39.92	µg/L	NA	1.62	NA	NA	0.54	NA
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	4/9/2023	50.83	47.98	µg/L	5.35	1.08	80%	2.3	0.43	81%
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	4/10/2023	90.90	90.90	µg/L	5.43	1.13	79%	4.1	0.86	79%
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	4/11/2023	79.65	79.65	µg/L	3.26	1.16	64%	2.2	0.77	64%
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	5/2/2023	35.13	31.70	µg/L	NA	5.29	NA	NA	1.4	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	5/9/2023	39.00	35.20	µg/L	NA	1.65	NA	NA	0.48	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	6/6/2023	33.05	29.53	µg/L	NA	2.52	NA	NA	0.62	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	6/20/2023	32.90	28.39	µg/L	NA	2.55	NA	NA	0.60	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	7/5/2023	27.67	23.17	µg/L	NA	1.49	NA	NA	0.29	NA
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	7/9/2023	28.75	24.80	µg/L	3.69	1.68	55%	0.88	0.35	61%
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	7/10/2023	29.61	25.93	µg/L	5.27	1.49	72%	1.3	0.32	75%

Influent-Effluent Metals & Cyanide: Rock Creek Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	7/11/2023	28.60	24.89	µg/L	4.65	1.84	60%	1.1	0.38	66%
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	7/18/2023	27.89	23.96	µg/L	NA	2.16	NA	NA	0.43	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	7/25/2023	27.90	23.93	µg/L	NA	1.97	NA	NA	0.39	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	8/2/2023	29.18	23.43	µg/L	NA	2.35	NA	NA	0.46	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	9/12/2023	28.54	25.45	µg/L	NA	1.93	NA	NA	0.41	NA
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	10/1/2023	32.23	28.76	µg/L	4.01	2.34	42%	1.1	0.56	48%
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	10/2/2023	33.63	30.35	µg/L	4.75	2.03	57%	1.3	0.51	61%
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	10/3/2023	32.78	29.59	µg/L	6.46	2.38	63%	1.8	0.59	67%
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	10/17/2023	36.58	33.17	µg/L	NA	5.99	NA	NA	1.7	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	10/24/2023	38.61	34.55	µg/L	NA	4.96	NA	NA	1.4	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	11/21/2023	37.75	33.14	µg/L	NA	4.70	NA	NA	1.3	NA
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	12/11/2023	66.53	66.53	µg/L	3.66	1.13	69%	2.0	0.63	69%
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	12/12/2023	56.68	56.68	µg/L	3.98	1.36	66%	1.9	0.64	66%
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	12/13/2023	50.83	50.83	µg/L	4.82	1.30	73%	2.0	0.55	73%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	1/16/2023	56.70	54.83	µg/L	< 0.508	< 0.508	NA	0.24	0.23	3%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	1/17/2023	50.17	46.72	µg/L	< 0.508	< 0.508	NA	0.21	0.20	7%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	1/18/2023	53.03	49.08	µg/L	< 0.508	< 0.508	NA	0.22	0.21	7%
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	2/7/2023	35.50	32.00	µg/L	NA	< 0.508	NA	NA	0.14	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	3/7/2023	43.93	40.48	µg/L	NA	< 0.508	NA	NA	0.17	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	4/4/2023	43.62	39.92	µg/L	NA	< 0.508	NA	NA	0.17	NA
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	4/9/2023	50.83	47.98	µg/L	< 0.508	< 0.508	NA	0.22	0.20	6%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	4/10/2023	90.90	90.90	µg/L	< 0.508	< 0.508	NA	0.39	0.39	0%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	4/11/2023	79.65	79.65	µg/L	< 0.508	< 0.508	NA	0.34	0.34	0%
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	5/2/2023	35.13	31.70	µg/L	NA	< 0.508	NA	NA	0.13	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	5/9/2023	39.00	35.20	µg/L	NA	< 0.508	NA	NA	0.15	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	6/6/2023	33.05	29.53	µg/L	NA	< 0.508	NA	NA	0.13	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	6/20/2023	32.90	28.39	µg/L	NA	< 0.508	NA	NA	0.12	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	7/5/2023	27.67	23.17	µg/L	NA	< 0.508	NA	NA	0.098	NA
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	7/9/2023	28.75	24.80	µg/L	< 0.508	< 0.508	NA	0.12	0.11	14%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	7/10/2023	29.61	25.93	µg/L	< 0.508	< 0.508	NA	0.13	0.11	12%

Influent-Effluent Metals & Cyanide: Rock Creek Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	7/11/2023	28.60	24.89	µg/L	0.573	< 0.508	56%	0.14	0.11	23%
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	7/18/2023	27.89	23.96	µg/L	NA	< 0.508	NA	NA	0.10	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	7/25/2023	27.90	23.93	µg/L	NA	< 0.508	NA	NA	0.10	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	8/2/2023	29.18	23.43	µg/L	NA	< 0.508	NA	NA	0.099	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	9/12/2023	28.54	25.45	µg/L	NA	< 0.508	NA	NA	0.11	NA
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	10/1/2023	32.23	28.76	µg/L	< 0.508	< 0.508	NA	0.14	0.12	11%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	10/2/2023	33.63	30.35	µg/L	< 0.508	< 0.508	NA	0.14	0.13	10%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	10/3/2023	32.78	29.59	µg/L	< 0.508	< 0.508	NA	0.14	0.13	10%
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	10/17/2023	36.58	33.17	µg/L	NA	< 0.508	NA	NA	0.14	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	10/24/2023	38.61	34.55	µg/L	NA	< 0.508	NA	NA	0.15	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	11/21/2023	37.75	33.14	µg/L	NA	< 0.508	NA	NA	0.14	NA
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	12/11/2023	66.53	66.53	µg/L	< 0.508	< 0.508	NA	0.28	0.28	0%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	12/12/2023	56.68	56.68	µg/L	< 0.508	< 0.508	NA	0.24	0.24	0%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	12/13/2023	50.83	50.83	µg/L	< 0.508	< 0.508	NA	0.22	0.22	0%
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/16/2023	56.70	54.83	µg/L	0.103	< 0.102	51%	0.049	0.047	4%
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/17/2023	50.17	46.72	µg/L	0.108	< 0.102	53%	0.045	0.040	12%
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/18/2023	53.03	49.08	µg/L	0.104	< 0.102	51%	0.046	0.042	9%
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	2/7/2023	35.50	32.00	µg/L	NA	< 0.102	NA	NA	0.027	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	3/7/2023	43.93	40.48	µg/L	NA	< 0.102	NA	NA	0.034	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	4/4/2023	43.62	39.92	µg/L	NA	< 0.102	NA	NA	0.034	NA
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/9/2023	50.83	47.98	µg/L	0.105	< 0.102	52%	0.045	0.041	8%
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/10/2023	90.90	90.90	µg/L	0.123	< 0.102	59%	0.093	0.077	17%
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/11/2023	79.65	79.65	µg/L	< 0.102	< 0.102	NA	0.068	0.068	0%
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	5/2/2023	35.13	31.70	µg/L	NA	< 0.102	NA	NA	0.027	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	5/9/2023	39.00	35.20	µg/L	NA	< 0.102	NA	NA	0.030	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	6/6/2023	33.05	29.53	µg/L	NA	< 0.102	NA	NA	0.025	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	6/20/2023	32.90	28.39	µg/L	NA	< 0.102	NA	NA	0.024	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	7/5/2023	27.67	23.17	µg/L	NA	< 0.102	NA	NA	0.020	NA
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	7/9/2023	28.75	24.80	µg/L	0.207	< 0.102	76%	0.050	0.021	57%
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	7/10/2023	29.61	25.93	µg/L	0.214	< 0.102	76%	0.053	0.022	58%

Influent-Effluent Metals & Cyanide: Rock Creek Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	7/11/2023	28.60	24.89	µg/L	0.213	< 0.102	76%	0.051	0.021	58%
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	7/18/2023	27.89	23.96	µg/L	NA	< 0.102	NA	NA	0.020	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	7/25/2023	27.90	23.93	µg/L	NA	< 0.102	NA	NA	0.020	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	8/2/2023	29.18	23.43	µg/L	NA	< 0.102	NA	NA	0.020	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	9/12/2023	28.54	25.45	µg/L	NA	< 0.102	NA	NA	0.022	NA
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	10/1/2023	32.23	28.76	µg/L	0.186	< 0.102	73%	0.050	0.024	51%
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	10/2/2023	33.63	30.35	µg/L	0.201	< 0.102	75%	0.056	0.026	54%
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	10/3/2023	32.78	29.59	µg/L	0.322	< 0.102	84%	0.088	0.025	71%
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	10/17/2023	36.58	33.17	µg/L	NA	< 0.102	NA	NA	0.028	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	10/24/2023	38.61	34.55	µg/L	NA	< 0.102	NA	NA	0.029	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	11/21/2023	37.75	33.14	µg/L	NA	< 0.102	NA	NA	0.028	NA
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	12/11/2023	66.53	66.53	µg/L	< 0.102	< 0.102	NA	0.057	0.057	0%
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	12/12/2023	56.68	56.68	µg/L	0.103	< 0.102	51%	0.049	0.048	1%
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	12/13/2023	50.83	50.83	µg/L	0.164	< 0.102	69%	0.070	0.043	38%
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	1/16/2023	56.70	54.83	µg/L	97.0	21.5	78%	46	9.8	79%
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	1/17/2023	50.17	46.72	µg/L	100	22.4	78%	42	8.7	79%
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	1/18/2023	53.03	49.08	µg/L	101	20.5	80%	45	8.4	81%
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	2/7/2023	35.50	32.00	µg/L	NA	24.6	NA	NA	6.6	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	3/7/2023	43.93	40.48	µg/L	NA	26.1	NA	NA	8.8	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	4/4/2023	43.62	39.92	µg/L	NA	25.8	NA	NA	8.6	NA
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	4/9/2023	50.83	47.98	µg/L	118	23.9	80%	50	9.6	81%
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	4/10/2023	90.90	90.90	µg/L	144	23.3	84%	110	18	84%
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	4/11/2023	79.65	79.65	µg/L	92.9	20.9	78%	62	14	78%
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	5/2/2023	35.13	31.70	µg/L	NA	26.8	NA	NA	7.1	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	5/9/2023	39.00	35.20	µg/L	NA	24.2	NA	NA	7.1	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	6/6/2023	33.05	29.53	µg/L	NA	47.2	NA	NA	12	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	6/20/2023	32.90	28.39	µg/L	NA	32.0	NA	NA	7.6	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	7/5/2023	27.67	23.17	µg/L	NA	30.4	NA	NA	5.9	NA
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	7/9/2023	28.75	24.80	µg/L	132	34.7	74%	32	7.2	77%
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	7/10/2023	29.61	25.93	µg/L	188	30.8	84%	46	6.7	86%

Influent-Effluent Metals & Cyanide: Rock Creek Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	7/11/2023	28.60	24.89	µg/L	140	33.7	76%	33	7.0	79%
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	7/18/2023	27.89	23.96	µg/L	NA	34.0	NA	NA	6.8	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	7/25/2023	27.90	23.93	µg/L	NA	39.9	NA	NA	8.0	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	8/2/2023	29.18	23.43	µg/L	NA	41.8	NA	NA	8.2	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	9/12/2023	28.54	25.45	µg/L	NA	32.4	NA	NA	6.9	NA
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	10/1/2023	32.23	28.76	µg/L	132	33.4	75%	35	8.0	77%
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	10/2/2023	33.63	30.35	µg/L	130	33.5	74%	36	8.5	77%
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	10/3/2023	32.78	29.59	µg/L	151	35.5	76%	41	8.8	79%
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	10/17/2023	36.58	33.17	µg/L	NA	36.1	NA	NA	10	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	10/24/2023	38.61	34.55	µg/L	NA	36.6	NA	NA	11	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	11/21/2023	37.75	33.14	µg/L	NA	43.9	NA	NA	12	NA
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	12/11/2023	66.53	66.53	µg/L	119	22.8	81%	66	13	81%
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	12/12/2023	56.68	56.68	µg/L	125	26.9	78%	59	13	78%
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	12/13/2023	50.83	50.83	µg/L	123	25.7	79%	52	11	79%

Form 3 – Treatment Plant Monitoring Data – Rock Creek Biosolids

Biosolids: Rock Creek Water Resource Recovery Facility					
Sample Point Description	Pollutant Parameter	Analysis Description	MRL	Sample Date	Biosolids Concentration (mg/kg)
Rock Creek Cake	Arsenic	ICP/MS Metals, Dry	2.16	1/17/2023	5.12
Rock Creek Cake	Arsenic	ICP/MS Metals, Dry	2.05	1/18/2023	4.74
Rock Creek Cake	Arsenic	ICP/MS Metals, Dry	2.08	1/19/2023	4.87
Rock Creek Cake	Arsenic	ICP/MS Metals, Dry	2.18	2/14/2023	4.60
Rock Creek Cake	Arsenic	ICP/MS Metals, Dry	2.25	3/14/2023	5.26
Rock Creek Cake	Arsenic	ICP/MS Metals, Dry	2.22	4/10/2023	4.18
Rock Creek Cake	Arsenic	ICP/MS Metals, Dry	2.17	4/11/2023	4.23
Rock Creek Cake	Arsenic	ICP/MS Metals, Dry	2.18	4/12/2023	4.25
Rock Creek Cake	Arsenic	ICP/MS Metals, Dry	2.33	5/9/2023	5.01
Rock Creek Cake	Arsenic	ICP/MS Metals, Dry	2.31	6/14/2023	4.41
Rock Creek Cake	Arsenic	ICP/MS Metals, Dry	2.29	7/17/2023	4.38
Rock Creek Cake	Arsenic	ICP/MS Metals, Dry	2.27	7/18/2023	4.76
Rock Creek Cake	Arsenic	ICP/MS Metals, Dry	2.22	7/19/2023	4.60
Rock Creek Cake	Arsenic	ICP/MS Metals, Dry	2.18	8/9/2023	4.04
Rock Creek Cake	Arsenic	ICP/MS Metals, Dry	2.14	9/13/2023	4.26
Rock Creek Cake	Arsenic	ICP/MS Metals, Dry	2.37	10/16/2023	4.73
Rock Creek Cake	Arsenic	ICP/MS Metals, Dry	2.29	10/18/2023	5.06
Rock Creek Cake	Arsenic	ICP/MS Metals, Dry	2.45	11/14/2023	4.04
Rock Creek Cake	Arsenic	ICP/MS Metals, Dry	2.28	11/15/2023	4.30
Rock Creek Cake	Arsenic	ICP/MS Metals, Dry	2.28	11/16/2023	4.62
Rock Creek Cake	Arsenic	ICP/MS Metals, Dry	2.25	12/6/2023	4.48
Rock Creek Cake	Cadmium	ICP/MS Metals, Dry	0.43	1/17/2023	0.93
Rock Creek Cake	Cadmium	ICP/MS Metals, Dry	0.41	1/18/2023	0.89
Rock Creek Cake	Cadmium	ICP/MS Metals, Dry	0.42	1/19/2023	0.91
Rock Creek Cake	Cadmium	ICP/MS Metals, Dry	0.44	2/14/2023	0.78
Rock Creek Cake	Cadmium	ICP/MS Metals, Dry	0.45	3/14/2023	0.92
Rock Creek Cake	Cadmium	ICP/MS Metals, Dry	0.44	4/10/2023	0.97
Rock Creek Cake	Cadmium	ICP/MS Metals, Dry	0.43	4/11/2023	0.88

Biosolids: Rock Creek Water Resource Recovery Facility					
Sample Point Description	Pollutant Parameter	Analysis Description	MRL	Sample Date	Biosolids Concentration (mg/kg)
Rock Creek Cake	Cadmium	ICP/MS Metals, Dry	0.44	4/12/2023	0.96
Rock Creek Cake	Cadmium	ICP/MS Metals, Dry	0.47	5/9/2023	0.87
Rock Creek Cake	Cadmium	ICP/MS Metals, Dry	0.46	6/14/2023	0.70
Rock Creek Cake	Cadmium	ICP/MS Metals, Dry	0.46	7/17/2023	0.68
Rock Creek Cake	Cadmium	ICP/MS Metals, Dry	0.45	7/18/2023	0.75
Rock Creek Cake	Cadmium	ICP/MS Metals, Dry	0.44	7/19/2023	0.70
Rock Creek Cake	Cadmium	ICP/MS Metals, Dry	0.44	8/9/2023	0.70
Rock Creek Cake	Cadmium	ICP/MS Metals, Dry	0.43	9/13/2023	0.78
Rock Creek Cake	Cadmium	ICP/MS Metals, Dry	0.47	10/16/2023	0.86
Rock Creek Cake	Cadmium	ICP/MS Metals, Dry	0.46	10/18/2023	0.89
Rock Creek Cake	Cadmium	ICP/MS Metals, Dry	0.49	11/14/2023	0.79
Rock Creek Cake	Cadmium	ICP/MS Metals, Dry	0.46	11/15/2023	0.78
Rock Creek Cake	Cadmium	ICP/MS Metals, Dry	0.46	11/16/2023	0.86
Rock Creek Cake	Cadmium	ICP/MS Metals, Dry	0.45	12/6/2023	0.87
Rock Creek Cake	Chromium	ICP/MS Metals, Dry	1.73	1/17/2023	25.3
Rock Creek Cake	Chromium	ICP/MS Metals, Dry	1.64	1/18/2023	24.4
Rock Creek Cake	Chromium	ICP/MS Metals, Dry	1.67	1/19/2023	24.6
Rock Creek Cake	Chromium	ICP/MS Metals, Dry	1.74	2/14/2023	24.7
Rock Creek Cake	Chromium	ICP/MS Metals, Dry	1.80	3/14/2023	25.4
Rock Creek Cake	Chromium	ICP/MS Metals, Dry	1.78	4/10/2023	28.8
Rock Creek Cake	Chromium	ICP/MS Metals, Dry	1.74	4/11/2023	26.8
Rock Creek Cake	Chromium	ICP/MS Metals, Dry	1.74	4/12/2023	27.6
Rock Creek Cake	Chromium	ICP/MS Metals, Dry	1.86	5/9/2023	28.7
Rock Creek Cake	Chromium	ICP/MS Metals, Dry	1.85	6/14/2023	20.1
Rock Creek Cake	Chromium	ICP/MS Metals, Dry	1.83	7/17/2023	18.5
Rock Creek Cake	Chromium	ICP/MS Metals, Dry	1.81	7/18/2023	21.5
Rock Creek Cake	Chromium	ICP/MS Metals, Dry	1.78	7/19/2023	19.1
Rock Creek Cake	Chromium	ICP/MS Metals, Dry	1.74	8/9/2023	16.5
Rock Creek Cake	Chromium	ICP/MS Metals, Dry	1.71	9/13/2023	24.2
Rock Creek Cake	Chromium	ICP/MS Metals, Dry	1.89	10/16/2023	24.2

Biosolids: Rock Creek Water Resource Recovery Facility					
Sample Point Description	Pollutant Parameter	Analysis Description	MRL	Sample Date	Biosolids Concentration (mg/kg)
Rock Creek Cake	Chromium	ICP/MS Metals, Dry	1.83	10/18/2023	23.5
Rock Creek Cake	Chromium	ICP/MS Metals, Dry	1.96	11/14/2023	20.6
Rock Creek Cake	Chromium	ICP/MS Metals, Dry	1.83	11/15/2023	21.0
Rock Creek Cake	Chromium	ICP/MS Metals, Dry	1.82	11/16/2023	22.8
Rock Creek Cake	Chromium	ICP/MS Metals, Dry	1.80	12/6/2023	21.5
Rock Creek Cake	Copper	ICP/MS Metals, Dry	1.73	1/17/2023	295
Rock Creek Cake	Copper	ICP/MS Metals, Dry	1.64	1/18/2023	279
Rock Creek Cake	Copper	ICP/MS Metals, Dry	1.67	1/19/2023	276
Rock Creek Cake	Copper	ICP/MS Metals, Dry	1.74	2/14/2023	255
Rock Creek Cake	Copper	ICP/MS Metals, Dry	1.80	3/14/2023	311
Rock Creek Cake	Copper	ICP/MS Metals, Dry	1.78	4/10/2023	304
Rock Creek Cake	Copper	ICP/MS Metals, Dry	1.74	4/11/2023	300
Rock Creek Cake	Copper	ICP/MS Metals, Dry	1.74	4/12/2023	299
Rock Creek Cake	Copper	ICP/MS Metals, Dry	1.86	5/9/2023	289
Rock Creek Cake	Copper	ICP/MS Metals, Dry	1.85	6/14/2023	237
Rock Creek Cake	Copper	ICP/MS Metals, Dry	1.83	7/17/2023	231
Rock Creek Cake	Copper	ICP/MS Metals, Dry	1.81	7/18/2023	261
Rock Creek Cake	Copper	ICP/MS Metals, Dry	1.78	7/19/2023	244
Rock Creek Cake	Copper	ICP/MS Metals, Dry	1.74	8/9/2023	226
Rock Creek Cake	Copper	ICP/MS Metals, Dry	1.71	9/13/2023	277
Rock Creek Cake	Copper	ICP/MS Metals, Dry	1.89	10/16/2023	301
Rock Creek Cake	Copper	ICP/MS Metals, Dry	1.83	10/18/2023	318
Rock Creek Cake	Copper	ICP/MS Metals, Dry	1.96	11/14/2023	275
Rock Creek Cake	Copper	ICP/MS Metals, Dry	1.83	11/15/2023	288
Rock Creek Cake	Copper	ICP/MS Metals, Dry	1.82	11/16/2023	317
Rock Creek Cake	Copper	ICP/MS Metals, Dry	1.80	12/6/2023	289
Rock Creek Cake	Cyanide	Cyanide, Dry (Contract Lab)	0.79	1/17/2023	2.51
Rock Creek Cake	Cyanide	Cyanide, Dry (Contract Lab)	0.75	1/18/2023	1.95
Rock Creek Cake	Cyanide	Cyanide, Dry (Contract Lab)	0.77	1/19/2023	1.36
Rock Creek Cake	Cyanide	Cyanide, Dry (Contract Lab)	0.80	4/10/2023	1.88

Biosolids: Rock Creek Water Resource Recovery Facility					
Sample Point Description	Pollutant Parameter	Analysis Description	MRL	Sample Date	Biosolids Concentration (mg/kg)
Rock Creek Cake	Cyanide	Cyanide, Dry (Contract Lab)	0.79	4/11/2023	2.14
Rock Creek Cake	Cyanide	Cyanide, Dry (Contract Lab)	0.79	4/12/2023	2.38
Rock Creek Cake	Cyanide	Cyanide, Dry	2.25	7/17/2023	9.68
Rock Creek Cake	Cyanide	Cyanide, Dry	2.35	7/18/2023	9.73
Rock Creek Cake	Cyanide	Cyanide, Dry	2.27	7/19/2023	10.4
Rock Creek Cake	Cyanide	Cyanide, Dry	2.23	10/16/2023	8.94
Rock Creek Cake	Cyanide	Cyanide, Dry	2.44	10/17/2023	9.37
Rock Creek Cake	Cyanide	Cyanide, Dry	2.28	10/18/2023	9.31
Rock Creek Cake	Cyanide	Cyanide, Dry	2.15	11/14/2023	10.2
Rock Creek Cake	Cyanide	Cyanide, Dry	2.25	11/15/2023	10.3
Rock Creek Cake	Cyanide	Cyanide, Dry	2.36	11/16/2023	10.6
Rock Creek Cake	Hardness	ICP/MS Metals, Dry	0.00	1/17/2023	62700
Rock Creek Cake	Hardness	ICP/MS Metals, Dry	0.00	1/18/2023	68600
Rock Creek Cake	Hardness	ICP/MS Metals, Dry	0.00	1/19/2023	62800
Rock Creek Cake	Hardness	ICP/MS Metals, Dry	0.00	2/14/2023	54400
Rock Creek Cake	Hardness	ICP/MS Metals, Dry	0.00	4/10/2023	63100
Rock Creek Cake	Hardness	ICP/MS Metals, Dry	0.00	4/11/2023	64800
Rock Creek Cake	Hardness	ICP/MS Metals, Dry	0.00	4/12/2023	58600
Rock Creek Cake	Hardness	ICP/MS Metals, Dry	0.00	5/9/2023	68000
Rock Creek Cake	Hardness	ICP/MS Metals, Dry	0.00	6/14/2023	59200
Rock Creek Cake	Hardness	ICP/MS Metals, Dry	0.00	7/17/2023	57900
Rock Creek Cake	Hardness	ICP/MS Metals, Dry	0.00	7/18/2023	64400
Rock Creek Cake	Hardness	ICP/MS Metals, Dry	0.00	7/19/2023	61500
Rock Creek Cake	Hardness	ICP/MS Metals, Dry	0.00	8/9/2023	59700
Rock Creek Cake	Hardness	ICP/MS Metals, Dry	0.00	9/13/2023	65700
Rock Creek Cake	Hardness	ICP/MS Metals, Dry	0.00	10/16/2023	69400
Rock Creek Cake	Hardness	ICP/MS Metals, Dry	0.00	10/18/2023	71800
Rock Creek Cake	Hardness	ICP/MS Metals, Dry	0.00	11/14/2023	60700
Rock Creek Cake	Hardness	ICP/MS Metals, Dry	0.00	11/15/2023	57600
Rock Creek Cake	Hardness	ICP/MS Metals, Dry	0.00	11/16/2023	63800

Biosolids: Rock Creek Water Resource Recovery Facility					
Sample Point Description	Pollutant Parameter	Analysis Description	MRL	Sample Date	Biosolids Concentration (mg/kg)
Rock Creek Cake	Hardness	ICP/MS Metals, Dry	0.00	12/6/2023	59900
Rock Creek Cake	Lead	ICP/MS Metals, Dry	0.43	1/17/2023	7.10
Rock Creek Cake	Lead	ICP/MS Metals, Dry	0.41	1/18/2023	6.79
Rock Creek Cake	Lead	ICP/MS Metals, Dry	0.42	1/19/2023	6.87
Rock Creek Cake	Lead	ICP/MS Metals, Dry	0.44	2/14/2023	6.58
Rock Creek Cake	Lead	ICP/MS Metals, Dry	0.45	3/14/2023	6.55
Rock Creek Cake	Lead	ICP/MS Metals, Dry	0.44	4/10/2023	6.28
Rock Creek Cake	Lead	ICP/MS Metals, Dry	0.43	4/11/2023	6.64
Rock Creek Cake	Lead	ICP/MS Metals, Dry	0.44	4/12/2023	6.63
Rock Creek Cake	Lead	ICP/MS Metals, Dry	0.47	5/9/2023	8.67
Rock Creek Cake	Lead	ICP/MS Metals, Dry	0.46	6/14/2023	5.59
Rock Creek Cake	Lead	ICP/MS Metals, Dry	0.46	7/17/2023	4.74
Rock Creek Cake	Lead	ICP/MS Metals, Dry	0.45	7/18/2023	5.11
Rock Creek Cake	Lead	ICP/MS Metals, Dry	0.44	7/19/2023	4.91
Rock Creek Cake	Lead	ICP/MS Metals, Dry	0.44	8/9/2023	5.72
Rock Creek Cake	Lead	ICP/MS Metals, Dry	0.43	9/13/2023	5.39
Rock Creek Cake	Lead	ICP/MS Metals, Dry	0.47	10/16/2023	6.10
Rock Creek Cake	Lead	ICP/MS Metals, Dry	0.46	10/18/2023	6.21
Rock Creek Cake	Lead	ICP/MS Metals, Dry	0.49	11/14/2023	6.05
Rock Creek Cake	Lead	ICP/MS Metals, Dry	0.46	11/15/2023	7.38
Rock Creek Cake	Lead	ICP/MS Metals, Dry	0.46	11/16/2023	6.85
Rock Creek Cake	Lead	ICP/MS Metals, Dry	0.45	12/6/2023	6.82
Rock Creek Cake	Mercury	ICP/MS Metals, Dry	0.09	1/17/2023	0.30
Rock Creek Cake	Mercury	ICP/MS Metals, Dry	0.08	1/18/2023	0.57
Rock Creek Cake	Mercury	ICP/MS Metals, Dry	0.08	1/19/2023	0.71
Rock Creek Cake	Mercury	ICP/MS Metals, Dry	0.09	2/14/2023	0.29
Rock Creek Cake	Mercury	ICP/MS Metals, Dry	0.09	3/14/2023	0.36
Rock Creek Cake	Mercury	ICP/MS Metals, Dry	0.09	4/10/2023	0.62
Rock Creek Cake	Mercury	ICP/MS Metals, Dry	0.09	4/11/2023	0.54
Rock Creek Cake	Mercury	ICP/MS Metals, Dry	0.09	4/12/2023	0.37

Biosolids: Rock Creek Water Resource Recovery Facility					
Sample Point Description	Pollutant Parameter	Analysis Description	MRL	Sample Date	Biosolids Concentration (mg/kg)
Rock Creek Cake	Mercury	ICP/MS Metals, Dry	0.09	5/9/2023	0.29
Rock Creek Cake	Mercury	ICP/MS Metals, Dry	0.09	6/14/2023	0.21
Rock Creek Cake	Mercury	ICP/MS Metals, Dry	0.09	7/17/2023	0.26
Rock Creek Cake	Mercury	ICP/MS Metals, Dry	0.09	7/18/2023	0.31
Rock Creek Cake	Mercury	ICP/MS Metals, Dry	0.09	7/19/2023	0.23
Rock Creek Cake	Mercury	ICP/MS Metals, Dry	0.09	8/9/2023	0.41
Rock Creek Cake	Mercury	ICP/MS Metals, Dry	0.09	9/13/2023	0.43
Rock Creek Cake	Mercury	ICP/MS Metals, Dry	0.09	10/16/2023	0.37
Rock Creek Cake	Mercury	ICP/MS Metals, Dry	0.09	10/18/2023	0.33
Rock Creek Cake	Mercury	ICP/MS Metals, Dry	0.10	11/14/2023	0.38
Rock Creek Cake	Mercury	ICP/MS Metals, Dry	0.09	11/15/2023	0.32
Rock Creek Cake	Mercury	ICP/MS Metals, Dry	0.09	11/16/2023	0.32
Rock Creek Cake	Mercury	ICP/MS Metals, Dry	0.09	12/6/2023	0.54
Rock Creek Cake	Molybdenum	ICP/MS Metals, Dry	0.43	1/17/2023	9.79
Rock Creek Cake	Molybdenum	ICP/MS Metals, Dry	0.41	1/18/2023	9.04
Rock Creek Cake	Molybdenum	ICP/MS Metals, Dry	0.42	1/19/2023	9.22
Rock Creek Cake	Molybdenum	ICP/MS Metals, Dry	0.44	2/14/2023	7.80
Rock Creek Cake	Molybdenum	ICP/MS Metals, Dry	0.45	3/14/2023	9.14
Rock Creek Cake	Molybdenum	ICP/MS Metals, Dry	0.44	4/10/2023	8.61
Rock Creek Cake	Molybdenum	ICP/MS Metals, Dry	0.43	4/11/2023	8.66
Rock Creek Cake	Molybdenum	ICP/MS Metals, Dry	0.44	4/12/2023	8.52
Rock Creek Cake	Molybdenum	ICP/MS Metals, Dry	0.47	5/9/2023	8.95
Rock Creek Cake	Molybdenum	ICP/MS Metals, Dry	0.46	6/14/2023	7.53
Rock Creek Cake	Molybdenum	ICP/MS Metals, Dry	0.46	7/17/2023	7.86
Rock Creek Cake	Molybdenum	ICP/MS Metals, Dry	0.45	7/18/2023	9.08
Rock Creek Cake	Molybdenum	ICP/MS Metals, Dry	0.44	7/19/2023	8.53
Rock Creek Cake	Molybdenum	ICP/MS Metals, Dry	0.44	8/9/2023	8.09
Rock Creek Cake	Molybdenum	ICP/MS Metals, Dry	0.43	9/13/2023	9.47
Rock Creek Cake	Molybdenum	ICP/MS Metals, Dry	0.47	10/16/2023	10.4
Rock Creek Cake	Molybdenum	ICP/MS Metals, Dry	0.46	10/18/2023	11.0

Biosolids: Rock Creek Water Resource Recovery Facility					
Sample Point Description	Pollutant Parameter	Analysis Description	MRL	Sample Date	Biosolids Concentration (mg/kg)
Rock Creek Cake	Molybdenum	ICP/MS Metals, Dry	0.49	11/14/2023	9.86
Rock Creek Cake	Molybdenum	ICP/MS Metals, Dry	0.46	11/15/2023	10.1
Rock Creek Cake	Molybdenum	ICP/MS Metals, Dry	0.46	11/16/2023	11.0
Rock Creek Cake	Molybdenum	ICP/MS Metals, Dry	0.45	12/6/2023	10.7
Rock Creek Cake	Nickel	ICP/MS Metals, Dry	1.73	1/17/2023	23.5
Rock Creek Cake	Nickel	ICP/MS Metals, Dry	1.64	1/18/2023	22.8
Rock Creek Cake	Nickel	ICP/MS Metals, Dry	1.67	1/19/2023	22.5
Rock Creek Cake	Nickel	ICP/MS Metals, Dry	1.74	2/14/2023	21.2
Rock Creek Cake	Nickel	ICP/MS Metals, Dry	1.80	3/14/2023	21.9
Rock Creek Cake	Nickel	ICP/MS Metals, Dry	1.78	4/10/2023	22.2
Rock Creek Cake	Nickel	ICP/MS Metals, Dry	1.74	4/11/2023	21.5
Rock Creek Cake	Nickel	ICP/MS Metals, Dry	1.74	4/12/2023	21.3
Rock Creek Cake	Nickel	ICP/MS Metals, Dry	1.86	5/9/2023	24.1
Rock Creek Cake	Nickel	ICP/MS Metals, Dry	1.85	6/14/2023	17.5
Rock Creek Cake	Nickel	ICP/MS Metals, Dry	1.83	7/17/2023	16.4
Rock Creek Cake	Nickel	ICP/MS Metals, Dry	1.81	7/18/2023	19.1
Rock Creek Cake	Nickel	ICP/MS Metals, Dry	1.78	7/19/2023	17.1
Rock Creek Cake	Nickel	ICP/MS Metals, Dry	1.74	8/9/2023	15.2
Rock Creek Cake	Nickel	ICP/MS Metals, Dry	1.71	9/13/2023	22.0
Rock Creek Cake	Nickel	ICP/MS Metals, Dry	1.89	10/16/2023	22.4
Rock Creek Cake	Nickel	ICP/MS Metals, Dry	1.83	10/18/2023	22.9
Rock Creek Cake	Nickel	ICP/MS Metals, Dry	1.96	11/14/2023	25.1
Rock Creek Cake	Nickel	ICP/MS Metals, Dry	1.83	11/15/2023	25.9
Rock Creek Cake	Nickel	ICP/MS Metals, Dry	1.82	11/16/2023	27.5
Rock Creek Cake	Nickel	ICP/MS Metals, Dry	1.80	12/6/2023	26.2
Rock Creek Cake	Selenium	ICP/MS Metals, Dry	2.16	1/17/2023	5.10
Rock Creek Cake	Selenium	ICP/MS Metals, Dry	2.05	1/18/2023	5.19
Rock Creek Cake	Selenium	ICP/MS Metals, Dry	2.08	1/19/2023	5.02
Rock Creek Cake	Selenium	ICP/MS Metals, Dry	2.18	2/14/2023	5.00
Rock Creek Cake	Selenium	ICP/MS Metals, Dry	2.25	3/14/2023	6.01

Biosolids: Rock Creek Water Resource Recovery Facility					
Sample Point Description	Pollutant Parameter	Analysis Description	MRL	Sample Date	Biosolids Concentration (mg/kg)
Rock Creek Cake	Selenium	ICP/MS Metals, Dry	2.22	4/10/2023	6.79
Rock Creek Cake	Selenium	ICP/MS Metals, Dry	2.17	4/11/2023	5.66
Rock Creek Cake	Selenium	ICP/MS Metals, Dry	2.18	4/12/2023	6.07
Rock Creek Cake	Selenium	ICP/MS Metals, Dry	2.33	5/9/2023	5.61
Rock Creek Cake	Selenium	ICP/MS Metals, Dry	2.31	6/14/2023	4.71
Rock Creek Cake	Selenium	ICP/MS Metals, Dry	2.29	7/17/2023	4.74
Rock Creek Cake	Selenium	ICP/MS Metals, Dry	2.27	7/18/2023	5.74
Rock Creek Cake	Selenium	ICP/MS Metals, Dry	2.22	7/19/2023	4.72
Rock Creek Cake	Selenium	ICP/MS Metals, Dry	2.18	8/9/2023	4.14
Rock Creek Cake	Selenium	ICP/MS Metals, Dry	2.14	9/13/2023	5.10
Rock Creek Cake	Selenium	ICP/MS Metals, Dry	2.37	10/16/2023	5.65
Rock Creek Cake	Selenium	ICP/MS Metals, Dry	2.29	10/18/2023	5.67
Rock Creek Cake	Selenium	ICP/MS Metals, Dry	2.45	11/14/2023	5.04
Rock Creek Cake	Selenium	ICP/MS Metals, Dry	2.28	11/15/2023	5.36
Rock Creek Cake	Selenium	ICP/MS Metals, Dry	2.28	11/16/2023	5.56
Rock Creek Cake	Selenium	ICP/MS Metals, Dry	2.25	12/6/2023	6.07
Rock Creek Cake	Silver	ICP/MS Metals, Dry	0.43	1/17/2023	1.99
Rock Creek Cake	Silver	ICP/MS Metals, Dry	0.41	1/18/2023	1.76
Rock Creek Cake	Silver	ICP/MS Metals, Dry	0.42	1/19/2023	1.68
Rock Creek Cake	Silver	ICP/MS Metals, Dry	0.44	2/14/2023	1.45
Rock Creek Cake	Silver	ICP/MS Metals, Dry	0.45	3/14/2023	1.65
Rock Creek Cake	Silver	ICP/MS Metals, Dry	0.44	4/10/2023	2.06
Rock Creek Cake	Silver	ICP/MS Metals, Dry	0.43	4/11/2023	1.90
Rock Creek Cake	Silver	ICP/MS Metals, Dry	0.44	4/12/2023	2.67
Rock Creek Cake	Silver	ICP/MS Metals, Dry	0.47	5/9/2023	2.07
Rock Creek Cake	Silver	ICP/MS Metals, Dry	0.46	6/14/2023	1.45
Rock Creek Cake	Silver	ICP/MS Metals, Dry	0.46	7/17/2023	1.53
Rock Creek Cake	Silver	ICP/MS Metals, Dry	0.45	7/18/2023	1.66
Rock Creek Cake	Silver	ICP/MS Metals, Dry	0.44	7/19/2023	1.49
Rock Creek Cake	Silver	ICP/MS Metals, Dry	0.44	8/9/2023	1.35

Biosolids: Rock Creek Water Resource Recovery Facility					
Sample Point Description	Pollutant Parameter	Analysis Description	MRL	Sample Date	Biosolids Concentration (mg/kg)
Rock Creek Cake	Silver	ICP/MS Metals, Dry	0.43	9/13/2023	3.22
Rock Creek Cake	Silver	ICP/MS Metals, Dry	0.47	10/16/2023	2.64
Rock Creek Cake	Silver	ICP/MS Metals, Dry	0.46	10/18/2023	2.42
Rock Creek Cake	Silver	ICP/MS Metals, Dry	0.49	11/14/2023	1.86
Rock Creek Cake	Silver	ICP/MS Metals, Dry	0.46	11/15/2023	1.80
Rock Creek Cake	Silver	ICP/MS Metals, Dry	0.46	11/16/2023	3.15
Rock Creek Cake	Silver	ICP/MS Metals, Dry	0.45	12/6/2023	1.81
Rock Creek Cake	Zinc	ICP/MS Metals, Dry	10.79	1/17/2023	676
Rock Creek Cake	Zinc	ICP/MS Metals, Dry	10.27	1/18/2023	655
Rock Creek Cake	Zinc	ICP/MS Metals, Dry	10.42	1/19/2023	642
Rock Creek Cake	Zinc	ICP/MS Metals, Dry	10.90	2/14/2023	577
Rock Creek Cake	Zinc	ICP/MS Metals, Dry	11.24	3/14/2023	675
Rock Creek Cake	Zinc	ICP/MS Metals, Dry	11.10	4/10/2023	682
Rock Creek Cake	Zinc	ICP/MS Metals, Dry	10.86	4/11/2023	667
Rock Creek Cake	Zinc	ICP/MS Metals, Dry	10.90	4/12/2023	665
Rock Creek Cake	Zinc	ICP/MS Metals, Dry	11.63	5/9/2023	650
Rock Creek Cake	Zinc	ICP/MS Metals, Dry	11.54	6/14/2023	563
Rock Creek Cake	Zinc	ICP/MS Metals, Dry	11.44	7/17/2023	536
Rock Creek Cake	Zinc	ICP/MS Metals, Dry	11.34	7/18/2023	625
Rock Creek Cake	Zinc	ICP/MS Metals, Dry	11.12	7/19/2023	570
Rock Creek Cake	Zinc	ICP/MS Metals, Dry	10.90	8/9/2023	525
Rock Creek Cake	Zinc	ICP/MS Metals, Dry	10.70	9/13/2023	620
Rock Creek Cake	Zinc	ICP/MS Metals, Dry	11.84	10/16/2023	634
Rock Creek Cake	Zinc	ICP/MS Metals, Dry	11.43	10/18/2023	663
Rock Creek Cake	Zinc	ICP/MS Metals, Dry	12.23	11/14/2023	583
Rock Creek Cake	Zinc	ICP/MS Metals, Dry	11.42	11/15/2023	598
Rock Creek Cake	Zinc	ICP/MS Metals, Dry	11.40	11/16/2023	653
Rock Creek Cake	Zinc	ICP/MS Metals, Dry	11.27	12/6/2023	657

Form 3 – Treatment Plant Monitoring Data - Hillsboro

Influent-Effluent Metals & Cyanide: Hillsboro Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	NA	1/5/2023	6.43	5.56	µg/L	1.13	NA	NA	0.061	NA	NA
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	1/16/2023	8.90	7.03	µg/L	1.02	0.768	25%	0.076	0.045	41%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	1/17/2023	7.53	5.96	µg/L	0.986	0.764	22%	0.062	0.038	39%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	1/18/2023	7.62	5.83	µg/L	1.18	0.758	36%	0.075	0.037	51%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	NA	1/31/2023	3.81	3.39	µg/L	1.27	NA	NA	0.040	NA	NA
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	NA	2/1/2023	3.75	3.34	µg/L	1.29	NA	NA	0.040	NA	NA
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	NA	2/2/2023	3.61	3.19	µg/L	1.47	NA	NA	0.044	NA	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	2/7/2023	4.34	3.93	µg/L	NA	0.828	NA	NA	0.027	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	3/7/2023	6.16	5.55	µg/L	NA	0.647	NA	NA	0.030	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	4/4/2023	5.33	4.63	µg/L	NA	0.830	NA	NA	0.032	NA
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	4/9/2023	7.91	6.62	µg/L	1.08	0.765	29%	0.071	0.042	41%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	4/10/2023	13.86	9.02	µg/L	1.10	0.749	32%	0.130	0.056	56%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	4/11/2023	12.44	7.50	µg/L	1.05	0.712	32%	0.110	0.045	59%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	NA	4/18/2023	6.79	5.83	µg/L	1.13	NA	NA	0.064	NA	NA
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	NA	4/19/2023	6.27	5.39	µg/L	1.09	NA	NA	0.057	NA	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	5/2/2023	4.12	3.15	µg/L	NA	0.761	NA	NA	0.020	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	5/12/2023	3.68	2.82	µg/L	NA	1.11	NA	NA	0.026	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	12/18/2023	4.65	4.30	µg/L	NA	0.918	NA	NA	0.033	NA
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	NA	1/5/2023	6.43	5.56	µg/L	< 0.102	NA	NA	0.0055	NA	NA
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/16/2023	8.90	7.03	µg/L	< 0.102	< 0.102	NA	0.0076	0.0060	21%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/17/2023	7.53	5.96	µg/L	< 0.102	< 0.102	NA	0.0064	0.0051	21%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/18/2023	7.62	5.83	µg/L	< 0.102	< 0.102	NA	0.0065	0.0050	23%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	NA	1/31/2023	3.81	3.39	µg/L	< 0.102	NA	NA	0.0032	NA	NA
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	NA	2/1/2023	3.75	3.34	µg/L	< 0.102	NA	NA	0.0032	NA	NA
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	NA	2/2/2023	3.61	3.19	µg/L	< 0.102	NA	NA	0.0031	NA	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	2/7/2023	4.34	3.93	µg/L	NA	< 0.102	NA	NA	0.0033	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	3/7/2023	6.16	5.55	µg/L	NA	< 0.102	NA	NA	0.0047	NA

Influent-Effluent Metals & Cyanide: Hillsboro Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	4/4/2023	5.33	4.63	µg/L	NA	< 0.102	NA	NA	0.0039	NA
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/9/2023	7.91	6.62	µg/L	< 0.102	< 0.102	NA	0.0067	0.0056	16%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/10/2023	13.86	9.02	µg/L	< 0.102	< 0.102	NA	0.012	0.0077	35%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/11/2023	12.44	7.50	µg/L	< 0.102	< 0.102	NA	0.011	0.0064	40%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	NA	4/18/2023	6.79	5.83	µg/L	< 0.102	NA	NA	0.0058	NA	NA
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	NA	4/19/2023	6.27	5.39	µg/L	< 0.102	NA	NA	0.0053	NA	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	5/2/2023	4.12	3.15	µg/L	NA	< 0.102	NA	NA	0.0027	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	5/12/2023	3.68	2.82	µg/L	NA	< 0.102	NA	NA	0.0024	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	12/18/2023	4.65	4.30	µg/L	NA	< 0.102	NA	NA	0.0037	NA
Chromium	ICP/MS Metals, Total Recoverable	0.406	NA	1/5/2023	6.43	5.56	µg/L	1.55	NA	NA	0.083	NA	NA
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	1/16/2023	8.90	7.03	µg/L	1.54	0.448	71%	0.11	0.026	77%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	1/17/2023	7.53	5.96	µg/L	1.46	< 0.406	86%	0.092	0.020	78%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	1/18/2023	7.62	5.83	µg/L	1.78	0.409	77%	0.11	0.020	82%
Chromium	ICP/MS Metals, Total Recoverable	0.406	NA	1/31/2023	3.81	3.39	µg/L	1.46	NA	NA	0.046	NA	NA
Chromium	ICP/MS Metals, Total Recoverable	0.406	NA	2/1/2023	3.75	3.34	µg/L	1.58	NA	NA	0.049	NA	NA
Chromium	ICP/MS Metals, Total Recoverable	0.406	NA	2/2/2023	3.61	3.19	µg/L	1.88	NA	NA	0.057	NA	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	2/7/2023	4.34	3.93	µg/L	NA	0.424	NA	NA	0.014	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	3/7/2023	6.16	5.55	µg/L	NA	0.479	NA	NA	0.022	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	4/4/2023	5.33	4.63	µg/L	NA	0.650	NA	NA	0.025	NA
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	4/9/2023	7.91	6.62	µg/L	1.39	0.517	63%	0.092	0.029	69%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	4/10/2023	13.86	9.02	µg/L	1.46	0.460	68%	0.17	0.035	79%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	4/11/2023	12.44	7.50	µg/L	1.25	< 0.406	84%	0.13	0.025	80%
Chromium	ICP/MS Metals, Total Recoverable	0.406	NA	4/18/2023	6.79	5.83	µg/L	1.51	NA	NA	0.086	NA	NA
Chromium	ICP/MS Metals, Total Recoverable	0.406	NA	4/19/2023	6.27	5.39	µg/L	1.58	NA	NA	0.083	NA	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	5/2/2023	4.12	3.15	µg/L	NA	0.512	NA	NA	0.013	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	5/12/2023	3.68	2.82	µg/L	NA	0.469	NA	NA	0.011	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	12/18/2023	4.65	4.30	µg/L	NA	0.439	NA	NA	0.016	NA
Copper	ICP/MS Metals, Total Recoverable	0.406	NA	1/5/2023	6.43	5.56	µg/L	21.8	NA	NA	1.2	NA	NA
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	1/16/2023	8.90	7.03	µg/L	34.0	2.41	93%	2.5	0.14	94%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	1/17/2023	7.53	5.96	µg/L	20.5	2.42	88%	1.3	0.12	91%

Influent-Effluent Metals & Cyanide: Hillsboro Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	1/18/2023	7.62	5.83	µg/L	22.5	3.02	87%	1.4	0.15	90%
Copper	ICP/MS Metals, Total Recoverable	0.406	NA	1/31/2023	3.81	3.39	µg/L	34.7	NA	NA	1.1	NA	NA
Copper	ICP/MS Metals, Total Recoverable	0.406	NA	2/1/2023	3.75	3.34	µg/L	49.1	NA	NA	1.5	NA	NA
Copper	ICP/MS Metals, Total Recoverable	0.406	NA	2/2/2023	3.61	3.19	µg/L	53.8	NA	NA	1.6	NA	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	2/7/2023	4.34	3.93	µg/L	NA	4.56	NA	NA	0.15	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	3/7/2023	6.16	5.55	µg/L	NA	3.97	NA	NA	0.18	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	4/4/2023	5.33	4.63	µg/L	NA	2.87	NA	NA	0.11	NA
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	4/9/2023	7.91	6.62	µg/L	11.1	2.29	79%	0.73	0.13	83%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	4/10/2023	13.86	9.02	µg/L	37.5	4.11	89%	4.3	0.31	93%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	4/11/2023	12.44	7.50	µg/L	11.8	2.40	80%	1.2	0.15	88%
Copper	ICP/MS Metals, Total Recoverable	0.406	NA	4/18/2023	6.79	5.83	µg/L	18.4	NA	NA	1.0	NA	NA
Copper	ICP/MS Metals, Total Recoverable	0.406	NA	4/19/2023	6.27	5.39	µg/L	23.2	NA	NA	1.2	NA	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	5/2/2023	4.12	3.15	µg/L	NA	3.16	NA	NA	0.083	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	5/12/2023	3.68	2.82	µg/L	NA	4.42	NA	NA	0.10	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	12/18/2023	4.65	4.30	µg/L	NA	6.34	NA	NA	0.23	NA
Cyanide	Cyanide, Total	1	1	1/17/2023	7.53	5.96	µg/L	1.19	1.10	8%	0.075	0.055	27%
Cyanide	Cyanide, Total	1	1	1/18/2023	7.62	5.83	µg/L	1.02	1.01	1%	0.065	0.049	24%
Cyanide	Cyanide, Total	1	1	1/19/2023	6.47	5.75	µg/L	1.06	1.10	-4%	0.057	0.053	8%
Cyanide	Cyanide, Total	1	1	4/10/2023	13.86	9.02	µg/L	1.56	1.55	1%	0.18	0.12	35%
Cyanide	Cyanide, Total	1	1	4/11/2023	12.44	7.50	µg/L	1.43	1.12	22%	0.15	0.070	53%
Cyanide	Cyanide, Total	1	1	4/12/2023	10.88	7.26	µg/L	1.26	1.19	6%	0.11	0.072	37%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	1/16/2023	8.90	7.03	mg/L	96.4	81.8	15%	7200	4800	33%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	1/17/2023	7.53	5.96	mg/L	101	85.5	15%	6300	4200	33%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	1/18/2023	7.62	5.83	mg/L	103	85.9	17%	6500	4200	36%
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	2/7/2023	4.34	3.93	mg/L	NA	91.9	NA	NA	3000	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	3/7/2023	6.16	5.55	mg/L	NA	88.6	NA	NA	4100	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	4/4/2023	5.33	4.63	mg/L	NA	94.9	NA	NA	3700	NA
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	4/9/2023	7.91	6.62	mg/L	95.9	86.4	10%	6300	4800	25%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	4/10/2023	13.86	9.02	mg/L	86.2	81.4	6%	10000	6100	39%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	4/11/2023	12.44	7.50	mg/L	92.1	81.7	11%	9600	5100	47%

Influent-Effluent Metals & Cyanide: Hillsboro Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	5/2/2023	4.12	3.15	mg/L	NA	98.4	NA	NA	2600	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	5/12/2023	3.68	2.82	mg/L	NA	102	NA	NA	2400	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	12/18/2023	4.65	4.30	mg/L	NA	91.9	NA	NA	3300	NA
Lead	ICP/MS Metals, Total Recoverable	0.1015	NA	1/5/2023	6.43	5.56	µg/L	1.05	NA	NA	0.056	NA	NA
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/16/2023	8.90	7.03	µg/L	0.769	< 0.102	93%	0.057	0.0060	90%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/17/2023	7.53	5.96	µg/L	0.509	< 0.102	90%	0.032	0.0051	84%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/18/2023	7.62	5.83	µg/L	0.782	0.175	78%	0.050	0.0085	83%
Lead	ICP/MS Metals, Total Recoverable	0.1015	NA	1/31/2023	3.81	3.39	µg/L	0.749	NA	NA	0.024	NA	NA
Lead	ICP/MS Metals, Total Recoverable	0.1015	NA	2/1/2023	3.75	3.34	µg/L	1.07	NA	NA	0.033	NA	NA
Lead	ICP/MS Metals, Total Recoverable	0.1015	NA	2/2/2023	3.61	3.19	µg/L	1.74	NA	NA	0.052	NA	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	2/7/2023	4.34	3.93	µg/L	NA	0.254	NA	NA	0.0083	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	3/7/2023	6.16	5.55	µg/L	NA	0.120	NA	NA	0.0056	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	4/4/2023	5.33	4.63	µg/L	NA	0.158	NA	NA	0.0061	NA
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/9/2023	7.91	6.62	µg/L	0.519	< 0.102	90%	0.034	0.0056	84%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/10/2023	13.86	9.02	µg/L	1.27	< 0.102	96%	0.15	0.0077	95%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/11/2023	12.44	7.50	µg/L	0.768	0.103	87%	0.080	0.0064	92%
Lead	ICP/MS Metals, Total Recoverable	0.1015	NA	4/18/2023	6.79	5.83	µg/L	1.54	NA	NA	0.087	NA	NA
Lead	ICP/MS Metals, Total Recoverable	0.1015	NA	4/19/2023	6.27	5.39	µg/L	0.604	NA	NA	0.032	NA	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	5/2/2023	4.12	3.15	µg/L	NA	0.138	NA	NA	0.0036	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	5/12/2023	3.68	2.82	µg/L	NA	0.136	NA	NA	0.0032	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	12/18/2023	4.65	4.30	µg/L	NA	0.119	NA	NA	0.0043	NA
Mercury	Mercury by Purge & Trap, Total	1	0.2	1/16/2023	8.90	7.03	ng/L	30.8	0.829	97%	0.0023	0.000049	98%
Mercury	Mercury by Purge & Trap, Total	1	0.2	1/17/2023	7.53	5.96	ng/L	67.8	0.858	99%	0.0043	0.000043	99%
Mercury	Mercury by Purge & Trap, Total	1	0.2	1/18/2023	7.62	5.83	ng/L	18.9	0.953	95%	0.0012	0.000046	96%
Mercury	Mercury by Purge & Trap, Total	1	0.2	4/9/2023	7.91	6.62	ng/L	77.4	1.38	98%	0.0051	0.000076	99%
Mercury	Mercury by Purge & Trap, Total	1	0.2	4/10/2023	13.86	9.02	ng/L	46.9	1.35	97%	0.0054	0.00010	98%
Mercury	Mercury by Purge & Trap, Total	1	0.2	4/11/2023	12.44	7.50	ng/L	10.6	1.10	90%	0.0011	0.000069	94%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	NA	1/5/2023	6.43	5.56	µg/L	7.29	NA	NA	0.39	NA	NA
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/16/2023	8.90	7.03	µg/L	4.77	4.60	4%	0.35	0.27	24%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/17/2023	7.53	5.96	µg/L	6.64	5.13	23%	0.42	0.25	39%

Influent-Effluent Metals & Cyanide: Hillsboro Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/18/2023	7.62	5.83	µg/L	7.32	5.73	22%	0.47	0.28	40%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	NA	1/31/2023	3.81	3.39	µg/L	6.97	NA	NA	0.22	NA	NA
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	NA	2/1/2023	3.75	3.34	µg/L	7.00	NA	NA	0.22	NA	NA
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	NA	2/2/2023	3.61	3.19	µg/L	7.17	NA	NA	0.22	NA	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	2/7/2023	4.34	3.93	µg/L	NA	9.21	NA	NA	0.30	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	3/7/2023	6.16	5.55	µg/L	NA	10.5	NA	NA	0.49	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	4/4/2023	5.33	4.63	µg/L	NA	12.8	NA	NA	0.49	NA
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/9/2023	7.91	6.62	µg/L	6.28	7.64	-22%	0.41	0.42	-2%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/10/2023	13.86	9.02	µg/L	4.16	4.86	-17%	0.48	0.37	24%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/11/2023	12.44	7.50	µg/L	5.62	4.84	14%	0.58	0.30	48%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	NA	4/18/2023	6.79	5.83	µg/L	10.6	NA	NA	0.60	NA	NA
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	NA	4/19/2023	6.27	5.39	µg/L	12.5	NA	NA	0.65	NA	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	5/2/2023	4.12	3.15	µg/L	NA	36.4	NA	NA	0.96	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	5/12/2023	3.68	2.82	µg/L	NA	24.9	NA	NA	0.59	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	12/18/2023	4.65	4.30	µg/L	NA	1.13	NA	NA	0.041	NA
Nickel	ICP/MS Metals, Total Recoverable	0.406	NA	1/5/2023	6.43	5.56	µg/L	4.61	NA	NA	0.25	NA	NA
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	1/16/2023	8.90	7.03	µg/L	5.53	2.04	63%	0.41	0.12	71%
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	1/17/2023	7.53	5.96	µg/L	7.17	2.20	69%	0.45	0.11	76%
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	1/18/2023	7.62	5.83	µg/L	6.54	2.41	63%	0.42	0.12	72%
Nickel	ICP/MS Metals, Total Recoverable	0.406	NA	1/31/2023	3.81	3.39	µg/L	5.78	NA	NA	0.18	NA	NA
Nickel	ICP/MS Metals, Total Recoverable	0.406	NA	2/1/2023	3.75	3.34	µg/L	6.11	NA	NA	0.19	NA	NA
Nickel	ICP/MS Metals, Total Recoverable	0.406	NA	2/2/2023	3.61	3.19	µg/L	10.8	NA	NA	0.33	NA	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	2/7/2023	4.34	3.93	µg/L	NA	8.93	NA	NA	0.29	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	3/7/2023	6.16	5.55	µg/L	NA	2.63	NA	NA	0.12	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	4/4/2023	5.33	4.63	µg/L	NA	2.58	NA	NA	0.10	NA
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	4/9/2023	7.91	6.62	µg/L	1.51	1.34	11%	0.10	0.074	26%
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	4/10/2023	13.86	9.02	µg/L	5.12	2.50	51%	0.59	0.19	68%
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	4/11/2023	12.44	7.50	µg/L	1.92	1.70	12%	0.20	0.11	47%
Nickel	ICP/MS Metals, Total Recoverable	0.406	NA	4/18/2023	6.79	5.83	µg/L	7.37	NA	NA	0.42	NA	NA
Nickel	ICP/MS Metals, Total Recoverable	0.406	NA	4/19/2023	6.27	5.39	µg/L	5.2	NA	NA	0.27	NA	NA

Influent-Effluent Metals & Cyanide: Hillsboro Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	5/2/2023	4.12	3.15	µg/L	NA	124	NA	NA	3.3	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	5/12/2023	3.68	2.82	µg/L	NA	4.40	NA	NA	0.10	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	12/18/2023	4.65	4.30	µg/L	NA	10.3	NA	NA	0.37	NA
Selenium	ICP/MS Metals, Total Recoverable	0.5075	NA	1/5/2023	6.43	5.56	µg/L	< 0.508	NA	NA	0.027	NA	NA
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	1/16/2023	8.90	7.03	µg/L	< 0.508	< 0.508	NA	0.038	0.030	21%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	1/17/2023	7.53	5.96	µg/L	< 0.508	< 0.508	NA	0.032	0.025	21%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	1/18/2023	7.62	5.83	µg/L	< 0.508	< 0.508	NA	0.032	0.025	23%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	NA	1/31/2023	3.81	3.39	µg/L	< 0.508	NA	NA	0.016	NA	NA
Selenium	ICP/MS Metals, Total Recoverable	0.5075	NA	2/1/2023	3.75	3.34	µg/L	< 0.508	NA	NA	0.016	NA	NA
Selenium	ICP/MS Metals, Total Recoverable	0.5075	NA	2/2/2023	3.61	3.19	µg/L	< 0.508	NA	NA	0.015	NA	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	2/7/2023	4.34	3.93	µg/L	NA	< 0.508	NA	NA	0.017	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	3/7/2023	6.16	5.55	µg/L	NA	< 0.508	NA	NA	0.024	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	4/4/2023	5.33	4.63	µg/L	NA	< 0.508	NA	NA	0.020	NA
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	4/9/2023	7.91	6.62	µg/L	< 0.508	< 0.508	NA	0.034	0.028	16%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	4/10/2023	13.86	9.02	µg/L	< 0.508	< 0.508	NA	0.059	0.038	35%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	4/11/2023	12.44	7.50	µg/L	< 0.508	< 0.508	NA	0.053	0.032	40%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	NA	4/18/2023	6.79	5.83	µg/L	< 0.508	NA	NA	0.029	NA	NA
Selenium	ICP/MS Metals, Total Recoverable	0.5075	NA	4/19/2023	6.27	5.39	µg/L	< 0.508	NA	NA	0.027	NA	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	5/2/2023	4.12	3.15	µg/L	NA	< 0.508	NA	NA	0.013	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	5/12/2023	3.68	2.82	µg/L	NA	< 0.508	NA	NA	0.012	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	12/18/2023	4.65	4.30	µg/L	NA	< 0.508	NA	NA	0.018	NA
Silver	ICP/MS Metals, Total Recoverable	0.1015	NA	1/5/2023	6.43	5.56	µg/L	0.137	NA	NA	0.0073	NA	NA
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/16/2023	8.90	7.03	µg/L	< 0.102	< 0.102	NA	0.0076	0.0060	21%
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/17/2023	7.53	5.96	µg/L	< 0.102	< 0.102	NA	0.0064	0.0051	21%
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/18/2023	7.62	5.83	µg/L	< 0.102	< 0.102	NA	0.0065	0.0050	23%
Silver	ICP/MS Metals, Total Recoverable	0.1015	NA	1/31/2023	3.81	3.39	µg/L	0.150	NA	NA	0.0048	NA	NA
Silver	ICP/MS Metals, Total Recoverable	0.1015	NA	2/1/2023	3.75	3.34	µg/L	0.210	NA	NA	0.0066	NA	NA
Silver	ICP/MS Metals, Total Recoverable	0.1015	NA	2/2/2023	3.61	3.19	µg/L	0.203	NA	NA	0.0061	NA	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	2/7/2023	4.34	3.93	µg/L	NA	< 0.102	NA	NA	0.0033	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	3/7/2023	6.16	5.55	µg/L	NA	< 0.102	NA	NA	0.0047	NA

Influent-Effluent Metals & Cyanide: Hillsboro Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	4/4/2023	5.33	4.63	µg/L	NA	< 0.102	NA	NA	0.0039	NA
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/9/2023	7.91	6.62	µg/L	< 0.102	< 0.102	NA	0.0067	0.0056	16%
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/10/2023	13.86	9.02	µg/L	< 0.102	< 0.102	NA	0.012	0.0077	35%
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/11/2023	12.44	7.50	µg/L	< 0.102	< 0.102	NA	0.011	0.0064	40%
Silver	ICP/MS Metals, Total Recoverable	0.1015	NA	4/18/2023	6.79	5.83	µg/L	< 0.102	NA	NA	0.0058	NA	NA
Silver	ICP/MS Metals, Total Recoverable	0.1015	NA	4/19/2023	6.27	5.39	µg/L	0.112	NA	NA	0.0059	NA	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	5/2/2023	4.12	3.15	µg/L	NA	< 0.102	NA	NA	0.0027	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	5/12/2023	3.68	2.82	µg/L	NA	< 0.102	NA	NA	0.0024	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	12/18/2023	4.65	4.30	µg/L	NA	< 0.102	NA	NA	0.0037	NA
Zinc	ICP/MS Metals, Total Recoverable	2.537	NA	1/5/2023	6.43	5.56	µg/L	65.7	NA	NA	3.5	NA	NA
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	1/16/2023	8.90	7.03	µg/L	52.6	21.3	60%	3.9	1.2	68%
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	1/17/2023	7.53	5.96	µg/L	48.8	24.1	51%	3.1	1.2	61%
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	1/18/2023	7.62	5.83	µg/L	63.4	25.3	60%	4.0	1.2	69%
Zinc	ICP/MS Metals, Total Recoverable	2.537	NA	1/31/2023	3.81	3.39	µg/L	82.1	NA	NA	2.6	NA	NA
Zinc	ICP/MS Metals, Total Recoverable	2.537	NA	2/1/2023	3.75	3.34	µg/L	91.8	NA	NA	2.9	NA	NA
Zinc	ICP/MS Metals, Total Recoverable	2.537	NA	2/2/2023	3.61	3.19	µg/L	100	NA	NA	3.0	NA	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	2/7/2023	4.34	3.93	µg/L	NA	39.0	NA	NA	1.3	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	3/7/2023	6.16	5.55	µg/L	NA	27.7	NA	NA	1.3	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	4/4/2023	5.33	4.63	µg/L	NA	25.1	NA	NA	0.97	NA
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	4/9/2023	7.91	6.62	µg/L	77.5	22.3	71%	5.1	1.2	76%
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	4/10/2023	13.86	9.02	µg/L	54.0	20.8	62%	6.2	1.6	75%
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	4/11/2023	12.44	7.50	µg/L	41.7	18.6	55%	4.3	1.2	73%
Zinc	ICP/MS Metals, Total Recoverable	2.537	NA	4/18/2023	6.79	5.83	µg/L	64.5	NA	NA	3.7	NA	NA
Zinc	ICP/MS Metals, Total Recoverable	2.537	NA	4/19/2023	6.27	5.39	µg/L	60.0	NA	NA	3.1	NA	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	5/2/2023	4.12	3.15	µg/L	NA	25.7	NA	NA	0.68	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	5/12/2023	3.68	2.82	µg/L	NA	29.9	NA	NA	0.70	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	12/18/2023	4.65	4.30	µg/L	NA	27.4	NA	NA	0.98	NA

Form 3 – Treatment Plant Monitoring Data – Forest Grove

Influent-Effluent Metals & Cyanide: Forest Grove Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	1/16/2023	8.35	6.52	µg/L	1.08	0.921	15%	0.075	0.050	33%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	1/17/2023	7.35	5.93	µg/L	1.12	0.921	18%	0.069	0.046	34%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	1/18/2023	7.31	5.87	µg/L	1.17	0.917	22%	0.071	0.045	37%
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	2/7/2023	5.08	4.20	µg/L	NA	0.943	NA	NA	0.033	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	3/7/2023	7.06	5.66	µg/L	NA	0.838	NA	NA	0.040	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	4/4/2023	5.72	4.78	µg/L	NA	0.866	NA	NA	0.035	NA
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	4/9/2023	8.58	7.45	µg/L	1.11	0.774	30%	0.079	0.048	39%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	4/10/2023	14.15	8.99	µg/L	1.14	0.759	33%	0.13	0.057	58%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	4/11/2023	11.37	6.53	µg/L	1.06	0.746	30%	0.10	0.041	60%
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	5/2/2023	4.10	3.44	µg/L	NA	0.889	NA	NA	0.026	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	7/25/2023	4.91	3.04	µg/L	NA	0.824	NA	NA	0.021	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	8/2/2023	4.82	3.40	µg/L	NA	0.702	NA	NA	0.020	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	9/12/2023	2.66	2.36	µg/L	NA	< 0.508	NA	NA	0.010	NA
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	9/19/2023	2.59	2.28	µg/L	1.01	< 0.508	75%	0.022	0.0097	56%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	9/20/2023	2.56	2.16	µg/L	0.876	< 0.508	71%	0.019	0.0092	51%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	9/21/2023	2.62	2.21	µg/L	0.866	< 0.508	71%	0.019	0.0094	51%
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	10/24/2023	3.72	0.00	µg/L	NA	0.552	NA	NA	0	NA
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	11/21/2023	3.91	2.87	µg/L	NA	0.859	NA	NA	0.021	NA
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	11/26/2023	3.47	2.57	µg/L	1.31	1.17	11%	0.038	0.025	34%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	11/27/2023	3.46	2.51	µg/L	1.36	1.16	15%	0.039	0.024	38%
Arsenic	ICP/MS Metals, Total Recoverable	0.5075	0.5075	11/28/2023	3.38	2.47	µg/L	1.29	1.09	16%	0.036	0.022	38%
Arsenic	ICP/MS Metals, Total Recoverable	NA	0.5075	12/12/2023	8.20	6.89	µg/L	NA	0.979	NA	NA	0.056	NA
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/16/2023	8.35	6.52	µg/L	< 0.102	< 0.102	NA	0.0071	0.0055	22%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/17/2023	7.35	5.93	µg/L	< 0.102	< 0.102	NA	0.0063	0.0050	19%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/18/2023	7.31	5.87	µg/L	< 0.102	< 0.102	NA	0.0062	0.0050	20%
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	2/7/2023	5.08	4.20	µg/L	NA	< 0.102	NA	NA	0.0036	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	3/7/2023	7.06	5.66	µg/L	NA	< 0.102	NA	NA	0.0048	NA

Influent-Effluent Metals & Cyanide: Forest Grove Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	4/4/2023	5.72	4.78	µg/L	NA	< 0.102	NA	NA	0.0041	NA
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/9/2023	8.58	7.45	µg/L	< 0.102	< 0.102	NA	0.0073	0.0063	13%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/10/2023	14.15	8.99	µg/L	< 0.102	< 0.102	NA	0.012	0.0076	36%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/11/2023	11.37	6.53	µg/L	< 0.102	< 0.102	NA	0.0097	0.0056	43%
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	5/2/2023	4.10	3.44	µg/L	NA	< 0.102	NA	NA	0.0029	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	7/25/2023	4.91	3.04	µg/L	NA	< 0.102	NA	NA	0.0026	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	8/2/2023	4.82	3.40	µg/L	NA	< 0.102	NA	NA	0.0029	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	9/12/2023	2.66	2.36	µg/L	NA	< 0.102	NA	NA	0.0020	NA
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	9/19/2023	2.59	2.28	µg/L	0.117	< 0.102	57%	0.0025	0.0019	23%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	9/20/2023	2.56	2.16	µg/L	0.125	< 0.102	59%	0.0027	0.0018	31%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	9/21/2023	2.62	2.21	µg/L	0.118	< 0.102	57%	0.0026	0.0019	27%
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	10/24/2023	3.72	0.00	µg/L	NA	< 0.102	NA	NA	0	NA
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	11/21/2023	3.91	2.87	µg/L	NA	< 0.102	NA	NA	0.0024	NA
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	11/26/2023	3.47	2.57	µg/L	0.157	< 0.102	68%	0.0045	0.0022	52%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	11/27/2023	3.46	2.51	µg/L	< 0.102	< 0.102	NA	0.0029	0.0021	27%
Cadmium	ICP/MS Metals, Total Recoverable	0.1015	0.1015	11/28/2023	3.38	2.47	µg/L	< 0.102	< 0.102	NA	0.0029	0.0021	27%
Cadmium	ICP/MS Metals, Total Recoverable	NA	0.1015	12/12/2023	8.20	6.89	µg/L	NA	< 0.102	NA	NA	0.0059	NA
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	1/16/2023	8.35	6.52	µg/L	1.50	< 0.406	86%	0.10	0.022	79%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	1/17/2023	7.35	5.93	µg/L	1.35	0.425	68%	0.083	0.021	75%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	1/18/2023	7.31	5.87	µg/L	1.38	0.411	70%	0.084	0.020	76%
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	2/7/2023	5.08	4.20	µg/L	NA	0.441	NA	NA	0.015	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	3/7/2023	7.06	5.66	µg/L	NA	0.460	NA	NA	0.022	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	4/4/2023	5.72	4.78	µg/L	NA	0.437	NA	NA	0.017	NA
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	4/9/2023	8.58	7.45	µg/L	1.59	0.434	73%	0.11	0.027	76%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	4/10/2023	14.15	8.99	µg/L	1.49	0.409	73%	0.18	0.031	83%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	4/11/2023	11.37	6.53	µg/L	1.31	< 0.406	84%	0.12	0.022	82%
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	5/2/2023	4.10	3.44	µg/L	NA	0.499	NA	NA	0.014	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	7/25/2023	4.91	3.04	µg/L	NA	0.476	NA	NA	0.012	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	8/2/2023	4.82	3.40	µg/L	NA	0.473	NA	NA	0.013	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	9/12/2023	2.66	2.36	µg/L	NA	0.447	NA	NA	0.0088	NA

Influent-Effluent Metals & Cyanide: Forest Grove Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	9/19/2023	2.59	2.28	µg/L	2.03	0.462	77%	0.044	0.0088	80%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	9/20/2023	2.56	2.16	µg/L	1.76	0.465	74%	0.038	0.0084	78%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	9/21/2023	2.62	2.21	µg/L	1.78	0.438	75%	0.039	0.0081	79%
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	10/24/2023	3.72	0.00	µg/L	NA	0.579	NA	NA	0	NA
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	11/21/2023	3.91	2.87	µg/L	NA	0.494	NA	NA	0.012	NA
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	11/26/2023	3.47	2.57	µg/L	2.14	0.453	79%	0.062	0.0097	84%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	11/27/2023	3.46	2.51	µg/L	1.57	0.497	68%	0.045	0.010	77%
Chromium	ICP/MS Metals, Total Recoverable	0.406	0.406	11/28/2023	3.38	2.47	µg/L	1.32	0.525	60%	0.037	0.011	71%
Chromium	ICP/MS Metals, Total Recoverable	NA	0.406	12/12/2023	8.20	6.89	µg/L	NA	0.406	NA	NA	0.023	NA
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	1/16/2023	8.35	6.52	µg/L	15.4	3.63	76%	1.1	0.20	82%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	1/17/2023	7.35	5.93	µg/L	17.3	4.09	76%	1.1	0.20	81%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	1/18/2023	7.31	5.87	µg/L	31.2	6.67	79%	1.9	0.33	83%
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	2/7/2023	5.08	4.20	µg/L	NA	6.39	NA	NA	0.22	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	3/7/2023	7.06	5.66	µg/L	NA	5.77	NA	NA	0.27	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	4/4/2023	5.72	4.78	µg/L	NA	5.51	NA	NA	0.22	NA
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	4/9/2023	8.58	7.45	µg/L	18.5	4.10	78%	1.3	0.25	81%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	4/10/2023	14.15	8.99	µg/L	17.5	5.17	70%	2.1	0.39	81%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	4/11/2023	11.37	6.53	µg/L	18.2	3.71	80%	1.7	0.20	88%
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	5/2/2023	4.10	3.44	µg/L	NA	4.44	NA	NA	0.13	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	7/25/2023	4.91	3.04	µg/L	NA	9.06	NA	NA	0.23	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	8/2/2023	4.82	3.40	µg/L	NA	8.45	NA	NA	0.24	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	9/12/2023	2.66	2.36	µg/L	NA	10.4	NA	NA	0.20	NA
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	9/19/2023	2.59	2.28	µg/L	90.7	6.66	93%	2.0	0.13	94%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	9/20/2023	2.56	2.16	µg/L	55.6	6.16	89%	1.2	0.11	91%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	9/21/2023	2.62	2.21	µg/L	54.6	5.03	91%	1.2	0.093	92%
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	10/24/2023	3.72	0.00	µg/L	NA	8.96	NA	NA	0	NA
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	11/21/2023	3.91	2.87	µg/L	NA	7.81	NA	NA	0.19	NA
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	11/26/2023	3.47	2.57	µg/L	25.1	5.99	76%	0.73	0.13	82%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	11/27/2023	3.46	2.51	µg/L	137	9.39	93%	4.0	0.20	95%
Copper	ICP/MS Metals, Total Recoverable	0.406	0.406	11/28/2023	3.38	2.47	µg/L	49.8	12.7	74%	1.4	0.26	81%

Influent-Effluent Metals & Cyanide: Forest Grove Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Copper	ICP/MS Metals, Total Recoverable	NA	0.406	12/12/2023	8.20	6.89	µg/L	NA	3.60	NA	NA	0.21	NA
Cyanide	Cyanide, Total	1	1	1/17/2023	7.35	5.93	µg/L	1.16	< 1	57%	0.071	0.049	30%
Cyanide	Cyanide, Total	1	1	1/18/2023	7.31	5.87	µg/L	1.42	1.14	20%	0.087	0.056	36%
Cyanide	Cyanide, Total	1	1	1/19/2023	6.39	5.25	µg/L	1.21	1.17	3%	0.064	0.051	21%
Cyanide	Cyanide, Total	1	1	4/10/2023	14.15	8.99	µg/L	1.22	1.37	-12%	0.14	0.10	29%
Cyanide	Cyanide, Total	1	1	4/11/2023	11.37	6.53	µg/L	1.43	1.15	20%	0.14	0.063	54%
Cyanide	Cyanide, Total	1	1	4/12/2023	9.78	7.61	µg/L	1.30	1.24	5%	0.11	0.079	26%
Cyanide	Cyanide, Total	1	1	9/18/2023	2.60	2.30	µg/L	4.19	1.85	56%	0.091	0.035	61%
Cyanide	Cyanide, Total	1	1	9/19/2023	2.59	2.28	µg/L	4.20	2.34	44%	0.091	0.044	51%
Cyanide	Cyanide, Total	1	1	9/20/2023	2.56	2.16	µg/L	3.74	2.90	22%	0.080	0.052	35%
Cyanide	Cyanide, Total	1	1	11/27/2023	3.46	2.51	µg/L	2.35	1.65	30%	0.068	0.035	49%
Cyanide	Cyanide, Total	1	1	11/28/2023	3.38	2.47	µg/L	2.82	2.04	28%	0.079	0.042	47%
Cyanide	Cyanide, Total	1	1	11/29/2023	3.38	2.45	µg/L	4.38	2.12	52%	0.12	0.043	65%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	1/16/2023	8.35	6.52	mg/L	93.4	82.3	12%	6500	4500	31%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	1/17/2023	7.35	5.93	mg/L	99.8	87.7	12%	6100	4300	29%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	1/18/2023	7.31	5.87	mg/L	98.0	88.7	10%	6000	4300	27%
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	2/7/2023	5.08	4.20	mg/L	NA	91.5	NA	NA	3200	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	3/7/2023	7.06	5.66	mg/L	NA	94.8	NA	NA	4500	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	4/4/2023	5.72	4.78	mg/L	NA	103	NA	NA	4100	NA
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	4/9/2023	8.58	7.45	mg/L	92.4	86.6	6%	6600	5400	19%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	4/10/2023	14.15	8.99	mg/L	85.5	81.5	5%	10000	6100	39%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	4/11/2023	11.37	6.53	mg/L	98.7	89.8	9%	9400	4900	48%
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	5/2/2023	4.10	3.44	mg/L	NA	99.5	NA	NA	2900	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	7/25/2023	4.91	3.04	mg/L	NA	71.3	NA	NA	1800	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	8/2/2023	4.82	3.40	mg/L	NA	84.3	NA	NA	2400	NA
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	9/12/2023	2.66	2.36	mg/L	NA	76.7	NA	NA	1500	NA
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	9/19/2023	2.59	2.28	mg/L	102	74.5	27%	2200	1400	36%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	9/20/2023	2.56	2.16	mg/L	114	76.7	33%	2400	1400	43%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	9/21/2023	2.62	2.21	mg/L	95.2	79.9	16%	2100	1500	29%
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	10/24/2023	3.72	0.00	mg/L	NA	97.1	NA	NA	0	NA

Influent-Effluent Metals & Cyanide: Forest Grove Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	11/21/2023	3.91	2.87	mg/L	NA	93.8	NA	NA	2200	NA
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	11/26/2023	3.47	2.57	mg/L	106	85.1	20%	3100	1800	41%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	11/27/2023	3.46	2.51	mg/L	111	90.1	19%	3200	1900	41%
Hardness	ICP/MS Metals, Total Recoverable	0.5	0.5	11/28/2023	3.38	2.47	mg/L	117	93.3	20%	3300	1900	42%
Hardness	ICP/MS Metals, Total Recoverable	NA	0.5	12/12/2023	8.20	6.89	mg/L	NA	93.7	NA	NA	5400	NA
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/16/2023	8.35	6.52	µg/L	0.429	0.123	71%	0.030	0.0067	78%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/17/2023	7.35	5.93	µg/L	0.974	0.384	61%	0.060	0.019	68%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/18/2023	7.31	5.87	µg/L	0.994	0.857	14%	0.061	0.042	31%
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	2/7/2023	5.08	4.20	µg/L	NA	0.637	NA	NA	0.022	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	3/7/2023	7.06	5.66	µg/L	NA	0.305	NA	NA	0.014	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	4/4/2023	5.72	4.78	µg/L	NA	0.280	NA	NA	0.011	NA
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/9/2023	8.58	7.45	µg/L	1.01	0.162	84%	0.072	0.010	86%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/10/2023	14.15	8.99	µg/L	2.03	0.574	72%	0.24	0.043	82%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/11/2023	11.37	6.53	µg/L	0.795	0.283	64%	0.075	0.015	80%
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	5/2/2023	4.10	3.44	µg/L	NA	0.494	NA	NA	0.014	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	7/25/2023	4.91	3.04	µg/L	NA	0.597	NA	NA	0.015	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	8/2/2023	4.82	3.40	µg/L	NA	0.761	NA	NA	0.022	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	9/12/2023	2.66	2.36	µg/L	NA	1.30	NA	NA	0.026	NA
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	9/19/2023	2.59	2.28	µg/L	1.62	0.515	68%	0.035	0.0098	72%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	9/20/2023	2.56	2.16	µg/L	1.30	0.408	69%	0.028	0.0073	74%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	9/21/2023	2.62	2.21	µg/L	1.08	0.305	72%	0.024	0.0056	76%
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	10/24/2023	3.72	0.00	µg/L	NA	0.412	NA	NA	0	NA
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	11/21/2023	3.91	2.87	µg/L	NA	0.187	NA	NA	0.0045	NA
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	11/26/2023	3.47	2.57	µg/L	1.17	0.167	86%	0.034	0.0036	89%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	11/27/2023	3.46	2.51	µg/L	1.34	0.650	52%	0.039	0.014	65%
Lead	ICP/MS Metals, Total Recoverable	0.1015	0.1015	11/28/2023	3.38	2.47	µg/L	0.933	1.09	-17%	0.026	0.022	15%
Lead	ICP/MS Metals, Total Recoverable	NA	0.1015	12/12/2023	8.20	6.89	µg/L	NA	0.231	NA	NA	0.013	NA
Mercury	Mercury by Purge & Trap, Total	1	0.2	1/16/2023	8.35	6.52	ng/L	10.5	1.13	89%	0.00073	0.000061	92%
Mercury	Mercury by Purge & Trap, Total	1	0.2	1/17/2023	7.35	5.93	ng/L	12.0	2.21	82%	0.00074	0.00011	85%
Mercury	Mercury by Purge & Trap, Total	1	0.2	1/18/2023	7.31	5.87	ng/L	15.4	1.18	92%	0.00094	0.000058	94%

Influent-Effluent Metals & Cyanide: Forest Grove Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Mercury	Mercury by Purge & Trap, Total	1	0.2	4/9/2023	8.58	7.45	ng/L	25.8	2.70	90%	0.0018	0.00017	91%
Mercury	Mercury by Purge & Trap, Total	1	0.2	4/10/2023	14.15	8.99	ng/L	10.4	2.04	80%	0.0012	0.00015	88%
Mercury	Mercury by Purge & Trap, Total	1	0.2	4/11/2023	11.37	6.53	ng/L	9.76	1.68	83%	0.00093	0.000091	90%
Mercury	Mercury by Purge & Trap, Total	1	0.2	9/19/2023	2.59	2.28	ng/L	69.8	1.16	98%	0.0015	0.000022	99%
Mercury	Mercury by Purge & Trap, Total	1	0.2	9/20/2023	2.56	2.16	ng/L	43.6	1.17	97%	0.00093	0.000021	98%
Mercury	Mercury by Purge & Trap, Total	1	0.2	9/21/2023	2.62	2.21	ng/L	50.1	1.06	98%	0.0011	0.000020	98%
Mercury	Mercury by Purge & Trap, Total	1	0.2	11/26/2023	3.47	2.57	ng/L	23.7	2.65	89%	0.00069	0.000057	92%
Mercury	Mercury by Purge & Trap, Total	1	0.2	11/27/2023	3.46	2.51	ng/L	30.0	0.994	97%	0.00087	0.000021	98%
Mercury	Mercury by Purge & Trap, Total	1	0.2	11/28/2023	3.38	2.47	ng/L	30.4	2.52	92%	0.00086	0.000052	94%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/16/2023	8.35	6.52	µg/L	0.433	0.237	45%	0.030	0.013	57%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/17/2023	7.35	5.93	µg/L	0.559	0.284	49%	0.034	0.014	59%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/18/2023	7.31	5.87	µg/L	0.566	0.352	38%	0.035	0.017	50%
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	2/7/2023	5.08	4.20	µg/L	NA	0.414	NA	NA	0.015	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	3/7/2023	7.06	5.66	µg/L	NA	0.395	NA	NA	0.019	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	4/4/2023	5.72	4.78	µg/L	NA	0.360	NA	NA	0.014	NA
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/9/2023	8.58	7.45	µg/L	0.449	0.270	40%	0.032	0.017	48%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/10/2023	14.15	8.99	µg/L	0.529	0.357	32%	0.062	0.027	57%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/11/2023	11.37	6.53	µg/L	0.368	0.254	31%	0.035	0.014	60%
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	5/2/2023	4.10	3.44	µg/L	NA	0.538	NA	NA	0.015	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	7/25/2023	4.91	3.04	µg/L	NA	1.05	NA	NA	0.027	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	8/2/2023	4.82	3.40	µg/L	NA	0.762	NA	NA	0.022	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	9/12/2023	2.66	2.36	µg/L	NA	0.300	NA	NA	0.0059	NA
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	9/19/2023	2.59	2.28	µg/L	2.03	0.424	79%	0.044	0.0081	82%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	9/20/2023	2.56	2.16	µg/L	1.15	0.445	61%	0.025	0.0080	67%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	9/21/2023	2.62	2.21	µg/L	1.10	0.171	84%	0.024	0.0032	87%
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	10/24/2023	3.72	0.00	µg/L	NA	0.378	NA	NA	0	NA
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	11/21/2023	3.91	2.87	µg/L	NA	0.332	NA	NA	0.0079	NA
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	11/26/2023	3.47	2.57	µg/L	0.811	0.312	62%	0.023	0.0067	72%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	11/27/2023	3.46	2.51	µg/L	0.819	0.326	60%	0.024	0.0068	71%
Molybdenum	ICP/MS Metals, Total Recoverable	0.1015	0.1015	11/28/2023	3.38	2.47	µg/L	0.770	0.349	55%	0.022	0.0072	67%

Influent-Effluent Metals & Cyanide: Forest Grove Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Molybdenum	ICP/MS Metals, Total Recoverable	NA	0.1015	12/12/2023	8.20	6.89	µg/L	NA	0.287	NA	NA	0.016	NA
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	1/16/2023	8.35	6.52	µg/L	2.85	2.25	21%	0.20	0.12	38%
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	1/17/2023	7.35	5.93	µg/L	8.80	4.73	46%	0.54	0.23	57%
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	1/18/2023	7.31	5.87	µg/L	7.28	5.68	22%	0.44	0.28	37%
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	2/7/2023	5.08	4.20	µg/L	NA	7.64	NA	NA	0.27	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	3/7/2023	7.06	5.66	µg/L	NA	5.27	NA	NA	0.25	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	4/4/2023	5.72	4.78	µg/L	NA	5.34	NA	NA	0.21	NA
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	4/9/2023	8.58	7.45	µg/L	2.78	1.73	38%	0.20	0.11	46%
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	4/10/2023	14.15	8.99	µg/L	4.01	2.56	36%	0.47	0.19	59%
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	4/11/2023	11.37	6.53	µg/L	4.18	3.34	20%	0.40	0.18	54%
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	5/2/2023	4.10	3.44	µg/L	NA	6.30	NA	NA	0.18	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	7/25/2023	4.91	3.04	µg/L	NA	9.38	NA	NA	0.24	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	8/2/2023	4.82	3.40	µg/L	NA	12.3	NA	NA	0.35	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	9/12/2023	2.66	2.36	µg/L	NA	7.39	NA	NA	0.15	NA
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	9/19/2023	2.59	2.28	µg/L	23.4	17.2	26%	0.51	0.33	35%
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	9/20/2023	2.56	2.16	µg/L	19.6	12.5	36%	0.42	0.23	46%
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	9/21/2023	2.62	2.21	µg/L	11.1	9.17	17%	0.24	0.17	30%
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	10/24/2023	3.72	0.00	µg/L	NA	6.26	NA	NA	0	NA
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	11/21/2023	3.91	2.87	µg/L	NA	6.18	NA	NA	0.15	NA
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	11/26/2023	3.47	2.57	µg/L	3.91	2.23	43%	0.11	0.048	58%
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	11/27/2023	3.46	2.51	µg/L	12.7	3.83	70%	0.37	0.080	78%
Nickel	ICP/MS Metals, Total Recoverable	0.406	0.406	11/28/2023	3.38	2.47	µg/L	18.4	8.22	55%	0.52	0.17	67%
Nickel	ICP/MS Metals, Total Recoverable	NA	0.406	12/12/2023	8.20	6.89	µg/L	NA	3.18	NA	NA	0.18	NA
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	1/16/2023	8.35	6.52	µg/L	< 0.508	< 0.508	NA	0.035	0.028	22%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	1/17/2023	7.35	5.93	µg/L	< 0.508	< 0.508	NA	0.031	0.025	19%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	1/18/2023	7.31	5.87	µg/L	< 0.508	< 0.508	NA	0.031	0.025	20%
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	2/7/2023	5.08	4.20	µg/L	NA	< 0.508	NA	NA	0.018	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	3/7/2023	7.06	5.66	µg/L	NA	< 0.508	NA	NA	0.024	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	4/4/2023	5.72	4.78	µg/L	NA	< 0.508	NA	NA	0.020	NA
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	4/9/2023	8.58	7.45	µg/L	< 0.508	< 0.508	NA	0.036	0.032	13%

Influent-Effluent Metals & Cyanide: Forest Grove Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	4/10/2023	14.15	8.99	µg/L	< 0.508	< 0.508	NA	0.060	0.038	36%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	4/11/2023	11.37	6.53	µg/L	< 0.508	< 0.508	NA	0.048	0.028	43%
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	5/2/2023	4.10	3.44	µg/L	NA	< 0.508	NA	NA	0.015	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	7/25/2023	4.91	3.04	µg/L	NA	< 0.508	NA	NA	0.013	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	8/2/2023	4.82	3.40	µg/L	NA	< 0.508	NA	NA	0.014	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	9/12/2023	2.66	2.36	µg/L	NA	< 0.508	NA	NA	0.010	NA
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	9/19/2023	2.59	2.28	µg/L	0.591	< 0.508	57%	0.013	0.0097	24%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	9/20/2023	2.56	2.16	µg/L	0.689	< 0.508	63%	0.015	0.0092	38%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	9/21/2023	2.62	2.21	µg/L	0.516	< 0.508	51%	0.011	0.0094	17%
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	10/24/2023	3.72	0.00	µg/L	NA	< 0.508	NA	NA	0	NA
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	11/21/2023	3.91	2.87	µg/L	NA	< 0.508	NA	NA	0.012	NA
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	11/26/2023	3.47	2.57	µg/L	< 0.508	< 0.508	NA	0.015	0.011	26%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	11/27/2023	3.46	2.51	µg/L	< 0.508	< 0.508	NA	0.015	0.011	27%
Selenium	ICP/MS Metals, Total Recoverable	0.5075	0.5075	11/28/2023	3.38	2.47	µg/L	< 0.508	< 0.508	NA	0.014	0.010	27%
Selenium	ICP/MS Metals, Total Recoverable	NA	0.5075	12/12/2023	8.20	6.89	µg/L	NA	< 0.508	NA	NA	0.029	NA
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/16/2023	8.35	6.52	µg/L	0.109	< 0.102	53%	0.0076	0.0055	27%
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/17/2023	7.35	5.93	µg/L	< 0.102	< 0.102	NA	0.0063	0.0050	19%
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	1/18/2023	7.31	5.87	µg/L	< 0.102	< 0.102	NA	0.0062	0.0050	20%
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	2/7/2023	5.08	4.20	µg/L	NA	< 0.102	NA	NA	0.0036	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	3/7/2023	7.06	5.66	µg/L	NA	< 0.102	NA	NA	0.0048	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	4/4/2023	5.72	4.78	µg/L	NA	< 0.102	NA	NA	0.0041	NA
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/9/2023	8.58	7.45	µg/L	< 0.102	< 0.102	NA	0.0073	0.0063	13%
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/10/2023	14.15	8.99	µg/L	< 0.102	< 0.102	NA	0.012	0.0076	36%
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	4/11/2023	11.37	6.53	µg/L	< 0.102	< 0.102	NA	0.0097	0.0056	43%
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	5/2/2023	4.10	3.44	µg/L	NA	< 0.102	NA	NA	0.0029	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	7/25/2023	4.91	3.04	µg/L	NA	< 0.102	NA	NA	0.0026	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	8/2/2023	4.82	3.40	µg/L	NA	< 0.102	NA	NA	0.0029	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	9/12/2023	2.66	2.36	µg/L	NA	< 0.102	NA	NA	0.0020	NA
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	9/19/2023	2.59	2.28	µg/L	0.623	< 0.102	92%	0.013	0.0019	86%
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	9/20/2023	2.56	2.16	µg/L	0.35	< 0.102	86%	0.0075	0.0018	75%

Influent-Effluent Metals & Cyanide: Forest Grove Water Resource Recovery Facility

Pollutant Parameter	Analysis Description	Influent MRL	Effluent MRL	Sample Date	Influent Flow (MGD)	Effluent Flow (MGD)	Conc. Units	Influent Conc.	Effluent Conc.	Conc. Percent Removal	Influent Load (lbs/day)	Effluent Load (lbs/day)	Load Percent Removal
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	9/21/2023	2.62	2.21	µg/L	0.267	< 0.102	81%	0.0058	0.0019	68%
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	10/24/2023	3.72	0.00	µg/L	NA	< 0.102	NA	NA	0	NA
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	11/21/2023	3.91	2.87	µg/L	NA	< 0.102	NA	NA	0.0024	NA
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	11/26/2023	3.47	2.57	µg/L	< 0.102	< 0.102	NA	0.0030	0.0022	26%
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	11/27/2023	3.46	2.51	µg/L	0.139	< 0.102	64%	0.0040	0.0021	47%
Silver	ICP/MS Metals, Total Recoverable	0.1015	0.1015	11/28/2023	3.38	2.47	µg/L	0.102	< 0.102	50%	0.0029	0.0021	27%
Silver	ICP/MS Metals, Total Recoverable	NA	0.1015	12/12/2023	8.20	6.89	µg/L	NA	< 0.102	NA	NA	0.0059	NA
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	1/16/2023	8.35	6.52	µg/L	44.5	21.0	53%	3.1	1.1	63%
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	1/17/2023	7.35	5.93	µg/L	45.5	48.9	-8%	2.8	2.4	13%
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	1/18/2023	7.31	5.87	µg/L	49.7	53.5	-8%	3.0	2.6	14%
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	2/7/2023	5.08	4.20	µg/L	NA	81.8	NA	NA	2.9	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	3/7/2023	7.06	5.66	µg/L	NA	63.5	NA	NA	3.0	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	4/4/2023	5.72	4.78	µg/L	NA	51.8	NA	NA	2.1	NA
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	4/9/2023	8.58	7.45	µg/L	66.6	29.0	56%	4.8	1.8	62%
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	4/10/2023	14.15	8.99	µg/L	44.6	55.2	-24%	5.3	4.1	21%
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	4/11/2023	11.37	6.53	µg/L	35.8	25.1	30%	3.4	1.4	60%
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	5/2/2023	4.10	3.44	µg/L	NA	77.6	NA	NA	2.2	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	7/25/2023	4.91	3.04	µg/L	NA	90.5	NA	NA	2.3	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	8/2/2023	4.82	3.40	µg/L	NA	87.7	NA	NA	2.5	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	9/12/2023	2.66	2.36	µg/L	NA	133	NA	NA	2.6	NA
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	9/19/2023	2.59	2.28	µg/L	156	91.3	42%	3.4	1.7	48%
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	9/20/2023	2.56	2.16	µg/L	134	72.4	46%	2.9	1.3	54%
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	9/21/2023	2.62	2.21	µg/L	140	55.1	61%	3.1	1.0	67%
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	10/24/2023	3.72	0.00	µg/L	NA	74.2	NA	NA	0	NA
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	11/21/2023	3.91	2.87	µg/L	NA	51.7	NA	NA	1.2	NA
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	11/26/2023	3.47	2.57	µg/L	103	52.0	50%	3.0	1.1	63%
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	11/27/2023	3.46	2.51	µg/L	97.5	102	-5%	2.8	2.1	24%
Zinc	ICP/MS Metals, Total Recoverable	2.537	2.537	11/28/2023	3.38	2.47	µg/L	91.0	114	-25%	2.6	2.3	9%
Zinc	ICP/MS Metals, Total Recoverable	NA	2.537	12/12/2023	8.20	6.89	µg/L	NA	53.4	NA	NA	3.1	NA

Form 4 – Headworks Loading Comparison

1. Provide a comparison of POTW's "maximum allowable headworks loading (MAHL in lb/day)" to the highest recorded actual loading for each local limit pollutant.

   For each MAHL exceedance provide a narrative discussion and show associated calculations to demonstrate whether pass through occurred.

2. Provide a narrative discussion of the POTW's local limits: any problems encountered in the application of the approved limits, any additional pollutants of concern that may have been observed in either industrial effluent or POTW influent, and any plans to revise or augment existing limits.

The highest single-day treatment plant influent loadings received during 2023 was calculated for each parameter, at each CWS facility, and recorded in Form 4 tables. The comparisons of these influent loadings to the Maximum Allowable Headworks Loadings (MAHLs) indicated the following headworks loads were greater than 90% of the MAHL:

- The MAHL for copper was exceeded at the Hillsboro facility on April 10, 2023. The Hillsboro facility experienced high flows with a daily average influent flow of 13.9 MGD. The peak flow rate in 2023 reached 16.6 MGD.
- The MAHL for copper was exceeded at the Forest Grove facility on November 27, 2023. The influent flow of (3.5 MGD) was within a range typical of seasonal flows, but the concentration was unusually high at 137 ug/L. There were no unusual operational notes that day. The permitted industries' copper data were evaluated and do not suggest the industrial loading was unusual that day. The percent removal efficiency for copper that day was 93%.

Examination of influent loading data indicated that there were no additional loads greater than 90% of the MAHL for copper at the Hillsboro or Forest Grove facilities in 2023.

All the MAHL exceedances described above are listed in Table 4-1 below and discussed below the table. Table 4-1 displays the facility, pollutant, sample date, analysis description, actual influent loading, and the percent of the MAHL represented by the actual influent loading.

Table 4-1. Influent loadings that exceeded 90% of the MAHL

Treatment Facility	Pollutant	Sample Date	Analysis Description	Actual Influent Loading (lbs/day)	Percent of Treatment Facility MAHL
Hillsboro	Copper, Total	4/10/2023	ICP/MS Metals, Total Recoverable	4.33	104%
Forest Grove	Copper, Total	11/27/2023	ICP/MS Metals, Total Recoverable	3.95	140%

DEQ annual report guidance requires an evaluation for all MAHL exceedances. The MAHL is based on the Allowable Headworks Loadings (AHLs) (pass through, biosolids sludge quality, and nitrification inhibition) that were calculated in the 2021 Local Limits evaluation. The most sensitive AHLs at the Hillsboro facility and at the Forest Grove facility without discharge to the NTS for copper are based on pass through. Of the other AHLs, there is no sludge at Hillsboro and Forest Grove facilities and the observed concentrations were well below a MAHL calculated to prevent nitrification inhibition. Therefore, only an evaluation for pass through is required.

The evaluation for pass through is used to determine if the observed effluent concentrations could have reasonable potential to cause or contribute to an excursion from the water quality criteria. The permit does not

include a water quality based effluent limit for copper since DEQ found no reasonable potential as part of the 2022 permit evaluation. Therefore, an evaluation for pass through follows the DEQ guidance for finding reasonable potential. The first step is to determine whether the applicable water quality criteria were exceeded at the end of pipe. If this analysis indicates that the plant effluent exceeded water quality criteria at the end of pipe, DEQ guidance requires an analysis to determine whether the applicable water quality criterion was exceeded at the zone of initial dilution (ZID), the regulatory mixing zone (RMZ), or after complete mix.

Table 4-2. AHL evaluation

Treatment Facility	Pollutant	Sample Date	Analysis Description	Actual Influent Loading (lbs/day)	Percent of Treatment Facility MAHL	Pass Through Allowable Loading (lbs/day)	Inhibition Allowable Loading (lbs/day)	Sludge Quality Allowable Loading (lbs/day)
Hillsboro	Copper, Total	4/10/2023	ICP/MS Metals, Total Recoverable	4.33	104%	4.1730	51.4826	N/A
Forest Grove	Copper, Total	11/27/2023	ICP/MS Metals, Total Recoverable	3.95	140%	2.8191	56.7985	N/A

The Biotic Ligand Model (BLM) software (Windward Environmental, 2015) was employed to calculate instantaneous water quality criteria for copper and compare these values with the copper concentrations.

Hillsboro Treatment Facility. The data collected during the pretreatment sampling effort on April 10, 2023, did not include dissolved copper, any of the input parameters, nor any paired ambient data required to run the BLM model to calculate the instantaneous water quality criteria (IWQC) for this date. The IWQC are specific to the day and location. Therefore, CWS could not accurately determine IWQC to compare for either the end-of-pipe analysis or the copper mixing zones analysis for this sampling day. Instead, CWS reviewed four scenarios with existing data for the Hillsboro treatment facility. The results of the four scenarios are included in Tables 4-3 and 4-4 below.

1. CWS reviewed a complete set of copper BLM suite parameters sampled close in time to the sample date listed in Table 4-1. A full copper BLM suite was collected on Feb. 7, 2023.
2. CWS reviewed a complete set of copper BLM suite parameters sampled close in time to the sample date listed in Table 4-1. A full copper BLM suite was collected on May 12, 2023.
3. CWS compiled the 10th percentile data from all Hillsboro BLM input data between 2020-2023 and ran the end-of-pipe and mixing zones analyses with this dataset.
4. CWS compiled the 90th percentile data from all Hillsboro BLM input data between 2020-2023 and ran the end-of-pipe and mixing zones analyses with this dataset.

Table 4-3. End-of-pipe analysis for Hillsboro

Scenario	Pollutant	Sample Date	Effluent Dissolved Copper Concentration (ug/L)	Dissolved Copper Instantaneous End-of-Pipe Water Quality Criteria (ugL)	Dissolved Copper Instantaneous Ambient Water Quality Criteria (ug/L)
1	Copper, Dissolved	2/7/2023	3.22	18.26 (CMC) & 11.34 (CCC)	3.63 (CMC) & 2.25 (CCC)
2	Copper, Dissolved	5/12/2023	3.44	25.77 (CMC) & 16.00 (CCC)	5.10 (CMC) & 3.17 (CCC)
3	Copper, Dissolved	10% of 2020-23	1.46	9.72 (CMC) & 6.04 (CCC)	2.12 (CMC) & 1.32 (CCC)
4	Copper, Dissolved	90% of 2020-23	5.73	22.92 (CMC) & 14.24 (CCC)	6.62 (CMC) & 4.11 (CCC)

Table 4-4. Mixing zone analysis for Hillsboro

Scenario	Pollutant	Sample Date	Dissolved Copper		ZID			RMZ			100% Mix		
			Effluent	Ambient	ZID	BLM CMC		RMZ	BLM CCC		100% Mix	BLM CCC	
			Cu ug/L	Cu ug/L	Cu ug/L	Cu ug/L	Toxic Units	Cu ug/L	Cu ug/L	Toxic Units	Cu ug/L	Cu ug/L	Toxic Units
1	Copper, Dissolved	2/7/2023	3.22	0.66	1.39	7.23	NA	0.82	2.68	0.31	0.90	2.99	0.30
2	Copper, Dissolved	5/12/2023	3.44	0.80	1.55	10.18	NA	0.97	3.77	NA	1.04	4.14	NA
3	Copper, Dissolved	10% of 2020-23	1.46	0.68	0.90	3.98	NA	0.73	1.66	NA	0.75	1.77	NA
4	Copper, Dissolved	90% of 2020-23	5.73	1.10	2.43	9.90	NA	1.40	4.35	0.32	1.53	4.58	0.33

Toxic units equal the concentration divided by the associated criterion, therefore toxic units greater than one show an exceedance of the criterion. To be consistent with DEQ's copper reasonable potential analysis spreadsheet, the "NA" occurs when there is no reasonable potential at the end of the pipe as compared to criteria derived for the ZID, RMZ, and complete mix. The analysis for the Hillsboro scenarios demonstrates with toxic units less than 1 that the plant effluent dissolved copper concentrations meet the dissolved copper water quality criteria in the ZID and RMZ (Table 4-4). Therefore, there is no reasonable potential to exceed the water quality standard.

Forest Grove Treatment Facility. The data collected during the pretreatment sampling effort on Nov. 27, 2023, did not include dissolved copper, any of the input parameters, nor paired ambient data required to run the BLM model to calculate IWQC for this date, therefore, CWS could not accurately determine IWQC to compare for either the end-of-pipe analysis or the mixing zone analysis for this sampling day. Instead, CWS reviewed three scenarios with existing data for the Forest Grove treatment facility. The results of the three scenarios are included in Tables 4-5 and 4-6 below.

1. CWS reviewed a complete set of copper BLM suite parameters sampled closest in time to the sample date listed in Table 4-1. A full copper BLM suite was collected on Nov. 21, 2023.

2. CWS compiled the 10th percentile data from all Forest Grove copper BLM data between 2020-2023 and ran the end-of-pipe and mixing zone analyses with this dataset.

3. CWS compiled the 90th percentile data from all Forest Grove copper BLM data between 2020-2023 and ran the end-of-pipe and mixing zone analyses with this dataset.

4. Since the sample collected on 11/27/2023 only included total copper and TSS, CWS conducted a dissolved fraction partitioning calculation based on the procedure for calculating a translator value detailed in Section 4.3 of *The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit From a Dissolved Criterion* (EPA 1996). CWS compiled the 10th percentile data for Forest Grove effluent and Tualatin River at Fernhill values needed for this procedure.

Table 4-5. End-of-pipe analysis for Forest Grove

Scenario	Pollutant	Sample Date	Effluent Dissolved Copper Concentration (ug/L)	Dissolved Copper Instantaneous End-of-Pipe Water Quality Criteria (ugL)	Dissolved Copper Instantaneous Ambient Water Quality Criteria (ug/L)
1	Copper, Dissolved	11/21/2023	4.22	23.63 (CMC) & 14.68 (CCC)	5.14 (CMC) & 3.20 (CCC)
2	Copper, Dissolved	10% of 2020-23	2.51	6.19 (CMC) & 3.84 (CCC)	1.81 (CMC) & 1.12 (CCC)
3	Copper, Dissolved	90% of 2020-23	7.86	39.21 (CMC) & 24.35 (CCC)	6.82 (CMC) & 4.23 (CCC)
4	Calculated Copper, Dissolved	11/27/2023	6.26	11.98 (CMC) & 7.44 (CCC)	1.81 (CMC) & 1.12 (CCC)

Table 4-6. Mixing zone analysis for Forest Grove

			Dissolved Copper		ZID			RMZ			100% Mix		
Scenario	Pollutant	Sample Date	Effluent Cu ug/L	Ambient Cu ug/L	ZID Cu ug/L	BLM CMC Cu ug/L	Toxic Units	RMZ Cu ug/L	BLM CCC Cu ug/L	Toxic Units	100% Mix Cu ug/L	BLM CCC Cu ug/L	Toxic Units
1	Copper, Dissolved	11/21/2023	4.22	0.89	1.96	10.52	NA	1.07	3.74	0.29	1.01	3.57	0.28
2	Copper, Dissolved	10% of 2020-2023	2.51	0.67	1.26	3.11	NA	0.77	1.25	0.62	0.74	1.20	0.62
3	Copper, Dissolved	90% of 2020-2023	7.86	1.17	3.33	15.86	NA	1.53	5.13	0.30	1.42	4.84	0.29
4	Calculated Copper, Dissolved	11/27/23	6.26	0.67	2.47	4.07	0.61	0.98	1.35	0.72	0.88	1.35	0.65

The analysis for the Forest Grove scenarios demonstrates that the plant effluent dissolved copper concentrations met the dissolved copper water quality criteria in the ZID and RMZ (Table 4-6). Therefore, there is no reasonable potential to exceed the water quality standard.

Additionally, three complete datasets at Hillsboro and five complete datasets at Forest Grove of paired and concurrent data were collected in 2023 to input to the copper BLM to calculate the IWQC. The dissolved copper concentrations were less than the associated IWQC. This is an additional line of evidence using IWQC calculated with complete datasets that the Hillsboro and Forest Grove WRRFs are meeting dissolved copper effluent limits. CWS actively reduces the copper load and potential copper toxicity from the Forest Grove WRRF discharges by taking the following actions.

1. CWS is building primary clarifiers at Forest Grove to improve treatment efficiency including copper removal efficiency.

2. CWS actively surveys all industrial users in the Forest Grove WRRF sewershed. CWS studied effluent from the permitted industrial user with known copper discharges and required the industrial user to install advanced copper pretreatment and monitor effluent copper nearly daily.

3. The Forest Grove WRRF operates a continuous effluent pH monitor, which provides feedback to a caustic pump to increase chemical addition when pH falls below 7.1 s.u.

4. CWS installed a continuous pH monitor at the ambient monitoring station (Tualatin River at Fernhill) to measure the river's pH more accurately by maintaining the probe's equilibrium with the river.

Form 4 – Headworks Loading Comparison

All Water Resource Recovery Facilities

Facility	Analysis Description	MAHL (lbs/day)	Sample Date	Max Influent Loading (lbs/day)	Max Percent Of MAHL
Durham	Arsenic	2.24	4/10/2023	0.516	23%
Durham	Cadmium	1.22	10/3/2023	0.0243	2.0%
Durham	Chromium	73.2	4/10/2023	0.759	1.0%
Durham	Copper	37.7	7/20/2023	7.94	21%
Durham	Cyanide	17.2	7/12/2023	3.53	21%
Durham	Lead	6.52	4/10/2023	0.459	7.0%
Durham	Mercury	0.409	10/3/2023	0.0110	2.7%
Durham	Molybdenum	5.41	7/9/2023	4.12	76%
Durham	Nickel	20.9	4/10/2023	1.24	5.9%
Durham	Selenium	3.25	4/10/2023	0.121	3.7%
Durham	Silver	0.961	4/10/2023	0.0955	9.9%
Durham	Zinc	80.4	4/10/2023	33.2	41%
Rock Creek	Arsenic	2.50	4/10/2023	1.16	46%
Rock Creek	Cadmium	1.96	12/13/2023	0.131	6.6%
Rock Creek	Chromium	93.7	4/10/2023	1.62	1.7%
Rock Creek	Copper	57.1	4/10/2023	40.9	72%
Rock Creek	Cyanide	12.2	4/10/2023	1.13	9.2%
Rock Creek	Lead	12.0	4/10/2023	1.36	11%
Rock Creek	Mercury	0.426	1/17/2023	0.0340	8.0%
Rock Creek	Molybdenum	12.7	12/11/2023	1.93	15%
Rock Creek	Nickel	29.2	4/10/2023	4.12	14%
Rock Creek	Selenium	6.53	4/10/2023	0.192	2.9%
Rock Creek	Silver	0.629	4/10/2023	0.0932	15%
Rock Creek	Zinc	124	4/10/2023	109	88%
Forest Grove	Arsenic	1.24	4/10/2023	0.135	11%
Forest Grove	Cadmium	0.825	4/10/2023	0.00599	0.73%
Forest Grove	Chromium	56.8	4/10/2023	0.176	0.31%
Forest Grove	Copper	2.82	11/27/2023	3.95	140%

All Water Resource Recovery Facilities

Facility	Analysis Description	MAHL (lbs/day)	Sample Date	Max Influent Loading (lbs/day)	Max Percent Of MAHL
Forest Grove	Cyanide	5.68	4/10/2023	0.144	2.5%
Forest Grove	Lead	2.29	4/10/2023	0.240	10%
Forest Grove	Mercury	0.246	4/9/2023	0.00185	0.75%
Forest Grove	Molybdenum	NA	4/10/2023	0.0624	NA
Forest Grove	Nickel	50.6	1/17/2023	0.539	1.1%
Forest Grove	Selenium	5.22	4/10/2023	0.0299	0.57%
Forest Grove	Silver	0.779	9/19/2023	0.0135	1.7%
Forest Grove	Zinc	17.0	4/10/2023	5.26	31%
Hillsboro	Arsenic	1.10	4/10/2023	0.127	12%
Hillsboro	Cadmium	0.426	4/10/2023	0.00587	1.4%
Hillsboro	Chromium	47.8	4/10/2023	0.169	0.35%
Hillsboro	Copper	4.17	4/10/2023	4.33	104%
Hillsboro	Cyanide	2.55	4/10/2023	0.180	7.1%
Hillsboro	Lead	1.31	4/10/2023	0.147	11%
Hillsboro	Mercury	0.0525	4/10/2023	0.00542	10%
Hillsboro	Molybdenum	NA	4/19/2023	0.654	NA
Hillsboro	Nickel	8.71	4/10/2023	0.592	6.8%
Hillsboro	Selenium	2.33	4/10/2023	0.0293	1.3%
Hillsboro	Silver	0.0816	1/5/2023	0.00735	9.0%
Hillsboro	Zinc	17.2	4/10/2023	6.24	36%

Form 5 – Treatment Plant Upsets/Problems

Durham Water Resource Recovery Facility NPDES #101141

1. Has the control authority experienced any of the following?

	Yes	No	Unknown	Explain
Interference		X		
Pass through		X		
Fire or explosions (including flash point violations)		X		
Corrosive structural damage (including pH<5.0)		X		
Flow obstructions		X		
Excessive flow or pollutant concentrations		X		
Heat problems		X		
Interference due to oil or grease		X		
Toxic fumes		X		
Illicit dumping of hauled waste		X		

2. Provide a description of each instance of treatment plant upset (pass through or interference) due in whole or in part to a non-domestic discharge (See Instructions for completing *FORM 5*).

   N/A

Form 5 – Treatment Plant Upsets/Problems

Forest Grove Water Resource Recovery Facility NPDES #101142

1. Has the control authority experienced any of the following?

	Yes	No	Unknown	Explain
Interference		X		
Pass through		X		
Fire or explosions (including flash point violations)		X		
Corrosive structural damage (including pH<5.0)		X		
Flow obstructions		X		
Excessive flow or pollutant concentrations		X		
Heat problems		X		
Interference due to oil or grease		X		
Toxic fumes		X		
Illicit dumping of hauled waste		X		

2. Provide a description of each instance of treatment plant upset (pass through or interference) due in whole or in part to a non-domestic discharge (See Instructions for completing *FORM 5*).

   N/A

Form 5 – Treatment Plant Upsets/Problems

Hillsboro Water Resource Recovery Facility NPDES #101143

1. Has the control authority experienced any of the following?

	Yes	No	Unknown	Explain
Interference		X		
Pass through		X		
Fire or explosions (including flash point violations)		X		
Corrosive structural damage (including pH<5.0)		X		
Flow obstructions		X		
Excessive flow or pollutant concentrations		X		
Heat problems		X		
Interference due to oil or grease		X		
Toxic fumes		X		
Illicit dumping of hauled waste		X		

2. Provide a description of each instance of treatment plant upset (pass through or interference) due in whole or in part to a non-domestic discharge (See Instructions for completing *FORM 5*).

   N/A

Form 5 – Treatment Plant Upsets/Problems

Rock Creek Water Resource Recovery Facility NPDES #101144

1. Has the control authority experienced any of the following?

	Yes	No	Unknown	Explain
Interference		X		
Pass through		X		
Fire or explosions (including flash point violations)		X		
Corrosive structural damage (including pH<5.0)		X		
Flow obstructions		X		
Excessive flow or pollutant concentrations		X		
Heat problems		X		
Interference due to oil or grease		X		
Toxic fumes		X		
Illicit dumping of hauled waste		X		

2. Provide a description of each instance of treatment plant upset (pass through or interference) due in whole or in part to a non-domestic discharge (See Instructions for completing *FORM 5*).

   N/A

Form 6 – List of Regulated Users

Name of User	SIU (Y/N)	CIU (Y/N)	40 CFR Part No.	NDCIU (Y/N)	NSCIU (Y/N)	Middle Tier CIU (Y/N)	SIC Code or NAICS Code	Permit Issued (Y/N)
Fujimi Corporation	Y	N	40 CFR Part 403.3 (v)(1)(ii)	N	N	N	3291	Y
Lieb Foods	Y	N	40 CFR Part 403.3 (v)(1)(ii)	N	N	N	2035	Y
~~Linde Inc.~~	~~Y~~	~~N~~	~~40 CFR Part 403.3 (v)(ii)~~	~~N~~	~~N~~	~~N~~	~~2813~~	~~Y~~
New Season Foods Incorporated	Y	N	40 CFR Part 403.3 (v)(1)(ii)	N	N	N	2034	Y
Old Trapper Smoked Products	Y	N	40 CFR Part 403.3 (v)(1)(ii)	N	N	N	2013	Y
Oregon Health Sciences University West Campus ONPRC	Y	N	40 CFR Part 403.3 (v)(1)(ii)	N	N	N	8733	Y
Pacific Foods	Y	N	40 CFR Part 403.3 (v)(1)(ii)	N	N	N	2099	Y
Pacific Nutritional Foods	Y	N	40 CFR Part 403.3 (v)(1)(ii)	N	N	N	2099	Y
Prudential Cleanroom Services	Y	N	40 CFR Part 403.3 (v)(1)(ii)	N	N	N	7218	Y
Reser's Fine Foods - Century Blvd Plant	Y	N	40 CFR Part 403.3 (v)(1)(ii)	N	N	N	2099	Y
Summit Foods, Inc.	Y	N	40 CFR Part 403.3 (v)(1)(ii)	N	N	N	2869	Y
TOK America	Y	N	40 CFR Part 403.3 (v)(1)(ii)	N	N	N	2899	Y
ACUMED, LLC	N	Y	40 CFR 433.17	N	N	N	3842	Y
Analog Devices (formerly Maxim Integrated Products)	N	Y	40 CFR 469.18	N	N	N	3674	Y
Anodize Solutions, LLC	N	Y	40 CFR 433.17	N	N	N	3471	Y
~~BASF Corporation~~	~~N~~	~~Y~~	~~40 CFR 433.17~~	~~N~~	~~N~~	~~N~~	~~2899~~	~~N~~
BASF Corporation	N	N	40 CFR 433.17	N	Y	N	2899	N

Name of User	SIU (Y/N)	CIU (Y/N)	40 CFR Part No.	NDCIU (Y/N)	NSCIU (Y/N)	Middle Tier CIU (Y/N)	SIC Code or NAICS Code	Permit Issued (Y/N)
~~Cal Weld~~	~~N~~	~~Y~~	~~40 CFR 433.17~~	~~N~~	~~N~~	~~N~~	~~3471~~	~~N~~
Cal Weld	N	N	40 CFR 433.17	Y	N	N	3471	N
Davis Tool, Inc.	N	Y	40 CFR 433.17	N	N	N	3471	Y
Forest Dental Equipment	N	Y	40 CFR 433.17	N	N	N	3843	Y
FormFactor, Inc.	N	Y	40 CFR 433.17	N	N	N	3825	Y
Genentech, Inc.	N	Y	40 CFR 439.27, Subpart D	N	N	N	2834	Y
Hillsboro Landfill, Inc.	N	Y	40 CFR 445.3	N	N	N	4953	Y
Intel Corporation - Aloha Campus	N	Y	40 CFR 469.16 / 469.18	N	N	N	3674	Y
Intel Corporation - Ronler Acres Campus	N	Y	40 CFR 469.18	N	N	N	3674	Y
JAE Oregon, Inc.	N	Y	40 CFR 433.17	N	N	N	3678	Y
Jireh Semiconductor, Incorporated	N	Y	40 CFR 469.18	N	N	N	3674	Y
KoMiCo Hillsboro, LLC	N	Y	40 CFR 433.17	N	N	N	3479	Y
Lam Research Corporation	N	Y	40 CFR 433.17	N	N	N	3559	Y
Leupold & Stevens, Inc.	N	Y	40 CFR 433.17	N	N	N	3827	Y
Lotus Applied Technology	N	Y	40 CFR 433.17	N	N	N	8731	Y
Northwest Rubber Extruders, Inc.	N	Y	40 CFR 428.56 Subpart E / 463 Subpart A	N	N	N	3061	Y
Pioneer Metal Finishing	N	Y	40 CFR 433.17	N	N	N	3479	Y
Qorvo	N	Y	40 CFR 433.17/ 469.18	N	N	N	3674	Y
QuantumClean	N	Y	40 CFR 433.17	N	N	N	3479	Y

Name of User	SIU (Y/N)	CIU (Y/N)	40 CFR Part No.	NDCIU (Y/N)	NSCIU (Y/N)	Middle Tier CIU (Y/N)	SIC Code or NAICS Code	Permit Issued (Y/N)
Seals Unlimited (Legal name changed to Mi Conveyance Solutions)	N	N	40 CFR 428.56, Subpart E	N	Y	N	3053	N
Sheldon Manufacturing Incorporated	N	Y	40 CFR 433.17	N	N	N	3821	Y
Sumitomo Electric Semiconductor Materials, Inc.	N	Y	40 CFR 469.28	N	N	N	3674	Y
~~Tektronix Inc. Building 50~~	~~N~~	~~Y~~	~~40 CFR 433.17~~	~~N~~	~~N~~	~~N~~	~~3829~~	~~Y~~
TTM Technologies North America, LLC	N	Y	40 CFR 433.15	N	N	N	3672	Y
Westak of Oregon, Inc.	N	Y	40 CFR 433.17	N	N	N	3672	Y
AMS-OSRAM USA Inc..	N	N	40 CFR 469, Subpart D	N	Y	N	2819	N
Engle Dental Systems	N	N	40 CFR 433.17	Y	N	N	3843	N
Integrated Metal Components	N	N	40 CFR 433.17	Y	N	N	3599	N
KAI Logistics	N	N	40 CFR 433.17	Y	N	N	3421	N
Meta Fab, Inc.	N	N	40 CFR 433.17	Y	N	N	3479	N
Nortek Air Solutions, LLC	N	N	40 CFR 433.17	Y	N	N	3585	N
NW Die Casting	N	N	40 CFR 464.12	Y	N	N	3363	N
Immunology Consultants Laboratory	N	N	40 CFR 439.27	N	Y	N	2836	N
Powder Tech, Inc	N	N	40 CFR 433.17	Y	N	N	3479	N
Regenyx	N	N	40 CFR 414, Subpart F	Y	N	N	2869	N
St Jude Medical	N	N	40 CFR 463.16	Y	N	N	3643	N
Tufcoat ProPowder Powder Coating	N	N	40 CFR 433.17	Y	N	N	3479	N
Valmont Coatings Pacific States Galvanizing	N	N	40 CFR 438	Y	N	N	3479	N

Name of User	SIU (Y/N)	CIU (Y/N)	40 CFR Part No.	NDCIU (Y/N)	NSCIU (Y/N)	Middle Tier CIU (Y/N)	SIC Code or NAICS Code	Permit Issued (Y/N)
Warne Scope Mounts	N	N	40 CFR 438	Y	N	N	3484	N
NW4S, Inc.	N	N	40 CFR 433.17	N	Y	N	3469	N
Finishing First	N	N	40 CFR 433.17	Y	N	N	3479	N
Continental Coatings	N	N	40 CFR 433.17	Y	N	N	3479	N

Underlined Name = New SIU permitted in 2023

~~Strike through Name~~ = SIU that ceased discharge in 2023

Middle Tier CIU Permit types have not been adopted by Clean Water Services.

Form 6 Comments

Linde, Inc.- Previously permitted as an SIU for volume of flow discharged, Linde no longer met the criteria in 40 CFR Part 403.3 (v)(ii) for SIU status and, upon permit expiration, was issued a waste discharge permit under the local program on 10/1/2023 due to decreased flow.

BASF Corporation – Previously permitted as a CIU for metal finishing, the industry operations decreased volume of wastewater discharged and met the criteria for an NSCIU with annual certification in lieu of permit under the requirements listed in 40CFR403.3(v)(2).

Cal Weld – Previously permitted as a CIU for metal finishing, the industry operations ceased waste discharge on 2/15/2023 and met the criteria for an NDCIU with annual certification in lieu of permit. Clean Water Services continues to implement the adopted annual certification requirement in lieu of a permit.

Seals Unlimited changed its legal name to Mi Conveyance Solutions and notified CWS of the name change on 5/17/2023.

Tektronix – Building 50 ceased discharge on 5/23/2023; all chemicals were removed from facility on 1/3/2024 and permit voided.

NW4S, Inc – Previously permitted under local program BMP permit; met criteria for NSCIU for metal finishing operations.

Finishing First - Previously permitted under local program BMP permit; met criteria for NDCIU for metal finishing operations.

Continental Coatings - Previously permitted under local program BMP permit; met criteria for NDCIU for metal finishing operations.

Form 6A – Industrial Survey Update

Name of Industry	Survey Returned (Y/N)	Permit Application Required (Y/N)	Permit Application Returned (Y/N)	Permit Issued (Y/N)	Comments
Ackley Brands	Y	N	N	N	CWS is in the process of determining if a permit application is required.
Entegris, Inc	Y	Y	N	N	CWS required an updated application to be submitted. CWS will evaluate submitted application materials to determine if a permit is required.
Evans Components, Inc	N	Y	N	N	CWS required an application to be submitted. CWS will evaluate submitted application materials to determine if a permit is required.
P/M Industries, Inc	Y	Y	Y	N	CWS conducted sampling to determine if a permit is required. CWS will evaluate sample results once received.
Tosoh Quartz – Building 2	Y	Y	Y	N	No permit required.
Tosoh Quartz – Building 4	Y	Y	Y	N	No permit required.
Tektronix – Building 39	Y	Y	Y	N	No permit required.
U.S Linen	Y	Y	Y	N	CWS is evaluating submitted application materials.
Von Ebert Brewing	Y	N	N	N	CWS does not issue Industrial Wastewater Discharge permits for breweries. No application or permit required at this time.

Form 6A Comments

Clean Water Services' Environmental Services (ES) program continued to update industrial data that is stored in the Permit Information Management Software. ES staff screened hundreds of legacy surveyed facilities. After completing an exhaustive review of the database, ES identified 111 facilities for further inspection. ES staff inspected 37 legacy facilities in 2023 and identified 74 additional facilities that will be inspected in 2024. This effort ensures that ES is continually conducting screening for all possible industrial users as required through the Pretreatment Program Implementation Plan.

Form 7 – Compliance/Oversight Summary (SIUs Only)

Name of SIU	Permit Expiration Date	Number of Documented Inspections	POTW Sampling (All Regulated Pollutants)	SIU Self-Monitoring (All Regulated Pollutants)	SNC for Quarter			
ACUMED, LLC.	7/23/2024	2	1	4	1	2	3	4
Analog Devices	9/30/2028	1	2	1				
Anodize Solutions, LLC	10/31/2025	1	1	12				
BASF Corporation [1]	1/31/2024	1	1	4				
Davis Tool, Incorporated	6/19/2024	1	2	2				
Forest Dental Equipment	1/9/2029	1	1	4				
FormFactor, Inc	4/27/2024	1	1	4				
Fujimi Corporation	4/27/2027	1	1	2				
Genentech	5/4/2024	1	1	4				
Hillsboro Landfill Inc	8/27/2025	1	3	46				
Intel Corporation – Aloha Campus	11/22/2024	1	1	52				
Intel Corporation – Ronler Acres Campus	11/22/2024	1	1	2				
JAE Oregon Inc	1/22/2025	1	0 [2]	4			A	A
Jireh Semiconductor, Incorporated [2]	6/7/2026	1	2	0 [3]				
KoMiCo Hillsboro, LLC	12/13/2026	1	2	12				
Lam Research Corporation	6/30/2027	1	1	4				
Leupold & Stevens Inc	11/5/2027	1	1	0 [4]				
Lieb Foods LLC	12/14/2028	1	3	0 [3]				
Linde Inc. [5]	7/18/2023	1	1	58				
Lotus Applied Technology	2/21/2026	1	1	4				
New Season Foods Incorporated	1/20/2025	1	2	0 [3]				
Northwest Rubber Extruders, Inc.	3/18/2026	2	1	2				
Old Trapper Smoked Products	5/31/2027	2	1	0 [3]				
Oregon Health Sciences University West Campus ONPRC	6/10/2024	2	1	0 [3]				
Pacific Foods	9/30/2026	2	1	2				
Pacific Nutritional Foods	9/30/2028	1	1	1				

Name of SIU	Permit Expiration Date	Number of Documented Inspections	POTW Sampling (All Regulated Pollutants)	SIU Self-Monitoring (All Regulated Pollutants)	SNC for Quarter			
Pioneer Metal Finishing	1/23/2026	1	2	2				
Prudential Cleanroom Services	1/23/2026	1	1	2				
Qorvo	1/9/2029	1	1	4				
QuantumClean	11/30/2027	3	0 [6]	12				
Reser's Fine Foods – Century Blvd Plant	10/13/2025	1	3	0 [3]				
Sheldon Manufacturing Incorporated	9/30/2027	1	1	2				
Sumitomo Manufacturing Incorporated	8/31/2028	1	2	12				
Summit Foods, Inc	1/31/2029	1	2	0 [3]				
Tektronix – Building 50	1/3/2024	1	0 [7]	1				
TOK America	8/11/2026	1	1	2				
TTM Technologies North America, LLC	7/27/2024	1	2	2				
Westak of Oregon Incorporated	2/1/2026	1	1	2				

Form 7 Comments

[1] BASF Corporation permit expired on 1/31/2024 and after review of the submitted Industrial Waste Discharge Application, met the NSCIU requirements of 40CFR403.3(v)(2). BASF will submit an annual certification statement instead of permit.

[2] CWS sampled all regulated pollutants for JAE once at Outfall 001. At the second outfall, Outfall 009, all regulated pollutants were sampled. However, Total Cyanide was collected at Outfall 001 instead of Outfall 009. All Outfall 009 wastewater is conjoined with Outfall 001 before discharge. Results were non-detect for Total Cyanide. Sampling at Outfall 001 has since occurred. CWS is updating data system procedures to clarify sampling locations to ensure sampling requirements are met.

[3] The IUs' only regulated pollutant is pH, which requires continuous monitoring. Per DEQ guidance, continuous pH monitoring is not counted toward the total number of SIU samples. CWS collects pH grab samples at all industries and verifies the IUs' continuous pH monitoring systems and upon inspection verifies calibration schedule records.

[4] Leupold & Stevens Inc sampled all regulated pollutants except for Total Mercury.

[5] Data for Linde. Inc corresponds to 1/1/2023-9/30/2023 when Linde was permitted due to meeting the flow volume criteria in 40 CFR Part 403.3 (v)(ii) for SIU. Linde no longer meets the criteria and was issued a permit under the local program on 10/1/2023.

[6] QuantumClean was sampled by CWS three times at the categorical Outfall 001. The only regulated pollutant for the non-categorical Outfall 002 is pH, and it was not sampled by CWS due to intermittent low-volume batch discharges.

[7] Tektronix – Building 50 ceased discharge on 5/23/2023. All chemicals were removed from the facility on 1/3/2024 and the permit was closed. The facility ceased discharging sooner than expected and before CWS sampling.

Use the following code for SNC:

A – SNC with Applicable Pretreatment Standards

B – SNC with Self-Monitoring

C – SNC with Reporting

D – SNC with Compliance Schedule

Form 8 – Noncompliance/Enforcement Summary (SIUs Only)

Name of SIU	Nature of Violation	Date of Violation	POTW Enforcement Response	Date of POTW Response	Date of Return to Compliance	Comments
ACUMED, LLC.	Self-Monitoring Report (SMR) submitted later than report due date	9/13/2023	WLR	9/29/2023	10/5/2023	
Anodize Solutions, LLC	Exceeding Concentration Average Limit	5/31/2023	WLR	6/19/2023	6/30/2023	
BASF Corporation	Self-Monitoring Report (SMR) submitted later than report due date	9/12/2023	WLR	9/22/2023	10/5/2023	
Forest Dental Equipment	Exceeding Concentration Minimum Limit	7/12/2023	WLR	8/15/2023	7/13/2023	
Forest Dental Equipment	Failure to Monitor Correctly or Incorrect Sampling	8/4/2023	WLR	12/26/2023	10/27/2023	
FormFactor, Inc	Exceeding Concentration Maximum Limit	10/1/2023	NOV	11/21/2023	1/2/2024	
Hillsboro Landfill Inc	Calculated Penalty from Pretreatment Enforcement Matrix	2/10/2023	NOV	2/13/2024	3/7/2023	
Intel Corporation – Aloha Campus	Exceeding Concentration Maximum Limit	5/2/2023	WLR	8/15/2023	5/9/2023	
Intel Corporation – Ronler Campus	Exceeding Concentration Minimum Limit	5/24/2023	NOV	8/15/2023	5/25/2023	
JAE Oregon Inc	Exceeding Concentration Maximum Limit	8/29/2023	WLR	11/11/2023	10/3/2023	
JAE Oregon Inc	Exceeding Concentration Average Limit	8/31/2023				
KoMiCo Hillsboro, LLC	Exceeding Concentration Maximum Limit	3/10/2023	WLR	4/21/2023	4/6/2023	
KoMiCo Hillsboro, LLC	Exceeding Concentration Average Limit	5/18/2023	WLR	6/16/2023	5/23/2023	
KoMiCo Hillsboro, LLC	Exceeding Concentration Average Limit	5/31/2023	WLR	7/5/2023	6/8/2023	

Name of SIU	Nature of Violation	Date of Violation	POTW Enforcement Response	Date of POTW Response	Date of Return to Compliance	Comments
KoMiCo Hillsboro, LLC	Exceeding Concentration Maximum Limit	7/13/2023	WLR	8/23/2023	7/14/2023	
KoMiCo Hillsboro, LLC	Failure to Monitor for all Pollutants	7/31/2023	WLR	8/23/2023	8/8/2023	
KoMiCo Hillsboro, LLC	Exceeding Concentration Maximum Limit	9/6/2023	NOV	11/2/2023	11/22/2023	
KoMiCo Hillsboro, LLC	Exceeding Concentration Maximum Limit	9/30/2023				
KoMiCo Hillsboro, LLC	Exceeding Concentration Maximum Limit	11/6/2023	NOV	1/10/2024	11/17/2023	
Lam Research Corporation	Self-Monitoring Report (SMR) submitted later than report due date	8/11/2023	WLR	8/23/2023	9/7/2023	
Leupold & Stevens Inc	Exceeding Concentration Maximum Limit	1/10/2023	WLR	3/31/2023	2/1/2023	
Leupold & Stevens Inc	Exceeding Concentration Maximum Limit	11/9/2023	WLR	1/19/2024	11/27/2023	
Leupold & Stevens Inc	Exceeding Concentration Maximum Limit					
Leupold & Stevens Inc	Exceeding Concentration Maximum Limit	12/14/2023	NOV	1/19/2024	1/22/2024	
Leupold & Stevens Inc	Failure to Monitor for all Pollutants	12/31/2023	WLR	2/19/2024	Pending	Missed semiannual sampling. Return to compliance pending data for the pollutant that was missed.
New Season Foods Incorporated	Exceeding Concentration Maximum Limit	12/13/2023	NOV	2/9/2024	12/21/2023	
New Season Foods Incorporated	Failure to properly operate and maintain pretreatment equipment					
Northwest Rubber Extruders, Inc.	Exceeding Concentration Minimum Limit	12/18/2023	WLR	1/19/2024	1/2/2024	
Old Trapper Smoked Products	Exceeding Concentration Minimum Limit	6/24/2023	WLR	7/21/2023	6/25/2023	
Old Trapper Smoked Products	Exceeding Concentration Minimum Limit	6/27/2023	WLR	7/21/2023	6/28/2023	

Name of SIU	Nature of Violation	Date of Violation	POTW Enforcement Response	Date of POTW Response	Date of Return to Compliance	Comments
Old Trapper Smoked Products	Exceeding Concentration Minimum Limit	10/13/2023	NOV	12/26/2023	10/14/2023	
Old Trapper Smoked Products	Self-Monitoring Report (SMR) submitted later than report due date	11/13/2023	WLR	11/28/2023	12/1/2023	
Oregon Health Sciences University West Campus ONPRC	Exceeding Concentration Maximum Limit	3/21/2023	CO	8/15/2022	Pending	Penalties associated with NOVs are stayed as part of CO entered on 8/15/2022 due 5/10/2023 and extended to 10/31/2023.
Oregon Health Sciences University West Campus ONPRC	Exceeding Concentration Maximum Limit	4/30/2023				
Oregon Health Sciences University West Campus ONPRC	Exceeding Concentration Maximum Limit	5/12/2023				
Oregon Health Sciences University West Campus ONPRC	Exceeding Concentration Maximum Limit	6/8/2023				
Oregon Health Sciences University West Campus ONPRC	Exceeding Concentration Maximum Limit	6/23/2023				
Oregon Health Sciences University West Campus ONPRC	Exceeding Concentration Maximum Limit	6/24/2023				
Oregon Health Sciences University West Campus ONPRC	Exceeding Concentration Maximum Limit	6/25/2023				
Oregon Health Sciences University West Campus ONPRC	Exceeding Concentration Maximum Limit	6/26/2023				
Oregon Health Sciences University West Campus ONPRC	Exceeding Concentration Maximum Limit	6/27/2023				
Oregon Health Sciences University West Campus ONPRC	Exceeding Concentration Maximum Limit	7/1/2023				
Oregon Health Sciences University West Campus ONPRC	Exceeding Concentration Maximum Limit	7/2/2023				
Oregon Health Sciences University West Campus ONPRC	Exceeding Concentration Maximum Limit	7/3/2023				
Oregon Health Sciences University West Campus ONPRC	Exceeding Concentration Maximum Limit	7/4/2023				
Oregon Health Sciences University West Campus ONPRC	Exceeding Concentration Maximum Limit	7/5/2023				

Name of SIU	Nature of Violation	Date of Violation	POTW Enforcement Response	Date of POTW Response	Date of Return to Compliance	Comments
Oregon Health Sciences University West Campus ONPRC	Failure to properly operate and maintain pretreatment equipment	11/30/2023	NOV	2/16/2024	Pending	At the time of report submission, NOV is in the initial appeals process.
Oregon Health Sciences University West Campus ONPRC	Failure to properly operate and maintain pretreatment equipment	12/14/2023	NOV	2/16/2024	Pending	At the time of report submission, NOV is in the initial appeals process.
Pacific Foods	Unpermitted Discharge	12/1/2023	WLR	12/26/2023	12/8/2023	
Pacific Nutritional Foods	Failure to Monitor for all Pollutants	11/11/2023	WLR	12/12/2023	12/19/2023	
Pacific Nutritional Foods	Failure to Monitor for all Pollutants	12/11/2023	NOV	12/26/2023	12/19/2023	
Pioneer Metal Finishing	Exceeding Concentration Minimum Limit	3/24/2023	WLR	4/14/2023	3/25/2023	
QuantumClean	Slug Discharge	3/14/2023	NOV	2/7/2024	3/29/2023	
QuantumClean	Exceeding Concentration Maximum Limit	3/14/2023				
QuantumClean	Exceeding Concentration Maximum Limit	3/30/2023	NOV	2/16/2024	5/31/2023	
QuantumClean	Exceeding Concentration Maximum Limit	4/1/2023				
QuantumClean	Exceeding Concentration Maximum Limit	4/7/2023				
QuantumClean	Exceeding Concentration Maximum Limit	4/14/2023				
QuantumClean	Exceeding Concentration Maximum Limit	4/25/2023				
QuantumClean	Exceeding Concentration Average Limit	4/30/2023				
QuantumClean	Self-Monitoring Report (SMR) submitted later than report due date	4/13/2023	WLR	7/5/2023	5/10/2023	
QuantumClean	Failure to Monitor Correctly or Improper Sampling	4/30/2023	NOV	2/16/2024	9/8/2023	

Name of SIU	Nature of Violation	Date of Violation	POTW Enforcement Response	Date of POTW Response	Date of Return to Compliance	Comments
QuantumClean	Failure to Monitor Correctly or Improper Sampling	5/13/2023	NOV	2/16/2024	9/8/2023	
QuantumClean	Reporting Violation	8/1/2023	NOV	8/3/2023	2/23/2024	
QuantumClean	Failure to Monitor Correctly or Improper Sampling	8/19/2023	NOV	2/16/2024	9/8/2023	
Reser's Fine Foods – Century Blvd Plant	Failure to properly operate and maintain pretreatment equipment	6/5/2023	NOV	11/22/2023	12/22/2023	Compliance date when corrective actions to prevent future violations of the same type was received.
Reser's Fine Foods – Century Blvd Plant	Slug Discharge	6/5/2023	NOV	11/22/2023	12/22/2023	Compliance date when corrective actions to prevent future violations of the same type was received.
Reser's Fine Foods – Century Blvd Plant	Exceeding Concentration Maximum Limit	6/7/2023	WLR	8/22/2023	6/8/2023	
Sumitomo Electric Semiconductor Materials, Inc.	Failure to Monitor for all Pollutants	12/31/2023	WLR	2/13/2024	1/24/2024	
TOK America	Self-Monitoring Report (SMR) submitted later than report due date	3/13/2023	WLR	3/22/2023	5/9/2023	
TOK America	Self-Monitoring Report (SMR) submitted later than report due date	4/11/2023	NOV	4/21/2023	6/6/2023	

Form 8 Comments

CWS' Date of Return to Compliance is defined as the first date following a violation that an Industrial User submits a sample result of the same permit parameter that is in compliance. In the case of a missed sample, the return to compliance date is the first day that the missed sample is received. If the violation was not a discharge violation or missed sample violation, the return to compliance is defined as the date when documentation providing the corrective actions to prevent future violations of the same type is received.

Form 9 – Resource Summary

Item	Report Year	Planned	Comments
Labor (billable hours)			
Sampling	465.00	500.00	WQL industrial pretreatment sampling
Inspection	1,263.25	1,515.9	
Management	1,906.65	1,906.65	
Administration	6,072.00	6,072.00	
Laboratory	709.00	800.00	Contract lab coordination, Sample Manager
Enforcement	525.75	630.90	
TOTAL HOURS	**10,941.65**	**11,425.45**	
Operating Cost			
Laboratory	$85,816	$120,000	Increased PFAS method development testing + shipping costs, increased pretreatment samples + testing
Sampling and inspection	$122,273.69	$142,624.93	
Permit writing	$149,671.63	$179,605.95	
Enforcement	$37,196.81	$44,636.18	
TOTAL COSTS ($)	**$394,958.13**	**$486,867.06**	
Income revenue			
Sewer use	$15,336,641.56	$15,950,107.22	Reflects 4% average rate increase
Extra strength	$1,092,701.87	$1,136,409.94	Reflects 4% average rate increase
Impervious area	NA	NA	
Penalties	$65,400.00	$4,000	
TOTAL INCOME ($)	**$16,494,743.43**	**$17,090,517.16**	

Form 10 – Pretreatment Program Evaluation

1. Has a change in contributing jurisdictions occurred since the last Annual Report? ☐ Yes ☒ No
   If yes, identify the jurisdictions that have been added or removed:

   _____

   _____

2. Has the Control Authority updated its Industrial User Survey to identify new Industrial Users (IUs) or changes in wastewater discharges at existing IUs? [(403.8(f)(2)(i)] If yes: ☐ Yes ☒ No

   a) Are any of these IUs located in new service areas (describe)? ☐ Yes ☒ No

   b) Have any IUs located in contributing jurisdictions where the POTW has no inter-jurisdictional agreements or IU Contracts? ☐ Yes ☒ No

   _____

   _____

3. For any <u>new</u> Categorical Industrial Users or processes identified during the Report period:
   a) Baseline Monitoring Report (BMR) Submitted? ☐ Yes ☒ No
   b) Final (90-day) Compliance Report (FCR) Submitted? ☐ Yes ☒ No

4. How many IUs are currently permitted, or identified by the Control Authority in each of the following categories during the Report period?

   <u>35</u> TOTAL SIUs
   - (a) <u>24</u> Categorical Industrial Users (CIUs)
   - (b) <u>11</u> Significant Non-categorical IUs
   - (c) <u>0</u> NDCIUs subject to zero discharge limits
   - (d) <u>N/A*</u> "Middle Tier" categorical industrials users*

   <u>15</u> NDCIUs that are not subject zero discharge categorical limits.

   <u>5</u> Non-Significant Categorical Industrial User (NSCIU)*

   <u>187</u> Other regulated non-categorical IUs (Describe):

   <u>Non-Significant User (local cost recovery), Washwater, Discharge Authorization, Best Management Practices, and Liquid Waste Haulers.</u>

   <u>*Clean Water Services has not adopted the "Middle Tier" provision.</u>

   ❖ For both NSCIUs and MTCIUs please indicate N/A if the POTW has NOT adopted these provisions. "0" if you have adopted the provisions but do not currently permit any IUs as such)

5. Is the Control Authority's definition of "Significant Industrial User" the same as EPA's? [403.3(v)(1)(i-ii)] ☒ Yes ☐ No

If not, the Control Authority has defined "Significant Industrial User" to mean:

6. How many SIUs are required to be covered by an individual control mechanism? 35

   How many SIUs are not covered by an existing, unexpired permit or other control mechanism? 0

   Explain:

   All SIUs are covered by an existing, unexpired permit or control mechanism.

7. Were individual control mechanisms issued/reissued for 90% of the SIUs within 180 days of the expiration date? ☐ Yes ☒ No

   How many control mechanisms were not issued within 180 days of the expiration date? 4

   Explain:

   Analog Devices permit issuance was delayed for categorical determination of processes. Permit issuance was delayed for Qorvo, Sumitomo, and Lieb for additional review of IU's monitoring requirements and finalization of PFAS Management Plan requirements. All SIUs are now covered by an existing, unexpired permit.

8. How many NDCIUs have been issued a control mechanism?

   a) How many NDCIUs subject to a zero-discharge prohibition have been issued a control mechanism? (Number/percent) N/A # N/A %

   b) How many NDCIUs NOT subject to a zero discharge and have been issued a control mechanism? 0 # 0 %

   c) Does the POTW require annual certification of NDCIUs in lieu of issuing a control mechanism? ☒ Yes ☐ No

   Comments, if any:
   Clean Water Services adopted the legal authority to include the NDCIU annual certification statement in lieu of issuing a control mechanism (i.e., permit). Clean Water Services continues to implement the adopted annual certification requirement in lieu of a permit.

9. Does the POTW accept hauled domestic waste? ☒ Yes ☐ No

10. Does the POTW accept hauled non-hazardous industrial waste? ☒ Yes ☐ No

11. Does the Control Authority have a control mechanism for regulating IUs whose waste are trucked to the treatment plant? ☒ Yes ☐ No ☐ N/A

    If yes, does control mechanism designate a discharge point? ☒ Yes ☐ No

    (Describe):

    Clean Water Services designates the discharge point(s) for any permitted trucked or hauled waste approved for discharge indicated in a Clean Water Services-issued control mechanism (i.e., discharge authorization letter, permit). CWS has a Hauled Waste Plan that describes permits, contracts, licensing, and authorization letters required to haul industrial waste.

12. Are all applicable categorical standards and local limits applied to IUs whose wastes are trucked into the POTW?

☒ Yes ☐ No ☐ N/A

If not, why:

13. Has the Control Authority evaluated the need for SIUs to develop slug discharge control plans? [403.8(f)(2)(vi)]

☒ Yes ☐ No

If yes, when was the evaluation last conducted and what criteria were used to identify the IUs for slug plans?

		During Report Period	Total
How many slug control plans	Required?	6	29
	Received?	7	29
	Approved?	7	29

Notes: The evaluation of SIU requirements to develop a slug discharge control plan is ongoing. In 2023, Environmental Services required updated slug discharge control plans for six SIUs that had historic plans on file. The evaluation is conducted in accordance with 40CFR403.8(f)(2)(vi) and under the criteria that SIUs, where there exists a potential to discharge slug loads to the POTW, are required to develop a slug discharge control plan.

14. Are TTO standards or alternatives (solvent management plans or oil & grease monitoring) being implemented for IUs subject to TTO limitations?

☒ Yes ☐ No ☐ N/A

If not, why?

Are TTO standards being applied to other IUs?

☐ Yes ☒ No ☐ N/A

15. How many times were the following monitored during the past year?

	Influent				Effluent				Sludge				Ambient (Receiving Water)
	DM	RC	HB	FG	DM	RC	HB	FG	DM	RC	HB	FG	
Metals	23	17	14	12	82	82	12[1]	33[2]	22	23	0[3]	0[3]	8[5]
Priority Poll.	0	0	0	0	5	5	2[4]	3[2]	0	0	0	0	0
Biomonitoring	-	-	-	-	3	3	1[4]	2[2]	-	-	-	-	-
TCLP	-	-	-	-	-	-	-	-	-	-	-	-	-
EP Tox	-	-	-	-	-	-	-	-	-	-	-	-	-
Other: Cyanide	12	15	6	12	13	15	6	15[2]	6	9	0[3]	0[3]	0

Notes:
1. Hillsboro discharges only during the high river flow period.
2. Combined Forest Grove effluent and Forest Grove NTS.
   Forest Grove NTS: Metals = 10, Priority = 1, Biomonitoring = 0, TCLP = 0, EP Tox = 0, Cyanide = 3.
3. Hillsboro and Forest Grove sludge is transferred to and included in Rock Creek analyses.
4. During low river flow conditions, effluent from both Hillsboro and Forest Grove is directed through the Forest Grove NTS before discharge in the river. During such discharges, Forest Grove NTS effluent is representative of both Hillsboro and Forest Grove effluents.
5. Number of receiving water sampling events. Each event includes multiple sampling points. There are 4 ambient (receiving water) sampling locations one associated with each of the 4 WRRFs. The number of samples taken and analyzed for metals at each site ranged from 8 – 17 depending on the seasonal discharge of the associated WRRF or coincidental routine or special projects.

16. Has the Control Authority had any problems performing compliance monitoring?

Scheduled: ☐ Yes ☒ No Unscheduled: ☐ Yes ☒ No Demand: ☐ Yes ☒ No

If yes, explain:

_____

_____

17. How many, and what percentage of SIUs were (a) not sampled at least once, or (b) not inspected at least once during the reporting period [403.8(f)(2)(vi)]

a) Number and % not sampled: 0 (0%) _____

b) Number and % not inspected: 0 (0%) _____

18. Does the Control Authority routinely split samples with industrial personnel?

a) If requested: ☒ Yes ☐ No

b) To verify IU self-monitoring: ☐ Yes ☒ No

19. Provide the following analytical information regarding pollutant analyses:

	Analytical Method	Name of Laboratory
Mercury	EPA 1631E, EPA 6020B	CWS Lab[1]
Other Metals	EPA 200.8 5.5, EPA 6020B	CWS Lab[1]
Cyanide	ASTM D4374-06/Kelada-01	CWS Lab[1]
Organics	EPA 420.1, EPA 601, EPA 624, EPA 625, EPA 8015B, EPA 8070D SIM, EPA 8081B, EPA 8082A, EPA 8151A, EPA 8260C, EPA 8270D, EPA 9065M	CWS Lab[1], ALS[2], APEX[3], Caltest[4]
Other:	EPA 537 (Modified)	Eurofins[5]

Notes:
1. CWS Lab = Clean Water Services' laboratory services
2. ALS = Australian Laboratory Services (ALS) Environmental
3. APEX = Apex Laboratories
4. Caltest = Caltest Analytical Laboratory
5. Eurofins = Eurofins Lancaster Laboratories Environmental Testing, LLC

20. Does the Control Authority use QA/QC for sampling and analysis? ☒ Yes ☐ No

If yes, describe:

Clean Water Service's Water Quality Laboratory maintains a comprehensive QA/QC program that complies with NPDES permit monitoring QA/QC requirements. Components of the program include a QA/QC coordinator position, a QA/QC program document, written SOPs for sampling and analysis, use of EPA-approved analytical methods and method QC requirements, analysis of commercially provided proficiency testing (PT) samples twice a year, PT acceptance criteria, and participation in the EPA's DMRQA program.

21. How much time normally elapses between sample collection and obtaining analytical results?

1-3 Weeks; varies by sample type and analysis.

22. Is there an established protocol clearly detailing sampling location and procedures? ☒ Yes ☐ No

23. How frequently does the Control Authority use the closed cup flashpoint test, specified in 40 CFR Part 261.21, to monitor SIUs? [403.5(b)(1)]

☐ Once per year

☐ Prior to each sampling

☒ Other: No SIUs discharge pollutants under 40 CFR 403.5(b)(1) that would require 40 CFR 261.21 testing. If testing becomes required, CWS would use a commercial laboratory as needed for testing frequency as required by individual permit.

Did the Control Authority find any problems? ☐ Yes ☒ No
If yes, explain:

_____

_____

24. Does the Control Authority compare all monitoring data to applicable pretreatment standards and requirements contained in the control mechanism within 15 days of its receipt? ☒ Yes ☐ No

25. Does the Control Authority use EPA's definition of Significant Noncompliance (SNC)? [403.8(f)(2)(viii)] ☒ Yes ☐ No

26. Are SIUs required to notify the Control Authority within 24 hours of becoming aware of a violation and to submit additional monitoring within 30 days after the violation is identified? [403.12(g)(2)] ☒ Yes ☐ No ☐ N/A

27. If the Control Authority conducts monitoring in lieu of the user, does the Control Authority resample and obtain results within 30 days of identifying and violation? ☐ Yes ☐ No ☒ N/A

28. Date that administrative penalties were last updated: Date: November 10, 2020

29. Indicate the compliance/enforcement options that are available in the event of IU noncompliance:

☒ Notice of Violation or Letter of Violation
☒ Compliance Schedule
☒ Injunctive Relief
☐ Imprisonment
☒ Termination of Service
☒ Administrative Order
☒ Revocation of Permit
☒ Fines (Maximum Amount)

a) Civil $NA*_____/day/violation
b) Criminal $NA*_____/day/violation
c) Administrative $5,000 _____/day/violation

Notes:

a. Civil * Civil judicial enforcement. CWS is authorized to take any action provided by law to enforce CWS rules or collect any monies owed to CWS as a result of enforcement actions taken under CWS rules.

b. Criminal * CWS is authorized to refer violations of CWS rules to the proper authorities for investigation and enforcement as criminal matters. Pursuant to ORS 198.600, violation of CWS rules is a Class C misdemeanor.

30. For each of the listed enforcement actions, identify the following for the ones the Control Authority has used during the reporting period:

	Total # of Actions	# of Industries Affected
Written notice or letter of violation	48	23
Administrative orders	0	0
Administrative fines	21	12
Show cause hearings	0	0
Compliance orders	0	0
Permit revocation	0	0
Civil action	0	0
Criminal action	0	0
Termination of service	0	0
Other (specify): Consent order	1	1
Notes: Warning letters are informal enforcement actions and are included as a written notice; there were 27 total number of actions. Total number of Notice of Violation actions was 21.		

31. For each of the listed enforcement actions, identify the following for the ones the Control Authority has used during the reporting period:

	Number	Amount ($)
Civil	None	None
Administrative	12	$65,400
Total	12	$65,400

32. Indicate the number and percent of SIUs that were identified as being in SNC (as defined by EPA) with the following during the reporting period:

		# of SNC SIUs	% of SNC SIUs
Applicable pretreatment standards	X	1	2.86%
Self-monitoring requirements			
Reporting requirements			
Pretreatment compliance schedule			
Other:			

33. Did the Control Authority publish all SIUs in SNC in newspapers, or general arbitration that provides meaningful public notice within the instructions served by the POTW? [403.8(f)(2)(vii)] ☒ Yes ☐ No
If yes, attach copy, or attach copy of affidavit of publication.

Notes: SNC was published in the local paper, The Oregonian, on February 28, 2024. A copy of the publication is attached.

34. Indicate the number of SIUs that are currently in SNC with self-monitoring and were not inspected or sampled: 0

35. How many SIUs are currently on compliance schedules in order to meet new or revised national pretreatment standards or requirements? 0

36. Have any CIUs been allowed more than 3 years from the effective date of a categorical standard to achieve compliance? [403.6(b)] ☐ Yes ☒ No

37. Have any IUs requested that data be held confidential? ☐ Yes ☒ No

38. Have any requests been made by the public to review files? ☒ Yes ☐ No

39. Are all records maintained for at least 3 years? ☒ Yes ☐ No

40. Are there significant public or community issues impacting the POTW's pretreatment program? ☐ Yes ☒ No

If yes, explain:

NA

41. Have any problems in program implementation been observed which appear to be related to inadequate funding, resources, or staff? ☐ Yes ☒ No

If yes, explain:

42. Does the Control Authority have adequate resources to implement the pretreatment program? ☒ Yes ☐ No

43. Does the Control Authority have the technical documents necessary for implementing its pretreatment program? ☒ Yes ☐ No

44. Does the Control Authority have access to adequate:

	Yes	No	Explain:
Sampling equipment	X		
Safety equipment	X		
Vehicles	X		
Analytical equipment	X		

Notice of SNC Publication

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LEGAL AFFIDAVIT

AD#: 0010832037

State of Oregon,) ss
County of Multnomah)
Kimberly Langdon being duly sworn, deposes that he/she is principal clerk of Oregonian Media Group; that Oregonian is a public newspaper published in the city of Portland, with general circulation in Oregon, and this notice is an accurate and true copy of this notice as printed in said newspaper, was printed and published in the regular edition and issue of said newspaper on the following date(s):
Oregonian 02/23/2024

Principal Clerk of the Publisher

Sworn to and subscribed before me this 28th day of February 2024

OFFICIAL SEAL
CARY LEE DAHLBERG
NOTARY PUBLIC - OREGON
COMMISSION NO. 1023797
MY COMMISSION EXPIRES APRIL 11, 2026

Notary Public

Public Notice of Industrial User in Significant Noncompliance

Clean Water Services (CWS) administers the federal Industrial Pretreatment Program to regulate discharges of industrial wastewater to the sanitary sewer system. It is a requirement of federal regulation 40 CFR 403.8(f)(2)(viii) and Nondomestic Waste Ordinance 42 that CWS publish a list of industrial users that were in Significant Noncompliance (SNC) with applicable Pretreatment Program requirements annually. Listed below are those industrial facilities that discharge industrial wastewater into CWS Publicly Owned Treatment Works and were found to be in Significant Noncompliance between January 1, 2023, and December 31, 2023. Any questions should be directed to Robert P. Baumgartner, Regulatory Affairs Director, at 503.681.4464.

JAE Oregon Inc
11555 SW Leveton Dr
Tualatin, OR 97062

Violation:
JAE Oregon Inc was found to be in Technical Review Criteria Significant Noncompliance for daily maximum and monthly average violations of the pretreatment standard for total nickel.

CWS Enforcement Action:
JAE Oregon was issued a Notice of Violation on November 11, 2023.

Current Compliance Status:
At the time of this publication, JAE Oregon Inc voluntarily returned to compliance in January 2024.

Public Notice of Industrial User in Significant Noncompliance

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Current Compliance Status:

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Form 11 – Sewage Treatment Plant Profile(s)

Complete this section for each sewage treatment plant operated under an NPDES/WPCF Permit.

DEQ NPDES/WPCF Permit Number: NPDES #101141: Durham Water Resource Recovery Facility

1. Treatment Plant Design Dry Weather Flow (MGD) 25.7
2. Treatment Plant Actual Dry Weather Flow (Ave.) (MGD) 19.7
3. Treatment Plant Design Wet Weather Flow (MGD) 42.0; Peak Design Flow = 140.0
4. Treatment Plant Actual Peak Wet Weather Flow (MGD) 72.5
5. Sewerage System:
   a) Separate (%) 100%
   b) Combined (%) 0%
   c) Number of CSOs 0
6. Industrial Contribution
   a) Flow (MGD) 0.94 MGD
   b) % of Influent 4.77% of actual dry weather flow
   c) Number of contributing SIUs (non-CIUs) 3
   d) Number of contributing CIUs 8
7. Level of Treatment and Description
   a) Preliminary ☒ 6 influent pumps followed by 4 barscreens and grit basins
   b) Primary ☒ 4 primary clarifiers
   c) Secondary ☒ 5 aeration basins with secondary clarifiers
   d) Tertiary ☒ 3 chemical clarifiers followed by 13 mixed media filters
   e) Type of Disinfection ☒ sodium hypochlorite
8. Receiving Water
   a. Name: Tualatin River
   b. Classification (NPDES/WPCF Permit Hydro Code): 22M-TUAL 9.2D
   c. Designated Beneficial Uses (OAR 340-41 Basin Standards): All but commercial navigation and transport.
9. Effluent Discharged to Any Location Other than Receiving Water? ☒ Yes ☐ No

If yes, Indicate Where, When, and Describe:

Class A recycled water is produced May to October and distributed to 3 golf courses (Tualatin, King City, and Summerfield), 2 schools (Durham Elementary and Tigard High athletic fields), 2 parks (Durham City and Tigard Cook), and 2 other properties (Thomas Dairy, a CWS-owned natural area, and Hickox, a privately owned farm).

10. Indicated methods of biosolids (sludge) disposal (Mg/Kg (dry weight) / year)
    a. Land Application: 4,331 dry tons/ year*
    b. Municipal Solid Waste Landfill: 0
    c. Sale or Donation to Public: 0
    d. Other (Specify): NA

    *Note: US dry tons/year for land application is provided. CWS is unclear what number is being asked, as Mg/Kg/Year for all regulated concentrations are reported in the biosolids annual report.

Form 11 – Sewage Treatment Plant Profile(s)

Complete this section for each sewage treatment plant operated under an NPDES/WPCF Permit.

DEQ NPDES/WPCF Permit Number: NPDES #101142: Forest Grove Water Resource Recovery Facility

1. Treatment Plant Design Dry Weather Flow (MGD) 6.3
2. Treatment Plant Actual Dry Weather Flow (Ave.) (MGD) 3.9
3. Treatment Plant Design Wet Weather Flow (MGD) 7.8; Peak Design Flow = 20.0
4. Treatment Plant Actual Peak Wet Weather Flow (MGD) 16.6
5. Sewerage System:
   a) Separate (%) 100%
   b) Combined (%) 0%
   c) Number of CSOs 0
6. Industrial Contribution
   a) Flow (MGD) 0.24 MGD
   b) % of Influent 6.15% of actual dry weather flow
   c) Number of contributing SIUs (non-CIUs) 3
   d) Number of contributing CIUs 1
7. Level of Treatment and Description
   a) Preliminary ☒ 2 bar screens, 2 grit removal units.
   b) Primary ☐ none
   c) Secondary ☒ 2 aeration basins followed by 3 secondary clarifiers
   d) Tertiary ☒ seasonal Natural Treatment System (May – October)
   e) Type of Disinfection ☒ UV bank with 2 banks per channel, 2 channels; increased to 5 vessels in October 2023
8. Receiving Water
   a. Name: Tualatin River
   b. Classification (NPDES/WPCF Permit Hydro Code): : 22M-TUAL 53.8D
   c. Designated Beneficial Uses (OAR 340-41 Basin Standards) All but commercial navigation and transport.
9. Effluent Discharged to Any Location Other than Receiving Water? ☒ Yes ☐ No

If yes, Indicate Where, When, and Describe:

Periodically transfers to Rock Creek WRRF.

10. Indicated methods of biosolids (sludge) disposal (Mg/Kg (dry weight) / year)
    a. Land Application NA
    b. Municipal Solid Waste Landfill NA
    c. Sale or Donation to Public NA
    d. Other (Specify) NA; all solids are transferred to and processed at the Rock Creek WRRF

Form 11 – Sewage Treatment Plant Profile(s)

Complete this section for each sewage treatment plant operated under an NPDES/WPCF Permit.

DEQ NPDES/WPCF Permit Number: NPDES #101143: Hillsboro Water Resource Recovery Facility

1. Treatment Plant Design Dry Weather Flow (MGD) No Dry weather discharge; flow sent to Rock Creek/Forest Grove facilities
2. Treatment Plant Actual Dry Weather Flow (Ave.) (MGD) 3.1
3. Treatment Plant Design Wet Weather Flow (MGD) 7.8; Peak Design Flow = 16.0
4. Treatment Plant Actual Peak Wet Weather Flow (MGD) 14.3
5. Sewerage System:
   a) Separate (%) 100
   b) Combined (%) 0%
   c) Number of CSOs 0
6. Industrial Contribution
   a) Flow (MGD) 0.05 MGD
   b) % of Influent 1.61% of actual dry weather flow
   c) Number of contributing SIUs (non-CIUs) 1
   d) Number of contributing CIUs 3
7. Level of Treatment and Description
   a) Preliminary ☒ 2 Bar Screens, 2 grit removal units
   b) Primary ☒ 2 circular clarifiers
   c) Secondary ☒ 1 Aeration basin, 3 secondaries
   d) Tertiary ☐ none
   e) Type of Disinfection ☒ UV, 1 bank per channel, 2 channels
8. Receiving Water
   a. Name: Tualatin River
   b. Classification (NPDES/WPCF Permit Hydro Code): 22M-TUAL 42.9 D, 22M-TUAL 43.3
   c. Designated Beneficial Uses (OAR 340-41 Basin Standards) All but commercial navigation and transportation.
9. Effluent Discharged to Any Location Other than Receiving Water? ☒ Yes ☐ No

If yes, Indicate Where, When, and Describe:
The Hillsboro facility discharges only during the wet season (typically November – April). During the dry season effluent from the Hillsboro facility is transferred to the Rock Creek and Forest Grove facilities for treatment and discharge.

10. Indicated methods of biosolids (sludge) disposal (Mg/Kg (dry weight) / year)

a) Land Application NA
b) Municipal Solid Waste Landfill NA
c) Sale or Donation to Public NA
d) Other (Specify) N/A; all solids are transferred to and processed at the Rock Creek WRRF.

Form 11 – Sewage Treatment Plant Profile(s)

Complete this section for each sewage treatment plant operated under an NPDES/WPCF Permit.

DEQ NPDES/WPCF Permit Number: NPDES #101144: Rock Creek Water Resource Recovery Facility

1. Treatment Plant Design Dry Weather Flow (MGD) 46.4
2. Treatment Plant Actual Dry Weather Flow (Ave.) (MGD) 31.3
3. Treatment Plant Design Wet Weather Flow (MGD) 68.4; Peak Design Flow = 150.0
4. Treatment Plant Actual Peak Wet Weather Flow (MGD) 114.2
5. Sewerage System:
   a) Separate (%) 100
   b) Combined (%) 0%
   c) Number of CSOs 0
6. Industrial Contribution

a) Flow (MGD)	7.02 MGD
b) % of Influent	22.4% of actual dry weather flow
c) Number of contributing SIUs (non-CIUs)	4
d) Number of contributing CIUs	14

7. Level of Treatment and Description

a) Preliminary	☒	4 fine bar screens, 2 grit removal units, 3 primary fibrous removal systems.
b) Primary	☒	3 circular clarifiers
c) Secondary	☒	6 parallel aeration basins, 10 clarifiers
d) Tertiary	☒	4 chemical clarifiers, 2 direct filtration channels, 2 high rate clarifiers, 10 filters, 3 contact basins
e) Type of Disinfection	☒	chlorination with hypochlorite

8. Receiving Water
   a. Name: Tualatin River
   b. Classification (NPDES/WPCF Permit Hydro Code): 22M-TUAL 37.7 D
   c. Designated Beneficial Uses (OAR 340-41 Basin Standards): All but commercial navigation and transportation.
9. Effluent Discharged to Any Location Other than Receiving Water? ☐ Yes ☒ No

   If yes, Indicate Where, When, and Describe:

10. Indicated methods of biosolids (sludge) disposal (Mg/Kg (dry weight) / year)

a) Land Application: 6,157 dry tons/year*

b) Municipal Solid Waste Landfill: 0

c) Sale or Donation to Public: 0

d) Other (Specify): NA

* Note: Units provided are U.S. dry tons/year for land application; unclear what number is being asked as Mg/Kg/Year for all regulated concentrations are reported in the annual biosolids reports.

Form 12 – Pretreatment Program Profile(s)

1. Information pertaining to contributing jurisdictions (Complete for each jurisdiction)

   a) Name of contributing jurisdiction City of Portland

DEQ approved IJA or IGS	☒ Yes ☐ No
Date approved by DEQ:	NA
Date incorporated into NPDES/WPCF permit:	July 20, 1999
Number of CIUs in contributing jurisdiction	Zero (0)
Number of other SIUs in contributing jurisdiction	One (1)* See notes below.

   * Facilities within the City of Portland's jurisdiction discharge to CWS' conveyance system only during City of Portland's Fanno Creek pump station emergency bypass situations. There were no bypass situations in 2023.

   b) Name of contributing jurisdiction City of Tualatin and City of Lake Oswego** See notes below.

DEQ approved IJA or IGS	☒ Yes ☐ No
Date approved by DEQ:	NA
Date incorporated into NPDES/WPCF permit:	**2011
Number of CIUs in contributing jurisdiction	0
Number of other SIUs in contributing jurisdiction	0

   ** CWS has an intergovernmental agreement (IGA) with the City of Tualatin and the City of Lake Oswego to maintain a pump station on Childs Road, which directs all flows to the City of Portland; the discharge is covered under the IGA with the City of Portland. Discharge would only come to CWS if there was an emergency overflow situation. DEQ issued CWS an NPDES permit that became effective on January 1, 2023. CWS began updating the IGAs with all co-implementer cities. CWS estimates it will take approximately 24 months from permit reissuance to update the IGAs, including those with the City of Tualatin and City of Lake Oswego, which will complete the required Finding A.2 of the Final Pretreatment Audit Report.

   c) If relying on contributing jurisdictions, indicate, for each, which activities they are required to perform:

   Name: City of Portland

   ☒ Industrial Waste Survey (IWS) ->See memo from City of Portland attached to Form 12

   ☒ Permit Issuance

   ☒ Inspection Sampling Enforcement

   ☐ Notification of Industrial Users (IUs) of Pretreatment Requirements

   ☐ Receipt and Review of IU Reports

   ☒ Analysis of Samples

   ☒ Other (Specify): Review agreement annually on or before February 1.

Name: _____

☐ Industrial Waste Survey (IWS)

☐ Permit Issuance

☐ Inspection Sampling Enforcement

☐ Notification of Industrial Users (IUs) of Pretreatment Requirements

☐ Receipt and Review of IU Reports

☐ Analysis of Samples

Other (Specify)

Name: _____

☐ Industrial Waste Survey (IWS)

☐ Permit Issuance

☐ Inspection Sampling Enforcement

☐ Notification of Industrial Users (IUs) of Pretreatment Requirements

☐ Receipt and Review of IU Reports

☐ Analysis of Samples

Other (Specify)

2. Indicate approved pretreatment program compliance and inspection frequency requirements:

a) Inspections
   1. CIUs 1 x per year
   2. Other SIUs 1 x per year

b) Sampling by Control Authority (i.e., the municipality or POTW)
   1. CIUs 1 x per year
   2. Other SIUs 1 x per year

c) Industrial user (IU) self-monitoring
   1. CIUs 2 x per year
   2. Other SIUs 2 x per year

d) Reporting by IUs
   1. Other CIUs monthly
   2. Other SIUs monthly

3. Removal Credits:

a) Is the Control Authority currently authorized to issue removal credits? ☐ Yes ☒ No

b) Has the POTW applied for authorization to issue removal credits? ☐ Yes ☒ No

Date:

c) Has the Control Authority issued any removal credits? N/A

☐ Yes ☒ No

d) Date of most recent removal credits approval (if applicable): Date: N/A

Date: N/A

4. Is any part of the pretreatment program being operated under any pretreatment- related consent decree, administrative order, compliance schedule, or other enforcement action?

If yes, explain: No.

5. List effluent and sludge quality

List NPDES/WPCF Permit effluent and biosolids limits violated and suspected causes:

Parameters Violated/Date	**Cause(s)**
No Notice of Civil Penalty Assessment and Order has been received; a warning letter was issued for an excursion from the July monthly median TSS limits at FG NTS.	CWS responded (*See memo sent to DEQ on 8/15/2023 Re: Forest Grove WRRF TSS July 2023) consistently with TableA1(i)(*i*).

6. Have treatment plant biosolids violated any TCLP tests? ☐ Yes ☒ No

If Yes, Explain:

NA

CITY OF PORTLAND
ENVIRONMENTAL SERVICES

Water Pollution Control Laboratory

6543 N Burlington Ave, Bldg 217, Portland, Oregon 97203 ▪ Mingus Mapps, Commissioner ▪ Dawn Uchiyama, Director

Clean Water Services Industrial Pretreatment Program

To: Clean Water Services Pretreatment Program

From: Brooks, Tim

CC: Dorsey, Katrina

Date: 02/26/24

Re: Pretreatment Program Implementation Agreement 2023 Industrial User Survey

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Comments: The City of Portland (the City) and Clean Water Services (the Agency) Pretreatment Program Implementation Agreement establishes the City as the administrator of the NPDES required Industrial User survey in those areas of the City that discharge wastewater to the Agency's sanitary sewer system.

On November 30, 2023, the City conducted a drive through inspection of the area with the purpose of identifying industrial users that would be required to complete a City of Portland Industrial User survey. The City uses the following criteria to determine those businesses that require a survey.

- Are subject to categorical pretreatment standards and discharge regulated wastewaters to the sewer system, or
- Discharge 25,000 gallons per day or greater of process wastewater to the sewer system, or
- Are subject to a "zero-discharge" categorical pretreatment standard, or
- Are designated as such by the Industrial Pretreatment Program (IPP) Manager due to the nature of the IU's discharge to adversely impact the sewer system.

During the November 30, 2023 drive through, the City identified no businesses meeting those criteria and no connections.

For any further information or questions, please contact me at Timothy.Brooks@portlandoregon.gov, or 503-823-5538.

Respectfully,

Tim Brooks

Timothy Brooks
Environmental Survey Program
Bureau of Environmental Services

Ph: 503-823-5600 Fax: 503-823-5656 ▪ www.portlandoregon.gov/bes ▪ Using recycled paper ▪ An Equal Opportunity Employer

Form 13 – Pretreatment Data Summary Sheet

Form/Question	Question	
Form 2 Question 6	Date of Most Recent Technical Evaluation for Local Limits?	May 28, 2021
	Date of Most Recent Adoption of Technically Based Local Limits?	February 28, 2022
	Local Limit Pollutants?	As, Cd, Cr, Cu, Cyanide, Pb, Hg, Mo, Ni, Se, Ag, Zn, pH, FOG/BMP
Form 10 Question 4	Has City adopted NSCIU/MTCIU?	NSCIU only
	Number of SIUs	35
	Number of CIUs	24
	Number of Non Categorical SIUs	11
	Number of NDCIU subject to zero discharge?	0
	Number of NDCIU NOT subject to zero discharge?	15
	Number of NSCIU?	5
	Other Permitted IUs (not SIUs or CIUs)	187
Form 10 Question 6	SIUs Without Control Mechanism?	0
Form 10 Question 9	Acceptance of Hauled Domestic Wastes	☒ Yes ☐ No
Form 10 Question 10	Acceptance of Non-Hazardous Industrial Wastes?	☒ Yes ☐ No
Form 10 Question 17	SIUs Not Sampled?	0
	SIUs not Inspected?	0

Form 10 Question 30	Violation Notices Issued to SIUs? *Included WLs	48
	Administrative Orders Issued to SIUs?	0
	Civil Suits Filed Against SIUs?	0
	Criminal Suits Filed Against SIUs?	0
Form_10_Q31	Industrial Users (IUs) from which Penalties have been collected?	12
	Dollar Amount of Penalties Collected?	$65,400
Form 10 Question 32	SIUs in SNC with Pretreatment Standards?	1
	SIUs in SNC with Self-Monitoring Standards?	0
	SIUs in SNC with Reporting Requirements?	0
	SIUs in SNC with Pretreatment Compliance Schedule?	0
Form 10 Question 33	SIUs in SNC Published in Newspaper?	Yes
	Removal Credits Application Status?	None
Form 12 Question 3	Date of Most Recent Removal Credits Approval?	None
	Removal Credits	None

Attachments

Form 13 Excel version

Form 13 Excel version is included as an attachment.

Appendix A: NTS Metals Data

NTS Metals Data required by NPDES permit Table B8 are attached electronically in a spreadsheet in DEQ's electronic data delivery format.

Appendix B: Mercury Data

Mercury data required by Tables B4 – B7 in the NPDES permit are included in Form 3 of this Pretreatment Annual Report.

Summary of mercury reduction activities implemented: Environmental Services staff inspected 130 dental offices and provided onsite technical support for facilities that were in noncompliance to meet Best Management Practices (BMP). CWS confirmed one-time compliance reports were submitted for federal documentation. BMPs include proper maintenance of the amalgam separator and scrap amalgam.

Appendix C: PFAS Data Update

PFAS Summary for the Pretreatment Annual Report

Since 2019, Clean Water Services has been conducting regular PFAS monitoring at each of the four water resource recovery facilities (WRRFs) and industries to identify PFAS. Over the past five years, CWS has collected 41 effluent samples, 51 influent samples, and 135 industrial user (IU) samples. CWS' quarterly PFAS sampling of each WRRF and selected key industries is ongoing.

Influent, Effluent, and Biosolid Sampling at the Water Resource Recovery Facilities (WRRFs)

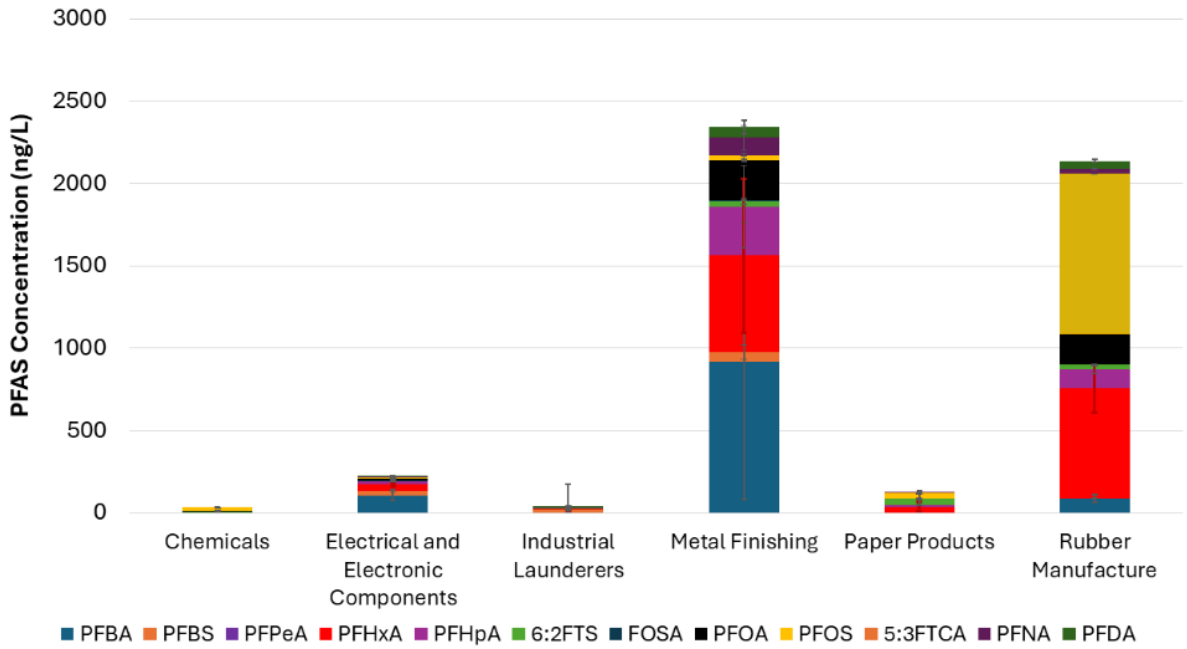
Influent and effluent are collected at each WRRFs every quarter; biosolids are also collected at the Rock Creek and Durham facilities. Influent is collected upon entry at the facility, prior to any treatment, while effluent is collected once all treatment is complete, before exiting the facility. In general, most PFAS were below detectable concentrations with only a handful having quantifiable concentrations for influent, effluent, and biosolids. On average, effluent concentrations from the four water resource recovery facilities are less than the effluent nationwide average[1] (effluent with and without contribution from industries) for most compounds.

Biosolid concentrations for most compounds that were quantifiable were very low (0.12 – 14 ng/g). Average PFOS and PFOA concentrations at Rock Creek and Durham (14 and 2, respectively) are both lower than the nationwide average (233 and 24, respectively).[1] When looking at median concentrations from the nation, CWS' biosolids concentrations were on par with the median (e.g., 13 ng/g for PFOS).[1]

Monitoring Industrial Users (IUs)

Initial sampling of 40 permitted industries in 2021 revealed 14 key industries with relatively higher concentrations of PFAS compared to the other monitored industries. Samples are currently collected from the discharge stream at these selected industrial users (IUs) every quarter to better understand industrial contributions to the POTW. CWS has been working with these and all permitted IUs to create PFAS Management Plans to decrease the PFAS in their discharges. In general, each type of industrial user exhibits very different PFAS compounds from the others (Figure 1). This information has given CWS insight into the concentrations that can be expected from certain industries and the forms of source control efforts that are most likely to be effective. The targeted actions to help lower PFAS concentrations and the PFAS Management Plans have already resulted in decreased PFAS loading at the WRRFs.

Figure 1. Average PFAS concentrations (ng/L) by compound for the various industrial sectors.



References

[1] Thompson, K. A.; Mortazavian, S.; Gonzalez, D. J.; Bott, C.; Hooper, J.; Schaefer, C..; Dickenson, E. R. V. Poly- and Perfluoroalkyl Substances in Municipal Wastewater Treatment Plants in the United States: Seasonal Patterns and Meta-Analysis of Long-Term Trends and Average Concentrations. EST Waters 2022, 2 (5), 690– 700, DOI: 10.1021/acsestwater.1c00377

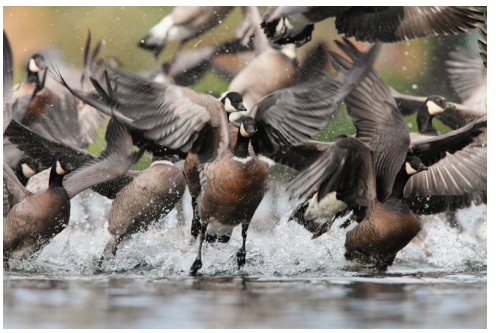
Appendix D: Hauled Waste Annual Report

The table below shows the types of hauled waste accepted at each designated discharge point in the CWS collection system and provides a summary of the volume accepted in 2023. The report of the date, time, type, and amount received each time CWS accepts hauled waste is attached electronically as PDF files, as the report contains thousands of records.

2023 Hauled Waste Annual Report Summary

Designated discharge point	Type	2023 Amount (Gallons)
Durham WRRF	FOG	12,568,800
Durham WRRF	Septage	8,059,461
Durham WRRF	Grey water and RV	152,820
Rock Creek WRRF	Industrial/high strength waste (HSW) for resource recovery	76,745 (HSW)
Rock Creek WRRF	Septage	1,929,475
Rock Creek WRRF	Grey water and RV	53,7000
Material Processing Yard	Decant	Not measured*

*The amount from decant processes is not measured currently, as stated in the CWS Hauled Waste Plan.



2024 Annual Report

NTS OPERATIONS PLAN REPORT

Clean Water Services

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2024 Forest Grove Natural Treatment System Operations Plan

Submitted by March 31, 2024, to fulfill requirements of Schedule D, Condition 12 of the NPDES permit.

Background: NTS Flow Path and Controls

During the dry season, fully treated and disinfected secondary effluent is discharged from the Clean Water Services (CWS) Forest Grove Water Resource Recovery Facility (WRRF) to the Forest Grove Natural Treatment System (NTS). Water is typically sent through the nitrifying Vertical Flow Wetland to the Lower Treatment Wetland and from there to the vegetated South Wetlands, where it flows sequentially through Cells 1 through 6 before being discharged to the Tualatin River through the NTS outlet structure and Outfall F001 (Figure 1).

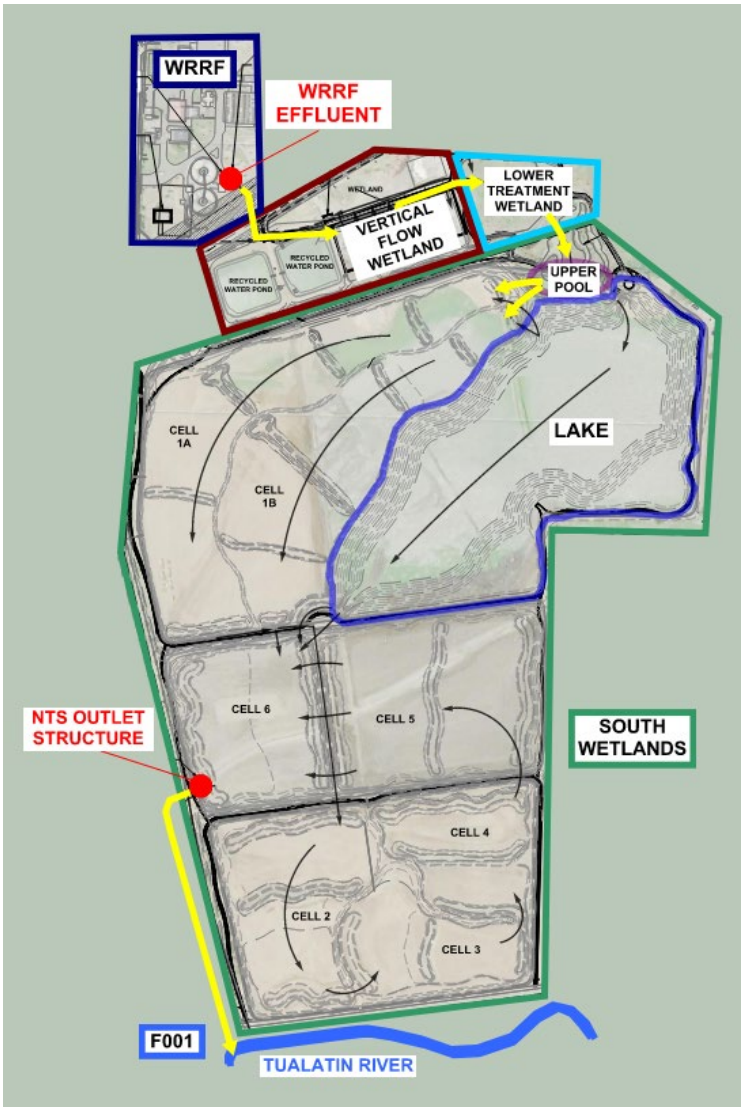

Figure 1. Forest Grove WRRF and NTS dry season flow path

Downstream of the Vertical Flow Wetland, the NTS contains no pumps, and all flow moves by gravity. Passive flow control structures at the end of each cell allow operators to alter water levels by adding or removing weir boards. Sliding weir gates were installed at the end of Cell 6 in September 2021; these gates can be moved up or down to adjust the size of the aperture and to enable discharge from either the water surface or lower in the water column. Sliding weir gates have also been installed at the ends of Cells 1A, 1B, and 4 to enable more active management of water levels and flows within the NTS.

During the dry weather season, treated flows from the WRRF are added to Fernhill Lake to maintain the water level and for storage and aesthetic purposes. Water can leave the lake via a weir box to the influent of Cells 1A and 1B or through an actuated weir gate to the northeast corner of Cell 6. This latter connection draws water from a structure in the southwest corner of the lake and can be used to partially draw down the water level of the lake.

NTS Operations Plan

CWS has developed an Operations Plan to optimize effluent quality at the NTS that includes the following elements:

- Spring startup plan.
- Reintroduction of effluent during the operational period.
- Flow control plan.
- Lake operations.
- Maintenance plan including vegetation management, pest management, and infrastructure maintenance.
- Compliance monitoring.
- Event recognition, prevention, and management.
- Adaptive management.
- End of season and wet season plan.
- Communication and coordination.
- Reporting.

Startup

"Startup" refers to the introduction of flow from the WRRF into the NTS and subsequent discharge from the NTS to the Tualatin River. This includes the annual transition from direct WRRF discharge to NTS operation at the beginning of the dry season. It also refers to resumption of flow after interruptions due to extended shutoffs during the dry season, such as those that may arise due to construction activities or as needed to maintain compliance. Generally, this relates to periods of three or more consecutive days without flow out of the NTS, which may lead to stagnation or exposure of submerged sediments.

Spring Startup

CWS' NPDES permit authorizes discharge from the Forest Grove NTS. During the high river flow period, the compliance point (F001) is at the Forest Grove WRRF prior to discharge to Outfall F001. During the low river flow period, during discharge from the NTS, the compliance point (F001) moves to the NTS outfall. During the low river flow period, if stream flows are greater than or equal to 350 cfs at the Farmington gage and discharge through the NTS is not possible due to hydraulic constraints, the Forest Grove WRRF is permitted to discharge directly to the river at Outfall F001. When discharging directly under these circumstances, the compliance point for all parameters is at the Forest Grove WRRF effluent channel, but the low river flow period limits must be met. When stream flows are below 350 cfs at Farmington, all discharge must go through the NTS, and the compliance point for some parameters shifts to the NTS outlet structure.

CWS will undertake the following actions prior to initial discharge from the NTS.

- Inspect the Natural Treatment System.
- Conduct pre-discharge maintenance to reduce potential sources of sediment.
    - Clean control structures.
    - Clear obstructions and debris resulting from beaver activity.
    - Install coir logs in any channelized areas.
    - Repair potential sources of sediment (e.g., eroded berms).
- Conduct annual targeted wetland planting as needed.
- Install aerators.
- Deploy continuous monitoring instruments.
- Prior to the release of water into the NTS:
    - Evaluate and adjust weir gate positions between cells to meet startup goals.

Reintroduction of Effluent During Operational Period

Stable operations, rather than frequent starts and stops of flow, are important to optimizing effluent quality in the NTS. While the overarching goal is to achieve continuous flow, it is expected that the NTS may be subject to periodic starts and stops due to operational issues at the Forest Grove WRRF, natural phenomena, and other unanticipated developments.

The operational plan aims to optimize effluent quality following reintroduction of effluent flow from the Forest Grove WRRF after an extended period with no flow. When water is reintroduced to the NTS, staff will set and adjust the height of weir gates between cells to minimize the potential for flow surges as water moves into each subsequent cell. The goal of this approach is to reduce resuspension of solids and limit transport of solids to downstream cells thereby optimizing discharge quality.

Flow Control Plan

The aim of the flow control plan is to maintain relatively consistent flows and water levels throughout the vegetated cells to support plant health, minimize short-circuiting of flow, and optimize water quality. Operational strategies will include:

- Maintain consistent flows into and out of the NTS.
    - Maintain an appropriate operating level to:
        - Help avoid drying and rewetting cycles that may increase turbidity, lower DO, and cause nutrient fluctuations.
        - To the extent feasible, avoid total stagnation that may contribute to cyanobacterial growth.
        - Utilize weir gates as necessary, to help ramp flows and minimize local water velocity to limit resuspension of sediment, especially near the outfall.
    - Decrease residence times to promote diatoms and green algae.
    - Evaluate options for determining optimum dry season flows through the NTS.
    - Monitor flow via the effluent flow meter at the NTS outlet structure.
- Identify and minimize preferential flow paths.
    - During the winter drawdown, conduct annual monitoring using drones to identify any preferential flow paths that may contribute to short-circuiting of flow.
    - Place coir logs or other established wetland flow control tools to minimize preferential flow paths.
- Use weir gates at the end of Cells 1A, 1B, 4, and 6 to control flow and water levels in segments of the NTS.
    - Adjust aperture to moderate impacts of flow fluctuations and minimize swings in water level to limit shear and resuspension of sediment.
    - Adjust operating depth of the NTS on a cell-by-cell basis to potentially increase chlorophyll and algal growth if supported by monitoring data.

Alternate flow paths within the NTS may be used for short periods as needed to enable maintenance or restoration during the dry weather season. This may involve isolating or bypassing parts of the regular flow path to enable access while minimizing the impact of sediment disturbances or other water quality concerns on the wider treatment system. Examples of reasons for using an alternate flow path include repairing damage caused by wildlife, vandalism, or equipment failure, improving effluent water quality, calibrating or repairing instrumentation, or conducting selective revegetation. Any use of alternate flow paths is intended to be of short duration and will be noted along with the reason in operational logs.

Lake Operation

The large open-water expanse of Fernhill Lake provides habitat as well as a large volume of water storage. Prior monitoring in the lake has identified water quality concerns such as high pH and populations of cyanobacteria that may arise in summer months. The goal of lake operation is

to maintain water quality and aesthetics and to avoid detrimental impacts to the treatment system. Strategies will include:

- Reduce lake level prior to the start of dry season operations. The decrease in level will expose perimeter mud flats and minimize shallow stagnant zones that are conducive to the growth of cyanobacteria.
    - When feasible, route water through Cells 1A and 1B (rather than directly to Cell 6) to maximize treatment.
- Isolate the lake from the NTS flow path in summer as necessary, based on current conditions; add fully treated secondary effluent to the lake as needed.
- Monitor pH and other water quality parameters to guide lake water quality management.
- Evaluate technology options for maintaining and improving water quality; the lake may be incorporated into the NTS flow path with improved water quality.

Maintenance Plan

Vegetation Management

Emergent vegetation in the wetland cells provides shade to cool effluent before discharge. Maintaining a target level of vegetative cover is required for optimal cooling. Annual flooding, animal feeding or burrowing, and other natural phenomena can contribute to vegetation loss. Regular upkeep is required to maintain and reestablish plant cover throughout the NTS. Steps for vegetation management will include:

- Regularly evaluate vegetation health and shade cover.
    - Walk the perimeter monthly during the dry season to note plant health and cover.
    - Conduct annual drone flights to generate shade maps for historical comparison.
- Revegetate as needed in response to monitoring, with a target of maintaining 80% cover in the vegetated cells (ongoing). Maintain an emphasis on incorporating native vegetation. In addition to developing and maintaining shade cover in wetland cells, plant shrubs and trees on adjacent upland slopes to increase shading.
- Remove nuisance invasive plant species such as reed canary grass.
- Conduct site maintenance and response to minimize preferential flow paths that may contribute to localized loss of vegetation (ongoing).
- Mimic the natural hydroperiod prior to annual startup and at the end of the dry season to minimize overinundation and allow for plant establishment and recovery.

Pest Management

Pest species such as carp and nutria feed extensively on plant roots to a degree that is unsustainable and damaging to the ecosystem. This activity contributes to expansion of open water with minimal shade and may increase sediment suspension. Carp burrow into sediments to lay eggs, which increases turbidity levels. Additionally, burrowing by nutria can lead to berm

erosion. Pest management aims to decrease the number of pest species present in the NTS and limit the damage resulting from them. Due to the location of the NTS within the floodplain, it is impossible to permanently eradicate problem species; fish are reintroduced from the river via annual flooding, and exclusion of nutria is functionally impossible. Ongoing management is required and will include strategies such as:

- Minimize open water areas where carp tend to thrive.
- Consult fisheries experts on management techniques.
- Identify and incorporate native wetland plants that are less vulnerable to animal damage.
- Control nutria populations.

Physical Assets Assessment and Earthwork

The NTS physical infrastructure includes a system of berms along with weirs that can be adjusted to control flow into and out of cells. Earthwork, weirs, and weir gates need to be regularly monitored and maintained to allow for desired flows and treatment. Measures will include:

- Conduct routine inspections during the operating season.
    - Identify and implement opportunities for repair and maintenance.
- Conduct pre- and post-dry season surveys using fall drone flights and seasonal walk-throughs to identify areas to target for repair and maintenance:
    - Preferential flow paths.
    - Bare substrate scoured during winter flooding.
    - Zones with extensive nutria and pest damage.
- Respond to emergent conditions during dry season operations:
    - Place temporary flow barriers (e.g., coir logs, rocks, sod mats, logs, or wooden post weirs) to prevent short-circuiting.
    - Regular checks and manual clearing of debris from weir boxes.
- Perform offseason maintenance:
    - Restore damaged berms. Where appropriate, block nutria burrows and stabilize the toe of the slope with barriers (e.g., rocks or chain-link fencing) to prevent further damage.
    - Conduct more permanent earthwork to correct or reverse preferential flow paths and minimize short-circuiting.

Compliance Monitoring Plan and Target Effluent Concentrations

The startup, flow control, and maintenance plans described above are geared at optimizing the quality of the effluent discharged from the NTS. CWS will implement these measures and monitor to verify that water quality targets and limits are being met and to assess the effectiveness of different strategies. Monitoring will include parameters in Table 1.

During dry season conditions when the NTS is in use, F001 represents the monitoring location at the NTS outlet structure. The Forest Grove WRRF serves as an internal monitoring point (F004) to characterize the initial quality of the water being released to the NTS.

Table 1. NTS Effluent Monitoring (Outfall F001)

Parameter	Limits	Monitoring Frequency	Sample Type
$CBOD_5$	10 mg/L (monthly median) [a] 15 mg/L (weekly median) [a]	3/week	24-hour composite (Grab as failsafe)
TSS	10 mg/L (monthly median) [a] 20 mg/L (weekly median) [a]	3/week	24-hour composite (Grab as failsafe)
Dissolved Oxygen	6.0 mg/L or greater as a daily average	Daily	Continuous
pH	6.3 to 9 SU	2/week	Grab
Thermal Shock Thermal Load [b]	85 million kcal/day (May) 68 million kcal/day (June) 93 million kcal/day (July) 76 million kcal/day (August) 60 million kcal/day (September) 69 million kcal/day (October)	N/A	Calculation
Excess Thermal Load [c]	7 million kcal/day (offset with water quality trading program)	N/A	Calculation
Total Phosphorus	81.6 lb/d – monthly median TP mass load from R001 (monthly median limit) 66.1 lb-d – monthly median TP mass load from R001 (seasonal median limit) (Applies May 1 – September 30)	2/week	24-hour composite
Ammonia (as N) for DO	Bubbled Tier 1 and Tier 2	3/week	24-hour composite

Notes:

[a] Per note (i) in Table A1 of the 2022 NPDES Permit:

The operation of the NTS can be impacted by extreme unpredictable natural and physical events that are determined by DEQ to impact the ability for the NTS to properly meet limits (e.g., declared droughts, smoke from forest fires, flash flooding, etc.). Such events are expected to be rare, infrequent and of limited duration, and can affect the ability of the NTS to meet the CBOD5 and TSS monthly and weekly median concentration limits. During such an event, the permittee must ensure that the following requirements are met:

i. The permittee must notify DEQ of the event as soon as practicable, but no later than three business days, after receiving any single F001 discharge sample result exceeding the weekly median values for CBOD5 or TSS. The notice must include a description of the abnormal event suspected of causing the elevated CBOD5 or TSS discharge concentration; the estimated duration of the abnormal event if it is ongoing; and any steps that the permittee is taking to reduce CBOD5 or TSS discharge concentrations in response to the abnormal event.

ii. Monitoring of the Forest Grove WRRF effluent at internal monitoring location (Outfall F004) meets the CBOD5 and TSS concentration targets in Table A1-1 below:

Table A1-1 Target Concentrations for CBOD5 and TSS at Forest Grove WRRF Effluent

Parameter	*Monthly Average*	*Weekly Average*
$CBOD_5$	*15 mg/L*	*25 mg/L*
TSS	*20 mg/L*	*30 mg/L*

iii. Monitoring of the effluent from the Forest Grove NTS outlet structure F001 meets the following effluent limits in Table A1-2 below:

Table A1-2 Effluent Limits for CBOD5 and TSS at NTS Outlet Structure

Parameter	*Monthly Average*	*Weekly Average*
$CBOD_5$	*25 mg/L*	*40 mg/L*
TSS	*30 mg/L*	*45 mg/L*

iv. Report exceedance of monthly or weekly median concentration limit for CBOD5 and TSS in discharge monitoring reports as required by Schedule B for the duration of exceedance. For each discharge monitoring report, the permittee shall include a statement describing any abnormal event that the permittee believes caused the exceedances, the estimated duration of the abnormal event if it is ongoing, the reasons the permittee believes that the exceedances were caused by the abnormal event, the measures that the permittee undertook to implement the NTS Operations Plan in response to the abnormal event, any steps that the permittee is taking to reduce CBOD5 or TSS discharge concentrations in response to the abnormal event and any adaptive management actions that the permittee will take in anticipation of similar future events.

v. Provided that the permittee was operating the NTS per the NTS Operations Plan required by Condition D.12 of this permit at the time of the event, complied with the target concentrations in Table A1-1 and prepared the required documentation and reporting of the event, the limits in Table A1-2 will apply for the duration of the event.

j. For all NTS start-up periods, the following limits apply to any calendar week for seven days after start-up, provided the permittee has implemented the NTS Operations Plan required by Schedule D.12 of this permit and complies with the internal Outfall F004 CBOD5 and TSS concentration targets in Table A1-1:"

Table A1-3 Weekly Effluent Limits for CBOD5 and TSS for NTS Start-Ups

Parameter	*Weekly Average*
$CBOD_5$	*40 mg/L*
TSS	*45 mg/L*

[b] Based on thermal plume requirements; temperature not to exceed 32 C

[c] Based on Tualatin sub-basin Temperature TMDL wasteload allocations

In addition to the parameters in Table 1, CWS will conduct monitoring for NH_3-N, TKN, nitrates, metals, copper Biotic Ligand Model parameters, aluminum parameters, and toxics, as well as Whole Effluent Toxicity testing, in accordance with permit requirements.

Table 2. TSS Action Levels

Number of Samples	Probability	Concentration	Action Levels
Single Sample	0.005	30 mg/L	Threshold indicating that levels of TSS are potentially elevated above permit limits and actions are needed to respond to elevated TSS

Applied Monitoring Program

Monitoring will also be conducted within the NTS to support optimization of operations. The applied monitoring will be updated annually and as needed to support operations. This monitoring will be carried out as needed and may include:

- Continuous temperature monitoring to evaluate the thermal impact of vegetation changes.
- Turbidity profiles to analyze whether flow strategies lead to reduced sediment suspension; select TSS monitoring to provide correlations to support the turbidity profiles.
- Longitudinal nutrient profiles and/or algal sampling.

Abnormal Conditions: Event Recognition, Prevention, and Management

An abnormal event is any condition that results in or appears to be leading toward conditions that increase any regulated water quality parameters. Over the past year, abnormal conditions have caused elevated levels of TSS. Abnormal events are defined in comment (i) of Table A1. An event may be identified through routine monitoring or maintenance activities including walk-throughs, data review, planned or unplanned maintenance, or severe weather alerts. For example, construction at the Forest Grove facility may cause termination of flow to the NTS, resulting in a substantial change to the flow pattern. Events may result in decreasing inflow to or outflow from the NTS, using alternate flow paths, and/or termination of flow and subsequent restart. Once initiated, event management will include initiation of the communication plan, increased monitoring as needed, and implementation of the applicable components of an adaptive management action.

Adaptive Management Actions

CWS has identified short-term and longer-term adaptive management actions to optimize water quality and promote stable operations. Many of the strategies presented in this document include adaptive management elements. Longer-term actions include targeted revegetation, berm restoration, and major projects such as infrastructure improvements that are planned and reviewed seasonally. Shorter-term adaptive management includes day-to-day responses such as debris removal and installation of temporary flow barriers to limit short-circuiting, and temporary flow path alterations within the NTS as described in the Flow Control Plan.

In addition, CWS has identified short-term adaptive management actions that are focused on optimizing temperature, dissolved oxygen, and TSS levels to meet permit limits for those parameters. Because of the five-day turnaround time for the CBOD test, short-term adaptive management actions are focused on optimizing TSS levels in the effluent, which will also be effective in optimizing CBOD levels. For all events, CWS will undertake an initial inspection and evaluation of the NTS to determine the likely cause of the abnormal operating conditions. CWS may increase monitoring of parameters. The following actions will be taken to meet DO, temperature, and TSS targets at the NTS outlet structure:

DO

- Ensure proper operation of aerators in the outlet structure.
- Control flow into NTS outlet structure to ensure that aerators can maintain target DO.
- Adjust aperture of weir gates leading into the NTS outlet structure to ensure aeration steps are available and not inundated during periods when DO is naturally lower in the wetland.
- Close outlet gate as necessary to ensure that DO target is met.

Temperature

- Evaluate using the outlet weir gate to draw water from below the surface to ensure that the warmest water is not being discharged.
- Adjust discharge flow to meet thermal load limits specified in the table above.
- Close outlet gate as necessary to ensure that temperature and thermal load limits are met.

TSS

CWS will monitor NTS effluent TSS levels. If a significant increase in TSS is observed, staff will:

- Attempt to isolate the cause and initiate maintenance or repairs.
- Temporarily divert flow, if feasible and appropriate.
- Adjust water levels and flows during and after event response to minimize sediment suspension.
- Terminate discharge from the NTS if necessary.

If discharge from the NTS is projected to be interrupted for an extended duration, Forest Grove WRRF effluent flow may be redirected away from the NTS to prevent the NTS from flooding. The need to divert Forest Grove WRRF flow would depend on multiple factors including NTS water depth, Forest Grove WRRF effluent flow rate, and the cause and expected duration of interrupted discharge from the NTS. If flow is diverted from the NTS, Forest Grove WRRF effluent flow will be directed to the Rock Creek WRRF until flows to the NTS resume.

In the event of a prolonged cessation of NTS discharge, CWS will follow the steps enumerated under the "Reintroduction of Effluent During Operational Period" section upon resuming flow into and out of the NTS.

Reporting Abnormal Events Outside of Reasonable Control

In the case of an abnormal event beyond CWS' reasonable control, DEQ will be notified as soon as practicable, but no later than three business days after receiving any sample exceeding the weekly median value of 15 mg/L of $CBOD_5$ or 20 mg/L of TSS. The notice must include a description of the abnormal event suspected of causing the elevated $CBOD_5$ or TSS discharge concentration; the estimated duration of the abnormal event if it is ongoing; and any steps that the permittee is taking to reduce $CBOD_5$ or TSS discharge concentrations in response to the abnormal event.

With each monthly discharge monitoring report in which an exceedance of the monthly or weekly median concentration limit for $CBOD_5$ or TSS is reported for Outfall F001, the permittee will include a statement describing any abnormal event that the permittee believes caused the exceedances, the duration of the abnormal event, the reasons that the permittee believes that the exceedances were caused by the abnormal event, the measures that the permittee undertook to implement the NTS Operations Plan in response to the abnormal event, and any adaptive management actions that the permittee will take in anticipation of similar future events.

Plan for End of Season and Wet Season

At the end of the dry season, the Forest Grove WRRF may discharge directly to the Tualatin River without sending flow through the NTS. In the past, CWS has continued to operate the NTS part time during the wet season. However, use of the NTS during the winter and early spring has been observed to disrupt vegetative growth; high flows can dislodge seedlings and topsoil and inhibit effective rooting. Future operations will aim to avoid wet season NTS operations that may damage vegetation. The NTS may still be used for some periods outside the permit-defined dry weather season, such as in the event of a prolonged dry period due to a delay in fall rains. When the NTS is offline during the wet season, CWS staff will evaluate the status of the NTS infrastructure and vegetation and carry out restoration work.

CWS will take the following actions:

- **Fall:** Stop sending flow into the NTS at the end of the dry season as needed to allow water levels to be drawn down prior to the start of regular winter rains. This will allow for fall-season restoration planting and late-season growth and rooting of macrophytes, giving them a better chance of survival during the annual winter inundation. Additional fall activities will include:
    - Keep weir gates open within and at the outlet structure of the NTS to allow water drainage and minimize sediment deposition near gates.
    - Identify and schedule repairs and revegetation.

  - Begin earthwork restoration.
  - Review status of major projects.
  - Conduct annual NTS operations and performance review and update operations plan as needed.
- **Winter:** Minimize use of the NTS to the extent feasible. If the NTS is used, limit wet season flows to a maximum of 6 MGD to avoid stressing dormant vegetation.
- **Spring:** Avoid discharging any flow through the NTS from mid-March through late April to allow the NTS to naturally dewater and plants to propagate. Spring activities will
- include:
  - Conduct annual targeted wetland planting in March and April of each year.
  - Carry out invasive plant management.
  - Decrease water level in Fernhill Lake and dewater vegetated cells in NTS.
  - Install monitoring equipment at the NTS outlet in mid- to late April.
  - Coordinate debris management and clean-out of control structures prior to May 1.

Communication and Coordination

- Weekly coordination meetings will begin April 1 of each year and will continue through the dry season. Members of Forest Grove WRRF management, the Wetland Manager, and Operations Analysts will meet to discuss items including:
  - Preparation for initial NTS startup: vegetation, dewatering, pest management, Fernhill Lake dewatering, NTS filling schedule.
  - Construction coordination.
  - Flow status/flow management.
  - Data review.
  - WRRF process changes.
  - NTS maintenance needs and status of projects.
  - Event management.
  - Compliance status.
- The Forest Grove WRRF Superintendent, Operations Analyst, and Wetland Manager will communicate regularly regarding process or flow changes, operational incidents, maintenance activities, and other topics that require immediate attention.

Reporting

- Monthly data and operational notes included in monthly DMRs.
- By March 1 of each year, review the previous year's NTS Operations Plan, maintenance, and operational activities to determine if updates or revisions are needed. An updated NTS Operations Plan must be submitted to DEQ by March 31.
- If changes to the operational plan are deemed necessary, document revisions before the start of dry season operations.