State of Oregon
Department of
Environmental
Quality

National Pollutant Discharge Elimination System
Permit Renewal Fact Sheet
Water Environment Services
Tri-City Water Resources Recovery Facility

Final: May 2, 2024

Permittee	Water Environment Services 150 Beavercreek Road; Suite 430 Oregon City, OR 97045
Existing Permit Information	File Number: 89700 Permit Number: 101168 EPA Reference Number: OR0031259 Category: Domestic Major Expiration Date: April 15, 2016
Permittee Contact	Ron Wierenga Deputy Director 503-742-4581 150 Beavercreek Road Oregon City, Oregon 97045
Receiving Water Information	Receiving Stream/NHD Name: Willamette River USGS 12-Digit HUC: 170900070405 NHD Reach Code & % along reach: 17090007000034 - 37% (Outfall 001) and 95.5% (Outfall 002) QDEQ LLID & RM: 1227618456580 – RM 25.0 (Outfall 001) and 25.3 (Outfall 002) Integrated Report Assessment Unit ID: OR_SR_170900704_88_104020
Proposed Action	Permit Renewal Application Number: 957864 Date Application Received: October 19, 2015
Permit Writer	Mark W. Hynson 503-229-5295 Date Prepared: May 2024

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1. Introduction

The Department of Environmental Quality proposes to renew the National Pollutant Discharge Elimination System wastewater permit for Clackamas County's Water Environment Services (WES) Tri-City Water Resources Recovery Facility (WRRF) located at 15941 S Agnes Avenue, Oregon City, Oregon. This permit allows and regulates the discharge of treated municipal wastewater to the main stem of the Willamette River, located in the Lower Willamette Sub-Basin of the Willamette Basin.

As required by Oregon Administrative Rule 340-045-0035, this fact sheet describes the basis and methodology used in developing the permit. The permit is divided into several sections:

Schedule A – Waste Discharge Limits
Schedule B – Minimum Monitoring and Reporting Requirements
Schedule C – Compliance Conditions and Schedules
Schedule D – Special Conditions
Schedule E – Pretreatment Activities
Schedule F – General Conditions

The existing permit was last renewed in 2011 and expired on April 15, 2016. DEQ issued Modification No. 1 for the permit on June 18, 2014. Modification No. 1 was initiated by DEQ to remove conflicts that existed between the facility permit and the facility's approved Biosolids Management Plan, and to make the permit more consistent with the DEQ's standard permit language. Permit Modification No. 2 was initiated by the permittee and issued on April 14, 2016 to allow the permittee to conduct a pilot test at the Tri-City WRRF for the use of peracetic acid (PAA) as a disinfectant.

The proposed permit contains a number of substantive changes from the 2011 permit as a result of the adoption of new water quality standards, regulations, and Total Maximum Daily Load for the Willamette River. A summary of the major changes is presented below:

- Schedule A:
    - Change of $CBOD_5$ and TSS mass load limits to reflect changes in the basin standards and facility improvements.
    - Addition of an excess thermal load limit based upon the Willamette River Temperature TMDL and water quality standards.
    - Addition of a summer Ammonia limit for Outfall 001.
    - Addition of ceiling concentration limits for biosolids.
    - Addition of a requirement to develop and implement a Mercury Minimization Plan.

- Schedule B:
    - Updated monitoring and reporting to current format, standards, and frequency.
    - Expanded effluent characterization monitoring for toxics, mercury, copper and aluminum.
- Schedule C:
    - Addition of compliance schedule to meet new ammonia limit.
- Schedule D:

Addition of requirements for:

    - Inflow and Infiltration reporting.
    - Recycled water use plan development and reporting.
    - Wastewater solids transfer conditions.
- Schedule E (Pretreatment Activities)
    - Updated to current permit requirements related to pretreatment program implementation.
- Schedule F (General Conditions)
    - Updated to latest version of the NPDES General Conditions.

2. Facility Description

2.1 Wastewater Facility

Water Environment Services owns and operates the Tri-City WRRF located at 15941 S Agnes Avenue in the City of Oregon City, Oregon. The facility began operations in 1986 and is an activated sludge secondary treatment plant that treats the wastewater from the Cities of Oregon City, West Linn, Gladstone and several unincorporated areas of Clackamas County. An aerial view of the facility is presented in Figure 2-1.

In addition to the wastewater received by the Tri-City WRRF from its own service area, the facility also receives transfer flows from the Kellogg Creek WRRF which is also owned and operated by WES. The Kellogg Creek WRRF has a treatment capacity cap of 25 million gallons per day (MGD) and excess flows are diverted to the Tri-City WRRF through the Intertie 2 and Clackamas Pump Stations. Population growth and wastewater flows in the Kellogg Creek service area are projected to increase through 2040 which will require the Tri-City WRRF to accept more transfer flows in the future.[1]

[1] *Sanitary Sewer System Master Plan for Water Environment Services.* Clackamas County Water Environment Services with Jacobs, Murray Smith and Century West Engineers. Final – January 2019.

The Tri-City WRRF currently has a maximum monthly dry weather design flow capacity of 17.1 million gallons per day (MGD) and a peak flow treatment capacity of 68.6 MGD. The plant facilities include an influent pump station, headworks with screening, grit removal and primary treatment. Influent flow is split between two secondary treatment systems: a conventional activated sludge (CAS) secondary treatment system with chlorine disinfection and a parallel Membrane Bio-Reactor (MBR) system with ultra-violet (UV) disinfection. The MBR system became active in early 2011 and increased the maximum monthly dry weather design flow capacity for the facility from 13.1 to 17.1 MGD. The two treatment systems function independently. Effluent from the two treatments is mixed before discharge to the receiving stream.

The facility produces class B biosolids which are then transported to DEQ authorized land application sites for beneficial use or are placed in temporary storage at the Tri-City WRRF.

With the exception of the MBR treatment system, there have been no other major treatment process or facility changes since the last permit renewal. Since commissioning the MBR facility, the Tri-City WRRF has provided the following capital improvements:

- Added a redundant lime storage tank,
- Improved grit removal process,
- Rehabilitated its primary sedimentation tank,
- Replaced an aeration blower,
- Improved chlorine contact chamber,
- Improved W3 water conveyance system, and
- Changed its disinfection chemical to sodium hypochlorite from chlorine.

Larger capital improvement projects that stand out include anaerobic digestion and solids handling improvements, a third anaerobic digester, flare replacement, and security improvements.

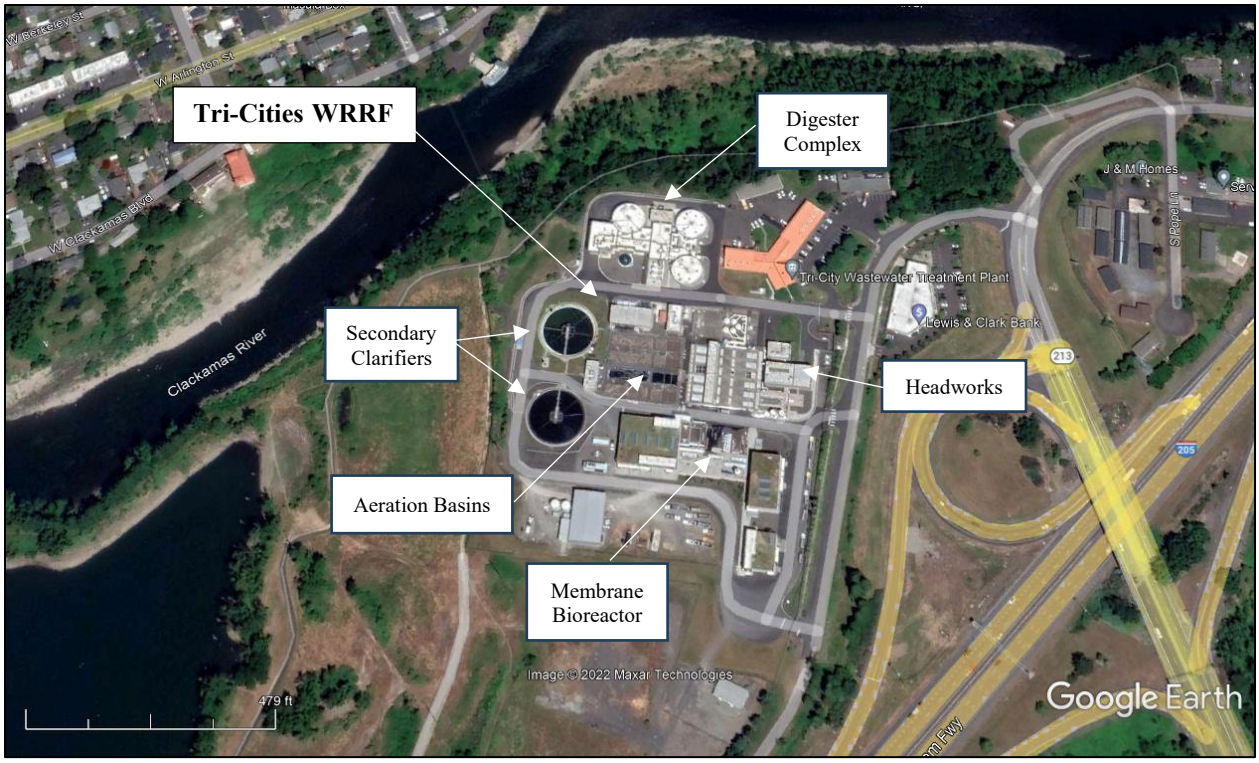


Image Source: Google Earth, 2023

Figure 2-1: Facility Location

Conventional Activated Sludge (CAS) Treatment System

The CAS treatment process provides secondary treatment to plant flows up to approximately 25 MGD. The CAS system is comprised of a series of unit processes that each perform a specific function to aid in the treatment of the wastewater. These unit processes are described below.

Influent Pump Station and Headworks

Wastewater that enters the facility by gravity is pumped through the influent pump station, which contains five variable frequency speed pumps with a total capacity of 68.4 MGD. The headworks provide influent screening and grit removal. Effluent screening is achieved with a series of bar screens designed to prevent rags, plastic and medium-to-large debris from entering the treatment process. The bar screens are cleaned both mechanically and manually. The screened material is conveyed to a hopper where it is collected for disposal to a solid waste landfill. The screening headworks building is completely enclosed and ducted to odor control equipment.

Once the influent passes the bar screens it is directed through Parshall flumes which measure the volume of influent flow. From the Parshall flumes, the influent is directed through aerated grit basins that remove inert particulate matter from the screened raw sewage. Grit is removed in two aerated grit chambers where it settles to the bottom of the grit chambers. The settled grit is pumped as slurry to hydrocyclone de-gritters and classifiers for separation from the water. The grit is then washed in the grit washers and removed for disposal to a solid waste landfill.

A septage receiving station is also located in the headworks screening building. Septage haulers discharge septage from off-site septic systems and chemical toilets into a receiving vault equipped with a bar rack. Septage is contained in a 10,000-gallon septage storage tank located next to the grit chambers building complex. Septage tank waste enters the treatment system after the influent pump station prior to screening in the screening approach channel.

Primary Clarifiers
After screenings and grit removal, the influent flows are directed to six primary clarifiers which allow solids in the wastewater either to settle or to float. Settled solids, also called "sludge", is collected in sludge collection hoppers, which is then pumped to the anaerobic digesters for further processing. The scum that floats on the top is collected with a skimmer and removed to the anaerobic digesters as well.

Secondary Treatment
The activated sludge process provides a secondary treatment capacity of 25 MGD. The activated sludge process removes suspended and dissolved organics that were not removed in the primary treatment process by creating an environment for micro-organisms to metabolize the food in the wastewater. The secondary treatment system consists of four aeration basins with fine pore diffusers and an anoxic zone at the front end of each basin.

The aeration basins create an environment for biological treatment of the wastewater. The result is sludge that settles out for separation and removal in two secondary clarifiers. Floating scum from the secondary clarifiers is collected with a skimmer and removed to the screening approach channel.

Disinfection
The disinfection process for the CAS system uses liquid hypochlorite, followed by two parallel contact basins and de-chlorination using sodium bisulfite at the "mixing box." The liquid hypochlorite dosage is controlled by the effluent flow meter prior to the chlorine contact basin.

Biosolids
Solids generated in the primary and secondary clarifiers are processed and then stabilized in three anerobic digesters. The initial processes thicken the solids. The primary solids are thickened in deep hoppers in the primary clarifiers and the secondary solids are thickened using gravity belt thickeners prior to pumping to the digesters. Thickening reduces the volume of the sludge added to the digesters.

Following digestion, the biosolids are dewatered in centrifuges to a 20-23 percent solids content. The biosolids are then held in a live bottom storage hopper before being loaded into haul truck which transport the biosolids to DEQ authorized land application sites for beneficial use or are placed in temporary storage at the Tri-City WRRF.

Membrane Bio-Reactor (MBR) Treatment System:
The MBR treatment facility is designed to provide treatment of the flows entering the treatment plant in conjunction with the CAS system. All flow from the MBR system is combined with the CAS system prior to discharge. This combined flow is required to meet the discharge criteria of the NPDES permit. In addition, the MBR treatment system treats to a level that will allow the distribution of reclaimed water.

The MBR treatment system includes the Intermediate Pump Station, Fine Screenings Building, Aeration Basins, Blower Building, Membrane Filtration Building and Ultraviolet (UV) Disinfection Building. Primary effluent pumped to the Fine Screens Building is then conveyed by gravity to the aeration basin Mixed liquor from the aeration basin is then transferred into the submerged MBR basins. Waste Activated Sludge (WAS) from the MBR system is conveyed to a gravity belt thickener for thickening and the solids are processed as described above. Treated effluent from the MBR is conveyed to the UV disinfection area before discharge.

Treated effluent from both the CAS and MBR treatment processes is conveyed through 1.1 miles of 42-inch diameter piping to the Willamette River and is discharged into the river at River Mile (RM) 25.5 through Outfall 001. Additional details regarding this outfall are presented below.

A schematic flow chart of the facility is presented in Appendix A.

2.2 Outfalls

The WRRF currently discharges into the Willamette River at RM 25.0[2] through Outfall 001 (Figure 2-2). This outfall is located approximately 800 feet upstream of the Willamette River's confluence with the Clackamas River. Outfall 001 is comprised of a multi-port diffuser with three (3) 42-inch diameter discharge ports that discharge below the river surface during dry weather (low river flow) conditions at a depth of approximately seven feet. The diffuser axis is aligned parallel to the river flow, with the diffuser ports discharging at 45 degrees relative to the direction of the river flow. A duckbill valve was placed on the upstream port in 2012. This single outfall port is used during the low flow summer season with all three ports used during the winter season. The addition of this duckbill valve provides additional dilution in the summer season.

[2] This is based upon DEQ's Geographic Information System (GIS) database and is more accurate than the previous RM of 25.5 which was based upon United States Geological Survey (USGS) mapping. The proposed permit will use the DEQ GIS river mile data to be consistent with river mile data being used in other DEQ compliance programs.

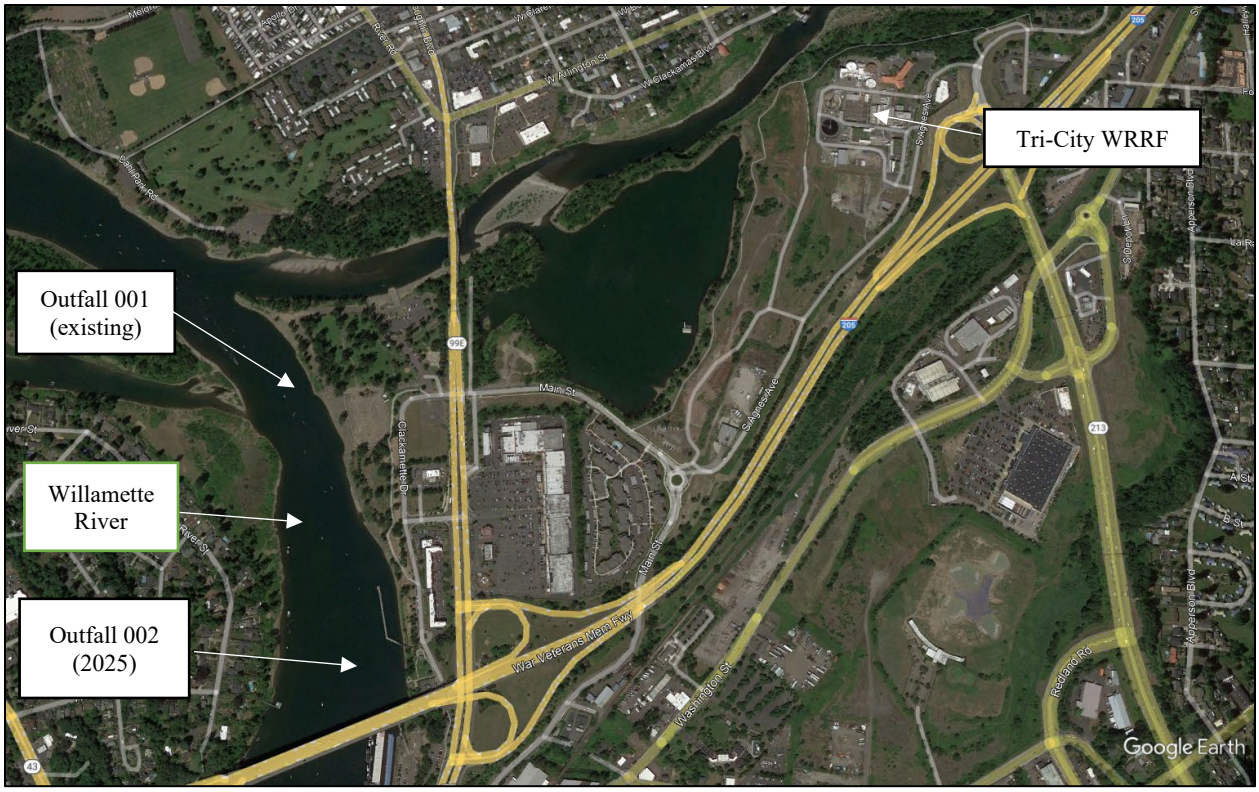


Image Source: Google Earth, 2023

Figure 2-2: Approximate Outfall Locations

During the proposed permit term, the permittee will be constructing a new outfall to address the expected hydraulic and dilution limitations with existing Outfall 001 as future discharges from the WRRF increase. The new outfall is designated as Outfall 002 in the proposed permit and will be constructed approximately 1,700 feet upstream of existing Outfall 001 (at RM 25.3) (Figure 2-2). Construction of Outfall 002 is expected during the 2025 in-water season (July-October) and is expected to be actively discharging by early 2026.

Outfall 002 is intended to provide enhanced dilution performance and will have a discharge design flow of 106.2 MGD at a Willamette River 25-year flood stage elevation. The combined hydraulic capacity from both proposed Outfall 002 and existing Outfall 001 will be 167.7 MGD.[3]

Once discharges through proposed Outfall 002 begin, it will become the WRRF's primary point of continuous discharge. As such, Outfall 001 will only discharge infrequently during peak wet weather flow events or when maintenance activities on Outfall 002 preclude discharges through that outfall.

[3] *Predesign Engineering Report for Tri-City Water Resource Recovery Facility Willamette River Outfall Project.* Executive Summary. Jacobs. October 5, 2021

Although the permittee is not currently producing recycled water for external use outside the limits of the WRRF, the proposed permit provides WES with the option for producing recycled water through an internal outfall when a recycled water use plan is developed and approved by DEQ. In the existing 2011 version of the permit, the internal outfall designated for the off-site distribution of recycled water is identified as Outfalls 097-099. The proposed permit changes the designation of the recycled water outfall as Outfall 003. This is an internal outfall within the treatment system downstream of UV disinfection and prior to effluent pumping. The facility will not be allowed to distribute recycled water to off-site properties until a recycled water use plan is prepared in accordance with Schedule D of the permit. When recycled water is produced by the facility, the permittee will be required to monitor the recycled water per Schedule B of the permit. The permittee is allowed to use recycled water for irrigation purposes within the facility boundary.

A summary listing of the outfalls included in the proposed permit is included in Table 2-1. The WRRF has a maximum monthly dry weather design flow of 17.1 MGD.

Table 2-1: List of Outfalls

Outfall Number	Type of Waste	Lat/Long	Design Flow (mgd)	Existing Flow (mgd)
001	Treated Municipal Wastewater	45.3704/-122.6050	75 (See note a.)	6.9 (See note b.)
002 (See note c.)	Treated Municipal Wastewater	45.3659/-122.6036 (See note d.)	106.2 (See note e.)	N/A (See notes c. and f.)
003	Recycled Water	To be determined (See note g.)	N/A	N/A

Notes:

a. Discharge capacity under 25-year river flood stage. Dry and wet weather flows will be discharged through Outfall 001 until Outfall 002 becomes operational.

b. Existing average monthly dry weather flow from 2016-2020 facility effluent data.

c. Outfall 002 to be constructed and operational by early 2026.

d. Approximate location of proposed outfall based upon pre-design construction drawing. Final location to be determined following construction of outfall.

e. Proposed peak wet weather design flow for Outfall 002.

f. Outfall 002 will become primary outfall for facility following construction and testing. Average monthly dry weather flows are initially expected to be similar to the existing dry weather discharges through Outfall 001.

g. Location of Outfall 003 for recycled water distribution to be determined by permittee during preparation of recycled water use plan.

2.3 Permit Modifications and Compliance History

2.3.1 Permit Modifications

The 2011 permit has been modified twice since it was issued on April 29, 2011. The following summarizes the two modifications:

- Permit Modification No. 1 was initiated by DEQ and issued on June 18, 2014 to update permit language on biosolids limits, biosolids monitoring and remove conflicting language between the permit and permittee's approved Biosolids Management Plan. In general, the permit was updated to be more consistent with DEQ's standard permit language that was being used at that time.

- Permit Modification No. 2 was initiated by the permittee and issued on April 14, 2016 to allow the permittee to conduct a pilot test at the Tri-City WRRF for the use of peracetic acid (PAA) as a disinfectant. The PAA was being considered as a replacement disinfectant for the gaseous chlorine disinfection system that was being employed at the facility at that time. The permit was modified to incorporate new effluent limits and monitoring requirements for PAA during the pilot testing. In addition, the permit modification also removed weekly monitoring requirements for nutrients. This frequency of nutrient monitoring was no longer considered necessary for effluent characterization. The permittee terminated the PAA pilot test in December 2016 due to unreliable results of the PAA pilot test and returned to using chlorine as a disinfectant.

2.3.2 Compliance History

Since the permit was last renewed in 2011, several violations and compliance issues have occurred that required enforcement action by DEQ. From 2011 through 2015, the majority of these enforcement actions were related to temporary exceedances of permit limits due to operational issues at the facility. Many of these exceedances were symptomatic of the MBR treatment system becoming operational in 2011 and periodic high rainfall events which placed large temporary demands on the facility. Once the initial operational issues with the MBR system were addressed, the frequency and duration of exceedances in permit limits were reduced.

In recent years, violations and compliance issues are largely related to temporary imbalances in the biological processes of the facility due to heavy rain events, short-term operational issues with disinfection and inadequate evaluation of industrial users in the facility's pre-treatment program. In addition, there were several violations related to sanitary sewer overflows due to temporary operational issues with pump stations within the sanitary collection system. All of these violations resulted in the issuance of Warning Letters to the permittee and were symptomatic of temporary and infrequent events. The permittee employed corrective actions in response to many of the Warning Letters and no additional enforcement action was necessary.

The following Mutual Agreement and Order was effective during the existing permit term:

Mutual Agreement and Orders

- A Mutual Agreement and Order (MAO No. WQ/M-NWR-11-046) was signed by WES and DEQ on April 29, 2011. This was the same date that the existing 2011 permit was issued by DEQ. This MAO established interim limits for ammonia until the permittee completed facility improvements to address ammonia toxicity. In addition, the permittee had to complete the facility improvements by December 1, 2012 or the final ammonia limits in Schedule A of the 2011 permit would become effective. The permittee completed the necessary facility improvements by the MAO deadline and DEQ issued a letter on December 3, 2012 acknowledging the permittee's compliance with their MAO obligations. As such, the interim and final ammonia limits described in the 2011 permit no longer apply with the issuance of DEQ's compliance letter.

The facility was last inspected by DEQ on September 9, 2022. Other inspections of the facility were conducted on October 17, 2017 and August 20, 2015. No compliance issues were noted during these inspections.

2.4 Stormwater

The facility was covered under the 1200-Z industrial stormwater general NPDES permit until that permit was terminated on September 15, 2021. All industrial stormwater at this facility is collected, treated, and discharged as part of its treated wastewater.

2.5 Industrial Pretreatment

Clackamas County Water Environment Services implements an industrial pretreatment program originally approved and incorporated into the permit on December 21, 1983. Federal and state pretreatment requirements were included in the NPDES permit for this facility when the existing 2011 permit was issued.

The Oregon Department of Environmental Quality (DEQ) last conducted an audit of the pretreatment program administered by Water Environment Services on December 10-14, 2018. During the 2018 audit, DEQ conducted a comprehensive evaluation of the permittee's pretreatment program and concluded that the permittee has a well-developed and administered pre-treatment program, sufficient legal authorities, excellent record keeping and documentation of pre-treatment program. However, the audit identified several deficiencies in the pre-treatment program that needed to be addressed. WES continues to make progress in addressing deficiencies identified during the report.

Until recently, the permittee maintained two sets of pretreatment program documents that are nearly identical, with the exception of specific industrial users and rule references.

In May 2023, WES revised its pretreatment legal authority by adopting Ordinance 02-2023 referred as "Rules and Regulations", provisions related to sanitary sewers applying to all areas within the Districts Service area including Tri-City and CCSD#1. WES initially submitted draft modifications of the legal authority document to DEQ in December of 2022. DEQ reviewed the document and provided comments. In August 2023, WES submitted the final Rules and

Regulations which was approved by DEQ. The proposed permit requires no further updates to the Rules and Regulations in the next permit term.

In the past, WES had two independent industrial pretreatment programs for Clackamas County Service District # 1, and Tri-City Service Districts. Two annual reports were submitted to DEQ, one for each District in WES, CCSD # 1, and Tri-City Service Districts. Beginning with 2019 annual report, WES began submitting one report for the two service districts. Through the updated ordinance, WES oversees one pretreatment program within its service area, therefore one pretreatment annual report will be submitted to DEQ.

The permittee is currently in the process of updating its local limits as required in the new NPDES permit. The local limits evaluation will include an evaluation of the headworks loading criteria and possible sources of the various pollutants being evaluated.

2.6 Biosolids

The Tri-Cities WRRF currently produces Class B biosolids for land application and anticipates continuing to do so. At the facility, solids are anaerobically digested to fully meet 40 CFR Part 503 Class B biosolids requirements. The biosolids are then dewatered by centrifuges and then loaded onto trucks for transport to land application sites in Sherman County. The WRRF currently has DEQ authorization for land application in Sherman County and may pursue additional land sites in Yamhill, Clackamas, Marion, Wasco, Gilliam, Morrow, Washington, Polk, and Linn counties during the term of this permit.

The permittee recently updated the facility's Biosolids Management Plan in 2022, which DEQ has reviewed and approved.[4] The conditions in the Biosolids Management Plan are enforceable under the proposed permit.

2.7 Recycled Water

Although the District does not currently operate a recycled water program, it may develop one during the term of this permit. If the permittee chooses to develop a recycled water program, an Outfall comprehensive recycled water use plan meeting the requirements in OAR 340-055 will be submitted to DEQ for review and approval; appropriate actions must also be made to the Oregon Health Authority (OHA) and the Oregon Water Resources Department (OWRD). The recycled water use plan, including the locations of any proposed irrigation projects, will be made available for public comment. The proposed permit identifies 003 as a distribution point for recycled water once a recycled water use plan is developed and approved.

2.8 Wastewater Classification

OAR 340-049 requires all permitted municipal wastewater collection and treatment facilities receive a classification based on the size and complexity of the systems. DEQ evaluated the

[4] *Clackamas Water Environment Services Biosolids Management Plan.* Clackamas Water Environment Services. September 2022. Approved by DEQ on November 8, 2022.

classifications for the treatment and collection system, which are publicly available at: https://www.deq.state.or.us/wq/opcert/Docs/OpcertReport.pdf.

3. Schedule A: Effluent Limit Development

Effluent limits serve as the primary mechanism in NPDES permits for controlling discharges of pollutants to receiving waters. Effluent limitations can be based on either the technology available to control the pollutants or limits that are protective of the water quality standards for the receiving water. DEQ refers to these two types of permit limits as technology-based effluent limitations (TBELs) and water quality-based effluent limitations (WQBELs), respectively. When a TBEL is not restrictive enough to protect the receiving stream, DEQ must include a WQBEL in the permit.

3.1 Existing Effluent Limits

The following table summarize the $CBOD_5$, TSS, bacteria, pH, chlorine, and ammonia limits contained in the existing permit. A complete listing of Schedule A limits in the existing permit, which include temperature limits and the limits modified by Permit Modification Nos. 1 and 2, are presented in Appendix B.

Table 3-1: Existing Effluent Limits

Treated Effluent Outfall 001

(1) May 1 - October 31:

Parameter	Average Effluent Concentrations		Monthly* Average lb/day	Weekly* Average lb/day	Daily* Maximum lb/day
	Monthly	Weekly			
$CBOD_5$ (See note 1.)	10 mg/L	15 mg/L	1050	1750	2100
TSS	10 mg/L	15 mg/L	1400	2100	2800

*Average Dry Weather Design Flow for the facility after the expansion is 11.9 MGD. Summer mass load limits remain the same as the pervious permit.

Other parameters	Limitations
BOD_5 and TSS Removal Efficiency	Shall not be less than 85% based on a monthly average for BOD_5 and shall not be less than 85% based on a monthly average for TSS.

(2) November 1 - April 30:

Parameter	Average Effluent Concentrations		Monthly* Average lb/day	Weekly* Average lb/day	Daily* Maximum lb/day
	Monthly	Weekly			
$CBOD_5$ (See note 1.)	25 mg/L	40 mg/L	2800	4500	5600
TSS	30 mg/L	45 mg/L	3400	5100	6800

*The winter mass load limits are based upon average wet weather design flow prior to expansion (13.5 MGD). The daily mass load limit is suspended on any day in which the flow into the treatment facility exceeds 23.8 MGD (twice the design average dry weather flow).

(3) Other parameters (year-round)

Parameters	Limitations
E. coli Bacteria	Shall not exceed 126 organisms per 100 mL monthly geometric mean. No single sample shall exceed 406 organisms per 100 mL. (See Note 2)
pH	Shall be within the range of 6.0 – 9.0
BOD_5 and TSS Removal Efficiency	Shall not be less than 85% based on a monthly average for BOD_5, and shall not be less than 85% based on a monthly average for TSS.
Total Chlorine Residual	Shall not exceed an average monthly concentration of 0.02 mg/L and maximum daily concentration of 0.04 mg/L.
Ammonia (Interim limit, See note 3.)	Shall not exceed a monthly average of 15 mg/L

Notes:

1. The $CBOD_5$ concentration limits are considered equivalent to the minimum design criteria for BOD_5 specified in OAR 340-041. These limits and $CBOD_5$ mass limits may be adjusted (up or down) by permit action if more accurate information regarding $CBOD_5/BOD_5$ becomes available.
2. If a single sample exceeds 406 organisms per 100 mL, then five consecutive re-samples may be taken at four-hour intervals beginning within 28 hours after the original sample was taken. If the log mean of the five re-samples is less than or equal to 126 organisms per 100 mL, a violation shall not be triggered.
3. Ammonia interim limit of 15 mg/L has been set until requirements in MAO #WQ/M-NWR-11-046 are completed. This limit shall no longer apply once the permittee meets the MAO requirements.

   If the permittee fails to complete the anticipated capital improvement requirements in the MAO by December 1, 2012, then the permittee's Total Ammonia discharge rate during the dry weather flow shall not exceed a monthly average of 9.4 mg/L, and a daily maximum of 20.1 mg/L. During wet weather, ammonia shall not exceed a monthly average of 16.0 mg/L and a daily maximum of 37.8 mg/L as determined by the Reasonable Potential Analysis.

3.2 Technology-Based Effluent Limit Development

40 CFR 122.(a)(1) requires publicly owned treatment works (POTW) to meet technology-based effluent limits, for five-day biochemical oxygen demand (BOD_5), total suspended solids (TSS) and pH (i.e., federal secondary treatment standards). Substitution of 5-day carbonaceous oxygen demand ($CBOD_5$) for BOD_5 is allowed. The numeric standards for these pollutants are contained

in 40 CFR 133.102. DEQ also uses best professional judgement, as allowed under federal rule (40 CFR 125.3), to apply the secondary treatment standards as TBELS for domestic wastewater treatment facilities that are not publicly-owned.

In addition, DEQ has developed minimum design criteria for BOD_5 and TSS that apply to specific watershed basins in Oregon. These are listed in the basin-specific criteria sections under OAR 340-041-0101 to 0350. During the summer low flow months as defined by OAR, these design criteria are more stringent than the federal secondary treatment standards. The basin-specific criteria are not effluent limits, but are implemented as design criteria for new or expanded wastewater treatment plants. The table below shows a comparison of the federal secondary treatment standards and the basin-specific design criteria for the Willamette basin.

Table 3-2: Comparison of TBELs for Federal Secondary Treatment Standards and Oregon Basin-Specific Design Criteria

<table>
<tr><th rowspan="2">Parameter</th><th colspan="2">Federal Secondary Treatment Standards</th><th>Willamette Basin-Specific Design Criteria (OAR 340-041-0345)</th></tr>
<tr><th>30-Day Average</th><th>7-Day Average</th><th>Monthly Average</th></tr>
<tr><td>BOD_5 (mg/L)</td><td>30</td><td>45</td><td rowspan="3">Low Stream Flow (approximately May 1 – October 31): 10 mg/L – BOD_5 and TSS, or equivalent control

High Stream Flow (approximately November 1 – April 30): Minimum of secondary treatment or equivalent control</td></tr>
<tr><td>$CBOD_5$ (mg/L) (See note 1.)</td><td>25</td><td>40</td></tr>
<tr><td>TSS (mg/L)</td><td>30</td><td>45</td></tr>
<tr><td>pH (S.U.)</td><td colspan="2">6.0 – 9.0. (instantaneous)</td><td>Not applicable</td></tr>
<tr><td>BOD_5, $CBOD_5$ and TSS % Removal</td><td>85%</td><td>Not applicable</td><td>Not applicable</td></tr>
<tr><td colspan="4">Note:
1. Federal regulations allow the replacement of the federal secondary treatment standard BOD_5 limits with $CBOD_5$ (Carbonaceous BOD) limits. EPA sets these $CBOD_5$ concentration limits 5 mg/L less than BOD_5.</td></tr>
</table>

Previous versions of the permit established $CBOD_5$ as an alternative measure of biochemical oxygen demand, and the proposed permit retains $CBOD_5$ limits. The winter limits are the federal secondary standards for $CBOD_5$.

During the low flow period (May 1 – October 31), the concentration limits for $CBOD_5$ of 10 mg/L as a monthly average and 15 mg/L as a 7-day average are considered to be equivalent to the state design criteria for this facility. In addition, the low stream flow basin standards also required more stringent concentration limits for TSS when compared to federal standards. The following table lists the concentration limits for $CBOD_5$ and TSS that will be placed into the proposed permit to address the basin design criteria and the secondary treatment standards:

Table 3-3: Proposed $CBOD_5$ and TSS Concentrations Limit

Season	Monthly/Weekly $CBOD_5$ Concentration Limits (mg/L)		Monthly/Weekly TSS Concentration Limit (mg/L)	
Dry Weather	10	15	10	15
Wet Weather	25	40	30	45

Mass Load Calculations

The limits for $CBOD_5$ and TSS shown in the table above are concentration-based limits. Mass-based limits are required in addition to the concentration-based limits per OAR 340-041-0061(9). For any new facility or any facility that has expanded its dry weather treatment capacity after June 30, 1992, OAR 340-041-0061(9)(b) requires that the mass load limits be calculated based on the proposed treatment facility capabilities and the highest and best practicable treatment to minimize the discharge of pollutants. The permittee's facility has been engineered to achieve $CBOD_5$ and TSS monthly average concentrations of 10.5 mg/L during the dry weather season and 21 mg/L during the wet weather season. DEQ uses the maximum monthly design flow to calculate the mass load limits as shown below for the dry and wet weather seasons.

Monthly Avg Mass Load = Design Flow* x Monthly Concentration Limit x Unit Conversion factor

Weekly Average Mass Load = 1.5 x Monthly Average Mass Load Limit
Daily Maximum Mass Load = 2.0 x Monthly Average Mass Load Limit

* Design flow is the design maximum monthly dry weather flow (DMMDWF) or design maximum monthly wet weather flow (DMMWWF)

The following table lists the effluent flows and concentration limits used for the calculations.

Table 3-4: Facility Design Flows and Performance-Based Concentrations

Seasonal Flow Condition	Maximum Monthly Design Flow (MGD)	Monthly Effluent $CBOD_5$ Concentration (mg/L)	Monthly Effluent TSS Concentration (mg/L)
Dry Weather (May 1 – Oct. 31)	17.1	10.5	10.5
Wet Weather (Nov. 1 – April 30)	31.7	21	21
Design flow comments: Design flow is the design maximum monthly dry weather flow (DMMDWF) or design maximum monthly wet weather flow (DMMWWF).			

Accordingly, DEQ calculated the proposed mass load limits based on the proposed treatment facility capabilities and the highest and best practicable treatment using the performance-based effluent concentrations presented above. The following equations were used to calculate the performance-based mass-based limits:

$CBOD_5$ and TSS Dry Weather Calculations:

Monthly Average Mass Load: 17.1 MGD x 10.5 mg/L x 8.34 = 1497 lbs/day (1500 lbs – round to two significant figures)

Weekly Average: 1500 lbs/day x 1.5 = 2250 lbs/day (2300 lbs/day)

Daily Maximum: 1500 lbs/day x 2.0 = 3000 lbs/day

$CBOD_5$ and TSS Wet Weather Calculations:

Monthly Average Mass Load: 31.7 MGD x 21 mg/L x 8.34 = 5552 lbs/day (5600 lbs – round to two significant figures)

Weekly Average: 5600 lbs/day x 1.5 = 8400 lbs/day

Daily Maximum: 5600 lbs/day x 2.0 = 11,200 lbs/day (11,000 lbs/day)

Table 3-5: Proposed $CBOD_5$ and TSS Mass Load Limits Compared with Existing Limits

Seasonal Flow Condition	Limit	$CBOD_5$ (lbs/day)		TSS (lbs/day)	
		Existing	Proposed	Existing	Proposed
Dry Weather (May 1 – Oct. 31)	Average Monthly	1050	1500	1400	1500
	Average Weekly	1750	2300	2100	2300
	Daily Maximum	2100	3000	2800	3000
Wet Weather (Nov.1 – April 30)	Average Monthly	2800	5600	3400	5600
	Average Weekly	4500	8400	5100	8400
	Daily Maximum	5600	11,000	6800	11,000

As indicated above, the proposed mass load limits for $CBOD_5$ and TSS are higher than the limits in the existing permit. The proposed increases in these mass loads are considered a relaxation of permit limits and must be consistent with anti-backsliding and anti-degradation provisions within the regulations. Discussion regarding the proposed mass load increase relative to anti-backsliding and anti-degradation is presented in Sections 3.4 and 3.5, respectively.

The proposed $CBOD_5$ and TSS limits are listed in the following table. These limits will function as combined limits for discharges from both Outfalls 001 and 002.

Table 3-6: Proposed $CBOD_5$ and TSS Limits

Parameter	Units	Average Monthly	Average Weekly	Daily Maximum
$CBOD_5$ (May 1 – October 31)	mg/L	10	15	NA
	lbs/day	1500	2300	3000
	% removal	85	NA	NA
TSS (May 1 – October 31)	mg/L	10	15	NA
	lbs/day	1500	2300	3000
	% removal	85	NA	NA
$CBOD_5$ (November 1 – April 1)	mg/L	25	40	NA
	lbs/day	5600	8400	11,000
	% removal	85	NA	NA
TSS (November 1 – April 1)	mg/L	30	45	NA
	lbs/day	5600	8400	11,000
	% removal	85	NA	NA

3.3 Water Quality-Based Effluent Limit Development

40 CFR 122.44(d) requires that permits include limitations more stringent than technology-based requirements where necessary to meet water quality standards. Water quality-based effluent limits may be in the form of a wasteload allocation required as part of a Total Maximum Daily Load (TMDL). They may also be required if a site-specific analysis indicates the discharge has the reasonable potential to cause or contribute to an exceedance of a water quality criterion. DEQ establishes effluent limits for pollutants that have a reasonable potential to exceed a criterion. The analyses are discussed below.

3.3.1 Designated Beneficial Uses

NPDES permits issued by DEQ must protect the following designated beneficial uses of the Willamette River. These uses are listed in OAR-340-041-340 for the Willamette River basin.

- Public and private domestic water supply*
- Industrial water supply
- Irrigation and livestock watering
- Fish and aquatic life (including salmonid rearing, migration and spawning)
- Wildlife and hunting
- Fishing
- Boating
- Water contact recreation
- Aesthetic quality

- Hydro power, and
- Commercial navigation and transportation

* with adequate pretreatment and natural quality that meets drinking water standards

OAR 340-041-0340 (Figure 340A) designates the Lower Willamette River as a salmon and steelhead migration corridor. No salmon or steelhead spawning use is designated for this portion of the river.

The applicable numeric water quality criteria are also found in OAR 340-041-0345. These include general criteria and Willamette Basin-specific criteria intended to be protective of the beneficial uses for the basin, as listed above.

3.3.2 303d Listed Parameters and Total Maximum Daily Loads

The following table lists the parameters in the 2022 303(d) list for which the receiving stream is water quality-limited (Category 5) within the discharge's stream reach. The table also lists any parameters with a TMDL wasteload allocation assigned to the facility (Category 4A).

Table 3-7: 303d and TMDL Parameters

Water Quality Limited Parameters (Category 5)	
AU ID:	OR_SR_170900704_88_104020
AU Name:	Willamette River
AU Status:	Impaired
Year Listed	1998
Year Last Assessed	2022
303d Parameters	Bio-criteria; Temperature – year-round; Aldrin-Human Health Toxics; DDE 4,4'- Human Health Toxics; DDT 4,4'- Human Health Toxics; Dieldrin – Human Health Toxics; Polychlorinated Biphenyls (PCBs) – Human Health Toxics; and Aquatic Weeds
TMDL Parameters	
Temperature (2006), Bacteria (2006), Mercury (2019)	

For temperature and bacteria, DEQ has developed Total Maximum Daily Loads (TMDLs) in the Willamette Basin to address these pollutants of concern. These TMDLs were approved by EPA in September 2006. Category 5 pollutants include aldrin, DDE, DDT, dieldrin, Polychlorinated biphenyls (PCBs) and aquatic weeds. The existing permit required periodic monitoring for several of these toxics in the effluent. These pollutants of concern are addressed in Section 3.3.8.

The Aquatic Weeds or Algae parameter is used to implement the statewide narrative criterion that prohibits deleterious or injurious effects on aquatic and human beneficial uses from biological growths (OAR 340-041-0007(9)). The growth of aquatic weeds or algae does not identify whether a pollutant or which pollutant is causing the impairment, nor does it identify which pollutant should be addressed by point source controls. Until there is specific evidence

that a pollutant produced by the facility is causing the impairment it is assumed that the limits contained within the NPDES permit are protective of the narrative criterion[5].

A discussion of the temperature issues associated with the discharge and the relationship to the TMDL is presented in Section 3.3.6.

The bacteria TMDL also provided wasteload allocations for bacteria that set the permitted effluent limits at the water quality standard. Bacteria limitations continue to require that the facility meet the water quality criteria at the end of pipe (see Section 3.3.7).

The EPA also issued a TMDL and Water Quality Management Plan (WQMP) for mercury on December 30, 2019. This TMDL requires that DEQ establish a wasteload allocation in the form of mercury reduction plans for major municipal wastewater treatment plants like the Tri-City WRRF. The development of a Mercury Monitoring Plan and monitoring for mercury to measure the effectiveness of mercury reduction efforts will be included in the renewed permit. Additional details are provided in Section 3.3.8.6.

3.3.3 Pollutants of Concern

To ensure that a permit is protective of water quality, DEQ must identify pollutants of concern. These are pollutants that are expected to be present in the effluent at concentrations that could adversely impact water quality. DEQ uses the following information to identify pollutants of concern:

- Effluent monitoring data.
- Knowledge about the permittee's processes.
- Knowledge about the receiving stream water quality.
- Pollutants identified by applicable federal effluent limitation guidelines.

Based on EPA's NPDES permit application requirements, toxic pollutants of concern for domestic facilities are listed in the following table:

Table 3-8: Domestic Toxic Pollutants of Concern

Flow Rate	Pollutants
< 0.1 mgd	Total Residual Chlorine
> 0.1 mgd and < 1.0 mgd	Total Residual Chlorine, Total Ammonia Nitrogen
> 1.0 mgd	Total Residual Chlorine, Total Ammonia Nitrogen, Metals, Volatile Organic Compounds, Acid Extractable Compounds, Base Neutral Compounds

DEQ identified the following pollutants of concern for this facility as shown in the table below:

[5] *Oregon Integrated Report: Frequently Asked Questions*. Water Quality Assessment, Oregon DEQ. September 1, 2022

Table 3-9: Pollutants of Concern

Pollutant	How was pollutant identified?
pH	Effluent Monitoring
Temperature	Effluent Monitoring
E. coli	Effluent Monitoring
Total Ammonia Nitrogen	Application Requirement
Metals	Application Requirement
Volatile Organic Compounds	Application Requirement
Acid Extractable Compounds	Application Requirement
Base-Neutral Compounds	Application Requirement
Base-Neutral Compounds	Application Requirement

The sections below discuss the RPA analyses that were conducted for the pollutants of concern to determine if water quality-based effluent limits are needed to meet water quality standards. The RPAs examined three different scenarios: 1) impacts of discharges from Outfall 001 alone, 2) impacts of discharges from Outfall 002 alone, and 3) the impacts of the discharges from the upstream Outfall 002 on the simultaneous discharge of Outfall 001 in meeting water quality standards at the downstream edge of the mixing zone for Outfall 001.

DEQ conducted RPAs for the discharges from both outfalls using effluent monitoring results collected from July 2017 to December 2022. Since Outfall 001 has the more restrictive dilutions and will be the primary outfall for the first part of the next permit term, only the results of the RPA analysis for Outfall 001 are discussed in detail in the following sections. Due to the significant improvement in dilutions anticipated for Outfall 002, the results of the RPA analysis for Outfall 002 show that the future discharges through this outfall will not have a reasonable potential to exceed water quality criteria for all pollutants of concern.

3.3.4 Regulatory Mixing Zone

The proposed permit contains mixing zones for existing Outfall 001 and proposed Outfall 002 as allowed per OAR 340-041-0053.

Outfall 001

The proposed mixing zone for Outfall 001 remains unchanged from the exiting permit and is described as follows:

> The regulatory mixing zone is that portion of the Willamette River which extends 300 feet downstream of the point of discharge. The zone of initial dilution shall include that portion of the Willamette River which extends 30 feet downstream of the point of discharge.

The dilutions at the edge of the ZID and RMZ for Outfall 001 are presented in the tables below. These dilutions are based upon 2011[6], 2012[7] and 2021[8] mixing zones studies reviewed by DEQ. DEQ's analysis of these mixing zone studies are contained in a January 2023 internal memorandum.[9]

Table 3-10: Outfall 001 Mixing Zone Dilution Summary

Dilution Summary- Dry Weather						
Water Quality Standard	**Stream Flow (cfs)**		**Effluent Flow (mgd)**		**Dilution**	**Location**
	Statistic	**Flow**	**Statistic**	**Flow** (See note a.)		
Aquatic Life, Acute	1Q10	5,809	☐ ADWDF x PF ☒ Max Daily Avg ☐ Other	29.2	3.2	ZID
Aquatic Life, Chronic	7Q10	5,902	☐ ADWDF ☒ Max Monthly Avg ☐ Other	17.2	27	MZ
Human Health, Non-Carcinogen	30Q5	7,130 (See note b.)	☐ ADWDF ☒ Max Monthly Avg ☒ Other	17.2	27 (See note c.)	MZ
Human Health, Carcinogen	Harmonic Mean	17,100 (See note b.)	☐ ADWDF ☐ Max Monthly Avg ☒ Other	17.2	27 (See note c.)	MZ
Dilution Summary - Wet Weather						
Aquatic Life, Acute	1Q10	7,445	☐ ADWDF ☒ Max Monthly Avg ☐ Other	42.2	2.9	ZID
Aquatic Life, Chronic	7Q10	7,827	☐ ADWDF ☒ Max Monthly Avg ☐ Other	32	23	MZ

[6] *Mixing Zone Field Monitoring and Modeling Study for Tri-City Water Pollution Control Plant.* MixZon, Inc. January 12, 2011.
[7] *Tri-City Water Pollution Control Plant Compliance with MAO WQ/M-NWR-11-046 Report.* CH2MHill. February 2012.
[8] *Pre-Design Engineering Report for Tri-City Water Resource Recovery Facility Willamette River Outfall Project.* Jacobs. October 5, 2021.
[9] *Mixing Zone Study Review*. Oregon Department of Environmental Quality. January 2023.

Human Health, Non-Carcinogen	30Q5	13,488	☐ ADWDF ☒ Max Monthly Avg ☐ Other	32	16	MZ
Human Health, Carcinogen	Harmonic Mean	17,100 (See note d.)	☐ ADWDF ☒ Max Monthly Avg ☐ Other	32	16 (See note e.)	MZ
Dilution Summary – Peak Wet Season Effluent Flow at 25-yr Flood						
Aquatic Life, Acute	25-yr flood	280,000	☐ ADWDF ☐ Max Monthly Avg ☒ Other	54 (See note f.)	11 (See note g.)	ZID
Aquatic Life, Chronic	25-yr flood	280,000	☐ ADWDF ☐ Max Monthly Avg ☒ Other	18	25	MZ

ADWDF = Average dry weather design flow *PF = Peaking factor*
ZID = Zone of Initial Dilution *MZ = Mixing Zone*

Notes:

a. Effluent flow values are from the February 2012 Tri-City Water Pollution Control Plant Compliance with MAO WQ/M-NWR-11-046 Report – these are similar to existing effluent flows. The stream flow statistics and dilution values are taken from Table 3-5 of the same report.

b. No 30Q5 or harmonic stream flow values were included with the updated dilution modeling. This value is from the 2011 MixZon study.

c. No 30Q5 or harmonic mean dilution values were presented in the February 2012 Tri-City Water Pollution Control Plant Compliance with MAO WQ/M-NWR-11-046 Report. The 7Q10 dilution was used.

d. No harmonic stream flow value was included in the updated dilution modeling. This value is from the 2011 MixZon study.

e. No harmonic mean dilution was presented in the February 2012 Tri-City Water Pollution Control Plant Compliance with MAO WQ/M-NWR-11-046 Report. The 30Q5 dilution was used.

f. Effluent flow values show only the portion expected to flow through Outfall 001 during the 25-year flood event.

g. Dilution values obtained from Table 3-10 in October 2021 Pre-Design Engineering Report for Tri-City WRRF Willamette River Outfall Project.

Outfall 002

The proposed mixing zone for the Outfall 002 is:

> The regulatory mixing zone is that portion of the Willamette River which extends 300 feet downstream and 100 feet upstream of the diffuser section of the outfall. The zone of initial dilution is that portion of the Willamette River which extends 30 feet in all directions from the diffuser section of the outfall.

The dilutions at the edge of the ZID and RMZ are presented in the table below. These dilutions are based upon a 2021 Pre-Design Engineering Report for Tri-City WRRF Willamette River Outfall Project (Outfall 002) which was reviewed by DEQ. DEQ's review of this report is contained in a January 2023 internal memorandum within the permit files.

Table 3-11: Outfall 002 Mixing Zone Dilution Summary

Dilution Summary- Dry Weather						
Water Quality Standard	**Stream Flow (cfs)**		**Effluent Flow (mgd)**		**Dilution** (See note a.)	**Location**
	Statistic	**Flow**	**Statistic**	**Flow**		
Aquatic Life, Acute	1Q10	5,904	☐ ADWDF x PF ☒ Max Daily Avg ☐ Other	40.7	16	ZID
Aquatic Life, Chronic	7Q10	5,989	☐ ADWDF ☒ Max Monthly Avg ☐ Other	17.8	81	MZ
Human Health, Non-Carcinogen	30Q5	6,576	☐ ADWDF ☒ Max Monthly Avg ☐ Other	17.8	85	MZ
Human Health, Carcinogen	Harmonic Mean	15, 100	☐ Annual Avg Design ☒ Annual Avg ☐ Other	13.0	247	MZ
Dilution Summary – Peak Wet Season Effluent Flow at 25-yr Flood						
Aquatic Life, Acute	25-yr flood	280,000	☐ ADWDF x PF ☐ Max Daily Avg ☒ Other	84	231 (See note b.)	ZID
Aquatic Life, Chronic	25-yr flood	280,000	☐ ADWDF ☐ Max Monthly Avg ☒ Other	68	804 (See note b.)	MZ

ADWDF = Average dry weather design flow	*PF = Peaking factor*
ZID = Zone of Initial Dilution	*MZ = Mixing Zone*

Notes:

a. Dilution information obtained from Table 3-7 (Page 3-17) in 2021 Pre-Design Engineering Report for Tri-City WRRF Willamette River Outfall Project. Outfall dilutions for 18-port diffuser with projected 2040 effluent flows. These dilutions are more conservative than 18-port diffuser with 2022 effluent flows (Table 3-6 of 2021 Pre-Design Engineering Report). However, even more conservative dilutions were modeled for 18-port diffuser under projected buildout effluent flows (Table 3-8 of 2021 Pre-Design Engineering Report for Tri-City WRRF Willamette River Outfall Project).

b. Dilution information obtained from Table 3-10 (Page 3-21) in 2021 Pre-Design Engineering Report for Tri-City WRRF Willamette River Outfall Project. Outfall dilutions for 18-port diffuser during 25-year flood event.

3.3.5 pH

The pH criterion for this basin is 6.5 – 8.5 per OAR 340-041-0345(1)(a). The federal secondary treatment standards allow the permittee to discharge effluent with a pH between 6.0 and 9.0 provided the basin standard is met at the edge of the mixing zone. The pH range of 6.0 to 9.0 was utilized in a reasonable potential analysis for both Outfalls 001 and 002 along with other effluent data collected from July 2017 through October 2022, and ambient river data from several monitoring stations within the river located upstream of the outfalls. DEQ determined there is no reasonable potential for the discharge from either Outfall 001or Outfall 002 to exceed the pH criterion at the edge of the mixing zone. Further, there is no reasonable potential to exceed pH criteria when both outfalls are discharging during extreme weather events.

The proposed limits for pH for both outfalls are 6.0 to 9.0 and are considered TBELS. These limits will apply separately for each outfall and when both outfalls are discharging simultaneously. The following table provides a summary of the data used for the analysis for the primary Outfall 001. With the exception of the dilutions, the effluent and ambient data used for the analysis for Outfall 002 was similar. The results for Outfall 002 were also similar indicating that there is no reasonable potential for the discharge from this outfall to exceed pH water quality criteria.

Table 3-12: pH Reasonable Potential Analysis- Outfall 001

INPUT	Lower pH Criteria	Upper pH Criteria
1. Dilution at mixing zone boundary	27	27
2. Upstream characteristics		
a. Temperature (deg C)	23.7	7.9
b. pH	7.3	7.9
c. Alkalinity (mg CaCO3/L)	22	22
3. Effluent characteristics		
a. Temperature (° C)	23.5	15.8
b. pH (S.U.)	6.0	9.0
c. Alkalinity (mg CaCO3/L)	156	156
4. Applicable pH criteria	6.5	8.5
pH at mixing zone boundary	**6.6**	**8.0**
Is there reasonable potential?	**No**	**No**
Proposed effluent limits	**6.0**	**9.0**
Effluent data source: ICIS data January July 2017-October 2022. Alkalinity data from January 2021 through May 2022. Temp 10th %ile = minimum of monthly average, 90th %ile = maximum of monthly average		
Ambient data source: AWQMS Feb 2016-March 2022. Stations 10339-ORDEQ, 26102-ORDEQ, 31545-ORDEQ, 38903-ORDEQ. All stations upstream of Outfall 001.		

3.3.6 Temperature

3.3.6.1 Temperature Criteria OAR 340-041-0028

The following table summarizes the temperature criteria that apply at Outfalls 001 and 002 for the Tri-City WRRF. This information indicates whether the receiving stream is water quality-limited for temperature and whether a TMDL wasteload allocation has been assigned. Using this information, DEQ performed several analyses to determine if effluent limits were needed to comply with the temperature criteria.

Table 3-13: Temperature Criteria Information

Applicable Temperature Criterion	Migration Corridor 20 C (OAR 340-041-0028(4)(d)
Applicable dates: Year-round	
Salmon/Steelhead Spawning 13 °C? *OAR 340-041-0028(4)(a)*	☐Yes ☒No
Applicable dates: N/A	
WQ-limited?	☒Yes ☐No
TMDL wasteload allocation assigned?	☒Yes ☐No
Applicable dates: June 1 – September 30	
Cold water summer protection criterion applies?	☐Yes ☒No
Cold water spawning protection applies?	☐Yes ☒No

Applicable Temperature Criteria and TMDL Waste Load Allocation

As noted in the table above, the Lower Willamette River is listed as impaired for temperature. In 2006, DEQ issued the Willamette River Basin Total Maximum Daily Load (TMDL) to address this impairment. According to the TMDL, the critical period for temperature in this segment of the river is June 1 through September 30. The TMDL contains Waste Load Allocations (WLAs) for point sources throughout the Willamette River, including the Tri-City WRRF, that apply during this period (TMDL, p. 4-69). The static WLA for the Tri-City WRRF is 156 million kilocalories per day (Mkcals/day) as a rolling 7-day average.[10] The Tri-City WRRF was not provided a temporary use of the reserve capacity described in the TMDL which can be added to the WLA.[11]

Overall, the WLA applies from June 1 through September 30. For the remainder of the year (October 1 – May 31), the TMDL determined that no WLA, and no associated limit, was necessary for the facility. The TMDL also includes flow-based WLAs for the facility, which are discussed below.

ETL limits based on the TMDL's static and flow-based WLAs are included in the proposed permit for the June 1 – September 31 period. As noted above, the TMDL determined that no WLA or limit was necessary for the October 1 – May 31 period to meet the Biologically-Based Numeric Criteria (BBNC). The ETL limits included in the proposed permit are discussed in more detail in Section 3.3.6.3, below.

[10] *Chapter 4: Temperature-Mainstem TMDL and Subbasin Summary for the 2006 Willamette Basin TMDL: Temperature.* Table 4.15: Individual Wasteload Allocations for Low Streamflow Conditions. Page 4-69. Willamette Basin TMDL: Temperature. DEQ. September 2006.

[11] *Mainstem Willamette River Reserve Capacity Analysis*. Table 5: Temporary Reserve Capacity Multipliers Which May Be Applied to Wasteload Allocations. Page 8. Oregon Department of Environmental Quality. April 2010.

Cold Water Refugia

As listed in OAR 340-041-0028(4)(d), streams identified as having a migration corridor use (such as the Lower Willamette River) must have cold water refugia that are sufficiently distributed so as to allow salmon and steelhead migration without significant adverse effects from higher water temperatures elsewhere in the water body. Per OAR 340-041-002 (10), "Cold Water Refugia" means those portions of the water body where, or times during the day when, the water temperature is at least 2 degrees Celsius colder than the daily maximum temperature of the adjacent well-mixed flow of the water body. Cold water refugia are frequently concentrated in confluence zones between tributaries and large receiving waters. DEQ's regulations restrict point source thermal discharges in locations where they will degrade cold water refugia.

In the vicinity of the Tri-City facility, two cold water refugia have been identified on the Willamette River. One cold water refuge is associated with the immediate confluence of the Clackamas River with the Willamette River where colder water from the Clackamas River initially settles into a deep section of the Willamette River channel. This refugia is located approximately 625 and 2500 feet downstream from the edges of the regulatory mixing zone for existing Outfall 001 and proposed Outfall 002, respectively. The second cold water refuge is associated with the confluence of Abernathy Creek with the Willamette River just under the Interstate 205 bridge. This refuge is located approximately 300 feet upstream from regulatory mixing zone for proposed Outfall 002 and is confined to a narrow band along the immediate eastern bank of the Willamette River next to Abernathy Creek.[12]

Given the distance to the Clackamas River confluence refuge, discharges from both Outfalls 001 and 002 will be fully mixed with the Willamette River and will have very limited impact on river temperature by the time it reaches this refuge. No degradation to this cold water refuge is anticipated. Similarly, the Abernathy Creek confluence refuge is located upstream of the regulatory mixing zone and discharge plume for proposed Outfall 002. This refuge will not be degraded by discharges through this outfall.

3.3.6.2 Thermal Plume OAR 340-041-0053(2)(d)

In addition to compliance with the temperature criteria, OAR 340-041-0053(2)(d) contains thermal plume limitation provisions designed to prevent or minimize adverse effects to salmonids that may result from thermal plumes. The discharge was evaluated for compliance with these provisions as follows:

- OAR 340-041-0053(2)(d)(A): Impairment of an active salmonid spawning area where spawning redds are located or likely to be located.

[12] *Lower Willamette River Cold-Water Refuge Narrative Criterion Interpretation Study*. Chapter 3: Existing Cold-Water Refuge for Adult Chinook and Steelhead in the Lower Willamette River. Oregon Department of Environmental Quality – Division of Water Quality Standards and Assessment. March 2020.

Tri-City WRRF Discharge: Based on the Willamette Basin fish use and salmonid spawning use maps contained in OAR 340-041 (Figures 340A and 340B, respectively), the designated fish uses for this segment of the Willamette River are salmon and steelhead migration (year-round) and no spawning use. Therefore, the discharge will not cause impairment of an active salmonid spawning area.

- OAR 340-041-0053(2)(d)(B): Acute impairment or instantaneous lethality is prevented or minimized by limiting potential fish exposure to temperatures of 32 ºC or more to less than 2 seconds.

  Tri-City WRRF Discharge: Based on a review of July 2017 – December 2022 effluent data, the maximum effluent temperature recorded at Outfall 001 during this time period was 24.6 ºC. Thus, anticipated peak temperatures through both Outfalls 001 and 002 are expected to be well below 32 ºC and are not expected to cause an acute impairment or instantaneous lethality due to the thermal plume.

- OAR 340-041-0053(2)(d)(C): Thermal shock caused by a sudden increase in water temperature is prevented or minimized by limiting potential fish exposure to temperatures of 25 ºC or more to less than 5% of the cross-section of 100% of the 7Q10 flow of the water body.

  Tri-City WRRF Discharge: Based on a review of July 2017 – December 2022 effluent data, the maximum effluent temperature recorded at Outfall 001 during this time period was 24.6 ºC. Since anticipated peak temperatures through both Outfalls 001 and 002 are expected to be below 25 ºC, thermal shock caused by the discharge is prevented or minimized.

- OAR 340-041-0053(2)(d)(D): Unless ambient temperature is 21 ºC or greater, migration blockage is prevented or minimized by limiting potential fish exposure to temperatures of 21 ºC or more to less than 25% of the cross-section of 100% of the 7Q10 flow of the water body.

  Tri-City Discharge: The migration rule is based primarily on the USEPA guidance document, *EPA Region 10 Guidance for Pacific Northwest State and Tribal Temperature Water Quality Standards* (April 2003) [13]. Section V.3 of the document gives guidance on protecting salmonids from thermal plume impacts and provides this discussion on migration blockage:

[13] U.S. Environmental Protection Agency. 2003. EPA *Region 10 Guidance for Pacific Northwest State and Tribal Temperature Water Quality Standards*. EPA 910-B-03-002. Region 10 Office of Water, Seattle. WA. Pages 33 -34.

Adult migration blockage conditions can occur at 21 °C. Therefore, EPA suggests that the cross-sectional area of a river at or above 21 °C be limited to less than 25% or, if upstream temperature exceeds 21 °C, the thermal plume be limited such that 75% of the cross-sectional area of the river has less than a de minimis (e.g., 0.25 °C) temperature increase.

The maximum recorded receiving water temperature upstream of the discharge location is 26.1 °C. An analysis for both Outfalls 001 and 002 related to migration blockage indicates that when the receiving water temperature is 21 °C and effluent temperature is at the maximum recorded value (24.6 ºC from 2017-2022 effluent data), the effluent plume, when it reaches 25% of the receiving stream's cross-sectional area, will be 21.1 ºC (See Appendix C: Attachments C-1 and C-2). This 0.1 ºC over the upstream temperature is considered a de minimis increase that prevents or minimizes migration blockage.

In summary, the analysis indicates that the discharge from the Tri-City WRRF meets the temperature thermal plume limits in OAR 340-041-0053(2)(d).

3.3.6.3 Temperature Effluent Limits

The temperature analyses summarized above indicate the need for temperature effluent limits during the June 1 – September 30 period. As discussed above, limits based on the Willamette Basin TMDL's WLA are included in the permit. These limits are expressed as Excess Thermal Load limits. The TMDL included three implementation options for determining the applicable ETL limit.[14] The first option is a static limit based on critical river and effluent flows. The second option is based on the critical effluent flow and the actual (measured) river flow, and the third option is based on the critical effluent flow, the actual (measured) river flow and the measured river temperature. The first two options are included in the proposed permit. The third option, while not included in the proposed permit, may be incorporated into the permit at a later date.

The two options included in the proposed permit are listed below:

Table 3-14: Temperature Effluent Limits

Effluent limit needed? ☒Yes ☐No
TMDL Static WLA Limit (Option A): 156 Mkcal/day as a seven-day rolling average. (See note a.)
Applicable time period: June 1 – September 30
TMDL Flow-Based WLA Limit (Option B): ETL Limit (ETLL) = (0.00611 x Q_R) + 111 (See notes b, c and d.)
Applicable time period: June 1 – September 30

[14] Chapter 4: Temperature-Mainstem TMDL and Subbasin Summary for the 2006 Willamette Basin TMDL: Temperature. Page 4-69. Willamette Basin TMDL: Temperature. DEQ. September 2006.

Notes:

a) The seven-day rolling average for any specific day is the average of the daily values for that day and the preceding six days.

b) Q_R = Rolling seven-day average ambient river flow as recorded at USGS Gauge #14211720 (Willamette River at Portland).

c) This ETL Equation is presented as Equation No. 6 in Appendix 4.5 of the Willamette Basin TMDL. The raw equation and the inputs to the equation are discussed in more detail in Appendix D.

d) This option is also applied as a seven-day rolling average ETL limit for each day that Option B limit is selected by the permittee.

For both options presented above, the permittee will be required to use the following formula for calculating the facility's daily excess thermal load to determine compliance with the ETL limit:

$$ETL = 3.785 * Qe * \Delta T$$

Where:

Qe = Daily Average Effluent Flow (MGD)
ΔT = Daily Maximum Effluent Temperature (°C) minus ambient criterion (20°C)

Since the limit is expressed as a 7-day rolling average, the facility will be required to report starting on the 7th day of each reporting season (June 7).

Schedule A of the proposed permit provides the permittee with the options and formulas for calculating the ETL and ETL limit. Schedule B provides the permittee with instructions for reporting compliance with the ETL limit under the options. The facility may use either option on a daily basis.

3.3.7 Bacteria

The 2006 Willamette Basin TMDL provides a wasteload allocation for a bacteria effluent limit that is set at the statewide water quality standard. OAR 340-041-0009(6)(b) requires discharges of bacteria into freshwaters meet a monthly geometric mean of 126 *E. coli* per 100 mL, with no single sample exceeding 406 *E. coli* per 100 mL. If a single sample exceeds 406 *E. coli* per 100 mL, then the permittee may take five consecutive re-samples. If the log mean of the five re-samples is less than or equal to 126, a violation is not triggered. The re-sampling must be taken at four-hour intervals beginning within 28 hours after the original sample was taken. The following table includes the proposed permit limits that apply year-round for both Outfalls 001 and 002.

Table 3-15: Proposed *E. coli* Limits

E. coli **(#/100 ml)**	**Geomean**	**Maximum**
Existing Limit	126	406
Proposed Limit	126	406

3.3.8 Toxic Pollutants

DEQ typically performs the reasonable potential analysis for toxics according to EPA guidance provided in the Technical Support Document for Water Quality-Based Toxics Control (TSD) (Office of Water Enforcement and Permits, U.S. EPA, March 1991). The factors incorporated into this analysis include:

- Effluent concentrations and variability
- Water quality criteria for aquatic life and human health
- Receiving water concentrations
- Receiving water dilution (if applicable)

DEQ performs these analyses using spreadsheets that incorporate EPA's statistical methodology. The following sections describe the analyses for various toxic pollutants below.

3.3.8.1 Total Ammonia Nitrogen

DEQ's ammonia criteria vary with changes in pH and temperature. DEQ performed a reasonable potential analysis that accounts for changes in the effluent and receiving water pH and temperature to determine the appropriate ammonia criteria. An RPA for ammonia was conducted using ambient river data collected by the permittee and by several DEQ monitoring stations on the Willamette River upstream of Outfall 001 from February 2016 through June 2023. Effluent data from January 2019 to June 2023 was also used. Effluent ammonia data is collected by the Tri-City WRRF several times per week throughout the year, which gives a robust data set of more than 800 effluent samples for ammonia.

Using the maximum effluent concentration of 40.7 mg/l recorded for ammonia between January 2019 and July 2023, the results of the RPA indicate that there is reasonable potential for the discharge through Outfall 001 to cause or contribute to exceedances of the water quality criteria for ammonia in the summer dry season discharges. The analysis did not indicate any reasonable potential to exceed ammonia water quality criteria during the wet season discharges from Outfall 001 from November 1 through April 30. As such, new limits for ammonia expressed as an average monthly limit (AML) and maximum daily limit (MDL) will be placed into the permit for Outfall 001only. These limits will be applicable from May 1 through October 31. The RPA for Outfall 001 is shown in Appendix E. The following tables provides a summary of the data used for the ammonia analysis for Outfall 001, the results of the analysis for summer and winter discharges and the proposed ammonia limits for Outfall 001.

Table 3-16: Ammonia Analysis Information – Outfall 001 (Summer)

	Acute	Chronic	
		4-day	30-day
Dilution	3.2	27	27
Ammonia Criteria	5.5	1.9	0.7
Effluent Data Used			
Ammonia (mg/L)	40.7	40.7	
pH (SU)	7.5	7.5	
Temperature (ºC)	23.7	23.7	
Alkalinity (mg/L CaCO3)	94.0	94.0	
Receiving Stream Date Used			
Ammonia (mg/L)	0.1	0.1	
pH (SU)	7.9	7.9	
Temperature (ºC)	24.2	24.2	
Alkalinity (mg/L CaCO3)	28.0	28.0	
Ammonia Limit Needed?	**Yes**		
Calculated Limits	AML	MDL	
Ammonia (mg/L)	10.3	17.5	
Effluent data source			
Effluent data from Discharge Monitoring Reports from January 2019 through June 2023. Ammonia data from January 2019 to July 2023. Temperature data from May through October 2019 – 2021; and November 2021 through June 2023. pH data from January 2019 through June 2023. Alkalinity data from January 2021 through June 2023.			
Ambient data source			
Oregon DEQ Water Quality Monitoring Stations (accessed through AWQMS) from February 2016 through March 2022. Stations 10339-ORDEQ, 26102-ORDEQ, 31545-ORDEQ, 38903-ORDEQ. Water Environment Services river monitoring at public dock at Jon Storm Park in Oregon City from February 2017 through June 2023. All stations located upstream of Outfall 001.			

Table 3-17: Ammonia Analysis Information – Outfall 001 (Winter)

	Acute	Chronic	
		4-day	30-day
Dilution	2.9	23	16
Ammonia Criteria	13.4	5.3	2.1
Effluent Data Used			
Ammonia (mg/L)	31.5	31.5	
pH (SU)	7.4	7.4	
Temperature (ºC)	16.9	16.9	
Alkalinity (mg/L CaCO3)	64.3	64.3	
Receiving Stream Date Used			
Ammonia (mg/L)	0.1	0.1	
pH (SU)	7.6	7.6	
Temperature (ºC)	12.1	12.1	
Alkalinity (mg/L CaCO3)	30.1	30.1	
Ammonia Limit Needed?	**No**		
Calculated Limits	AML	MDL	
Ammonia (mg/L)	N/A	N/A	
Effluent data source			
Effluent data from Discharge Monitoring Reports from January 2019 through June 2023. Ammonia data from January 2019 to July 2023. Temperature data from May through October 2019 – 2021; and November 2021 through June 2023. pH data from January 2019 through June 2023. Alkalinity data from January 2021 through June 2023.			
Ambient data source			
Oregon DEQ Water Quality Monitoring Stations (accessed through AWQMS) from February 2016 through March 2022. Stations 10339-ORDEQ, 26102-ORDEQ, 31545-ORDEQ, 38903-ORDEQ. Water Environment Services river monitoring at public dock at Jon Storm Park in Oregon City from February 2017 through June 2023. All stations located upstream of Outfall 001.			

An analysis of the potential discharges through Outfall 002 indicated that that there is no reasonable potential to exceed water quality criteria when discharges begin in early 2026. This includes both dry and wet season discharge periods. In general, the improved dilutions expected at Outfall 002 support a determination that no reasonable potential to exceed ammonia water quality criteria. Based on the results, the permit will not contain a permit limit for ammonia for Outfall 002. The following tables provides a summary of the data used for the ammonia analysis

for Outfall 002 during the critical dry (summer) discharge period and wet (winter) discharge period.

Table 3-18: Ammonia Analysis Information – Outfall 002 (Summer)

	Acute	Chronic	
		4-day	30-day
Dilution	16	81	85
Ammonia Criteria	4.8	1.8	0.7
Effluent Data Used			
Ammonia (mg/L)	40.7	40.7	
pH (SU)	7.5	7.5	
Temperature (ºC)	23.7	23.7	
Alkalinity (mg/L CaCO3)	94	94	
Receiving Stream Date Used			
Ammonia (mg/L)	0.1	0.1	
pH (SU)	7.9	7.9	
Temperature (ºC)	24.2	24.2	
Alkalinity (mg/L CaCO3)	28.0	28.0	
Ammonia Limit Needed?	**No**		
Calculated Limits	AML	MDL	
Ammonia (mg/L)	N/A	N/A	
Effluent data source			
Effluent data from Discharge Monitoring Reports from January 2019 through June 2023. Ammonia data from January 2019 through July 2023. Temperature data from May through October 2019 – 2021; and November 2021 through June 2023. pH data from January 2019 to June 2023. Alkalinity data from January 2021 through June 2023.			
Ambient data source			
Oregon DEQ Water Quality Monitoring Stations (accessed through AWQMS) from February 2016 through March 2022 at Stations 10339-ORDEQ, 26102-ORDEQ, 31545-ORDEQ, 38903-ORDEQ. Water Environment Services river monitoring at public dock at Jon Storm Park in Oregon City from February 2017 through June 2023. All stations located upstream of proposed location of Outfall 002.			

Table 3-19: Ammonia Analysis Information – Outfall 002 (Winter)

	Acute	Chronic	
		4-day	30-day
Dilution	16	81	85
Ammonia Criteria	11.9	5.3	2.1
Effluent Data Used			
Ammonia (mg/L)	31.5	31.5	
pH (SU)	7.4	7.4	
Temperature (ºC)	16.9	16.9	
Alkalinity (mg/L CaCO3)	64.3	64.3	
Receiving Stream Date Used			
Ammonia (mg/L)	0.1	0.1	
pH (SU)	7.6	7.6	
Temperature (ºC)	12.1	12.1	
Alkalinity (mg/L CaCO3)	30.1	30.1	
Ammonia Limit Needed?	**No**		
Calculated Limits	AML	MDL	
Ammonia (mg/L)	N/A	N/A	
Effluent data source			
Effluent data from Discharge Monitoring Reports from January 2019 through June 2023. Ammonia data from January 2019 through July 2023. Temperature data from May through October 2019 – 2021; and November 2021 through June 2023. pH data from January 2019 to June 2023. Alkalinity data from January 2021 through June 2023.			
Ambient data source			
Oregon DEQ Water Quality Monitoring Stations (accessed through AWQMS) from February 2016 through March 2022 at Stations 10339-ORDEQ, 26102-ORDEQ, 31545-ORDEQ, 38903-ORDEQ. Water Environment Services river monitoring at public dock at Jon Storm Park in Oregon City from February 2017 through June 2023. All stations located upstream of proposed location of Outfall 002.			

DEQ also conducted an analysis when both Outfalls 001 and 002 would be discharging. During the next permit term, Outfall 002 will become the facility's primary outfall and Outfall 001 will function as the secondary wet weather outfall. In these situations, the dilutions at Outfalls 001 and 002 are very high (see Tables 3-10 and 3-11) and there is no reasonable potential to exceed water quality criteria for ammonia.

Based upon the analysis summarized in the tables above, the proposed permit will include new limits for Outfall 001. These limits will only apply during dry season discharges from May 1 through October 31 and will become effective after Outfall 002 becomes fully operational in early 2026. A compliance schedule for meeting this new permit limit is discussed in Section 6.

The limits will not apply when both Outfalls 001 and 002 are discharging because this situation is only expected to occur in winter during high river flow events. No reasonable potential to exceed water quality standards for ammonia is expected during high flow wet season discharges.

3.3.8.2 Total Residual Chlorine

The existing permit contains chlorine limits for Outfall 001. The chlorine limits were re-evaluated using updated information to ensure that they are still protective of water quality. For Outfall 001, the analysis indicated that there was no reasonable potential for the water quality criteria to be exceeded under the current limits. As such, the existing limits for Outfall 001 are being retained in the proposed permit.

An analysis was also conducted to determine if discharges from proposed Outfall 002 had a reasonable potential to exceed the chlorine criteria. The maximum daily chlorine concentration reported between January 2017 through December 2022 (0.04 mg/L) was used for the analysis. The reasonable potential analysis indicates the discharge does not have the potential to exceed the chlorine criteria; therefore, no chlorine limits for Outfall 002 are included in the proposed permit.

Because the current chlorine effluent limit for Outfall 001 applies year-round, antibacksliding is a concern when both Outfalls 001 and 002 are discharging. The proposed chlorine limits for Outfall 001 will apply for all discharges through Outfall 001. Proposed limits for Outfall 001 are listed in the following table:

Table 3-20: Proposed Chlorine Limits – Outfall 001

	Chronic (mg/L)	**Acute (mg/L)**
Chlorine Criteria	0.011	0.019
	Average Monthly Limit (mg/L)	**Maximum Daily Limit (mg/L)**
Existing Limit	0.02	0.04
Calculated Limit	0.02	0.04
Proposed Limit (See note a.)	**0.02**	**0.04**
Effluent data source: Current Outfall 001 chlorine limits		
Receiving water data source: Assumed to be zero		
Note: a) Limits apply only to discharges through Outfall 001.		

3.3.8.3 Priority Pollutant Toxics

DEQ conducted a reasonable potential analysis for both Outfalls 001 and 002 for the group of toxics listed in the following table.

Table 3-21: Toxics Pollutants Analyzed

Toxic Group
Metals
Volatile Organic Compounds
Acid Extractable Compounds
Base-Neutral Compounds
Pesticides

The RPA used the results of effluent monitoring for toxic substances that was conducted by the permittee from February 2018 through July 2022. The effluent monitoring data was obtained from the permittee's laboratory in an electronic data delivery format and supported by a review of the analytical lab reports summarizing the results of the effluent monitoring. The monitoring for toxic substances included both wet and dry discharge seasons. The flows and dilutions used in the analysis are presented on Table 3-10. A summary discussion on the results of the RPA relative to toxic metals and organics is presented below:

Metals - The RPA analysis was conducted for priority pollutant metals for both the aquatic life and human health criteria. A separate RPA was conducted for the discharges from Outfalls 001 and 002. A separate RPA for copper and aluminum was conducted and the results are presented in Sections 3.3.8.4 and 3.3.8.5, respectively. In accordance with the mercury TMDL, the Tri-City WRRF will be required to prepare a Mercury Minimization Plan (MMP) as detailed in Section 3.3.8.6.

The aquatic toxicity freshwater RPA analysis for both Outfalls 001 and 002 identified mercury and cyanide as potential pollutants of concern at the end-of-pipe discharge (with no consideration for in-stream dilution).

When the ambient concentrations for pollutants of concern and dilution values were entered into the analysis, the completed RPAs indicated that there was "no reasonable potential" for the identified pollutants of concern to cause aquatic toxicity or exceed human health criteria at the edge of mixing zones or zones of initial dilution.

Priority Pollutant Organics – The Tri-City WRRF conducts monitoring for volatile organic, acid extractable and base neutral compounds. The facility also monitors for several pesticides and polychlorinated biphenyls for which the Willamette River is currently listed as water quality limited, such as dieldrin.

Overall, the results of the RPAs for Outfalls 001 and 002 did not result in any priority pollutant organics exceeding water quality standards either at the end of pipe or regulatory mixing zones. As such, the permit will not require limits for these parameters. The facility is required to continue monitoring for priority pollutant organics on an on-going basis in the NPDES Permit Renewal.

3.3.8.4 Copper Biotic Ligand Model

Eighteen monthly paired sets of effluent and ambient copper BLM input data was collected by WES Tri-City staff and analyzed by various labs from October 2021 through March 2023. For the RPAs, the mixed concentration of each input parameter were then entered into the BLM model to calculate the instantaneous water quality criteria (IWQC) for each paired data set. Each IWQC was compared to the corresponding copper concentration of the effluent or the calculated value at complete mix. Table 3-22 below shows the sample date, calculated criterion, calculated copper value, and toxic unit (copper concentration divided by the instantaneous criterion). A toxic unit greater than one, indicates there is a potential for the discharge to exceed the criterion. There is no reasonable potential to exceed the copper criterion because there were not any toxic units that exceed 1.0.

These results were achieved using the Outfall 001 dilutions. Because the expected dilutions from proposed Outfall 002 are even greater than the Outfall 001 dilutions, there is also no reasonable potential for Outfall 002 to exceed the copper criterion. As such, no limit for copper is required in the proposed permit.

Additional monitoring for copper in both the facility's effluent and the Willamette River is specified in Schedule B of the permit. This monitoring will be used to facilitate additional reasonable potential analysis for copper at the next permit renewal.

Table 3-22: Copper BLM Results

Date	Effluent	Ambient	ZID	BLM CMC	Toxic Units	RMZ	BLM CCC	Toxic Units	100% mix	BLM CCC	Toxic Units
	Cu (ug/L)	Cu (ug/L)	Cu (ug/L)	(ug/L)		Cu (ug/L)	(ug/L)		Cu (ug/L)	Cu (ug/L)	
10/14/2021	2.8	0.35	1.12	11.91	0.09	0.44	4.47	0.10	0.36	4.12	0.09
11/2/2021	1.92	0.58	1.00	13.51	0.074	0.63	6.05	0.104	0.59	5.62	0.104
12/1/2021	1.92	0.52	0.96	17.14	0.056	0.57	9.40	0.061	0.53	10.05	0.052
1/5/2022	1.44	1.22	1.29	6.89	0.187	1.23	3.60	0.341	1.22	3.48	0.351
2/7/2022	1.59	0.37	0.75	11.50	0.065	0.42	3.68	0.113	0.38	3.19	0.118
3/7/2022	1.63	0.91	1.14	5.37	0.211	0.94	2.87	0.326	0.91	2.59	0.352
4/4/2022	2.22	0.4	0.97	11.10	0.087	0.47	3.51	0.133	0.41	3.03	0.135
5/4/2022	0.41	1.85	1.40	12.79	0.109	1.80	10.36	0.173	1.84	10.69	0.172
6/6/2022	1.98	0.41	0.90	10.97	0.082	0.47	4.96	0.094	0.42	5.03	0.083
7/11/2022	2.57	0.42	1.09	15.41	0.071	0.50	4.11	0.122	0.43	3.25	0.132
8/8/2022	2.52	0.4	1.06	13.00	0.082	0.48	3.68	0.130	0.41	3.10	0.132
9/12/2022	2.85	0.36	1.14	17.29	0.066	0.45	5.77	0.078	0.37	5.14	0.072
10/3/2022	3.07	0.38	1.22	10.46	0.117	0.48	2.07	0.231	0.39	1.71	0.230
11/7/2022	1.59	0.99	1.18	7.98	0.148	1.01	4.55	0.222	0.99	4.42	0.225

12/6/2022	3.02	0.68	1.41	14.59	0.097	0.77	4.97	0.154	0.69	4.65	0.148
1/17/2023	1.6	0.74	1.01	9.37	0.108	0.77	5.14	0.150	0.74	5.60	0.133
2/7/2023	1.91	0.42	0.89	8.80	0.101	0.48	2.58	0.184	0.43	2.26	0.189
3/8/2023	1.25	0.5	0.73	6.20	0.119	0.53	3.03	0.174	0.50	2.70	0.186

3.3.8.5 Aluminum

Eighteen monthly paired sets of effluent and ambient aluminum criteria input data was collected by WES Tri-City staff and analyzed by various labs from October 2021 through March 2023. For the RPAs, the mixed concentration of each input parameter were then entered into the aluminum criteria model to calculate the instantaneous water quality criteria (IWQC) for each paired data set. Each IWQC was compared to the corresponding total recoverable aluminum concentration of the effluent or the calculated value at the ZID boundary, the MZ boundary, and at complete mix. Table 3-23 below shows the sample date, calculated criterion, calculated aluminum value, and toxic unit (aluminum concentration divided by the instantaneous criterion). A toxic unit greater than one, indicates there is a concern that the discharge may have the potential to cause or contribute to an exceedance of the criterion. There were four dates on which the toxic units exceeded one (highlighted in the table below). On all of these dates, the ambient total recoverable aluminum greatly exceeded the effluent aluminum and the potential to exceed the criterion is not due to the facility effluent. In these cases, the ambient aluminum exceeded the criterion while the effluent aluminum did not exceed the criterion, indicating that there is no reasonable potential for the facility effluent aluminum concentrations to exceed the criterion. Furthermore, aluminum toxicity is best determined by bioavailability. Using total or dissolved fractions for limit development could result in an over or under conservative limit. Until a bioavailable aluminum method is approved for use, toxic units greater than 1.0 will result in additional monitoring.

These results were achieved using the Outfall 001 dilutions. Because the expected dilutions from proposed Outfall 002 are even greater than the Outfall 001, there is also no reasonable potential for Outfall 002 to exceed the copper criterion. As such, no limit for aluminum is required in the proposed permit.

Additional monitoring for aluminum in both the facility's effluent and the Willamette River is specified in Schedule B of the permit. This monitoring will be used to facilitate additional reasonable potential analysis for aluminum at the next permit renewal.

Table 3-23: Aluminum RPA Results

Date	Effluent	Ambient	ZID	BLM CMC	Toxic Units	RMZ	BLM CCC	Toxic Units	100% mix	BLM CCC	Toxic Units
	Al (ug/L)	Al (ug/L)	Al (ug/L)	ug/L		Al (ug/L)	(ug/L)		Al (ug/L)	Al (ug/L)	
10/14/2021	18.40	52.50	41.84	1700.00	0.0200	51.24	550.00	0.09	52.35	550.00	0.10
11/2/2021	16.10	290.00	204.41	1800.00	0.1100	279.86	610.00	0.46	288.78	630.00	0.46
12/1/2021	15.30	297.00	208.97	2000.00	0.1000	286.57	750.00	0.38	295.74	810.00	0.37
1/5/2022	75.00	1980.00	1384.69	1200.00	1.1500	1909.44	440.00	4.34	1971.50	440.00	4.48

Date	Effluent	Ambient	ZID	BLM CMC	Toxic Units	RMZ	BLM CCC	Toxic Units	100% mix	BLM CCC	Toxic Units
	Al (ug/L)	Al (ug/L)	Al (ug/L)	ug/L		Al (ug/L)	(ug/L)		Al (ug/L)	Al (ug/L)	
2/7/2022	12.40	141.00	100.81	1800.00	0.0600	136.24	510.00	0.27	140.43	500.00	0.28
3/7/2022	21.70	791.00	550.59	1200.00	0.4600	762.51	440.00	1.73	787.57	450.00	1.75
4/4/2022	23.30	138.00	102.16	1700.00	0.0600	133.75	500.00	0.27	137.49	490.00	0.28
5/4/2022	17.40	341.00	239.88	1500.00	0.1600	329.01	570.00	0.58	339.56	610.00	0.56
6/6/2022	16.10	202.00	143.91	2400.00	0.0600	195.11	610.00	0.32	201.17	630.00	0.32
7/11/2022	16.30	100.00	73.84	2400.00	0.0300	96.90	620.00	0.16	99.63	610.00	0.16
8/8/2022	16.40	89.40	66.59	2000.00	0.0300	86.70	540.00	0.16	89.07	520.00	0.17
9/12/2022	13.60	76.00	56.50	2300.00	0.0200	73.69	640.00	0.12	75.72	630.00	0.12
10/3/2022	13.50	65.80	49.46	1700.00	0.0300	63.86	390.00	0.16	65.57	350.00	0.19
11/7/2022	22.60	1400.00	969.56	1300.00	0.7500	1348.99	460.00	2.93	1393.85	470.00	2.97
12/6/2022	49.80	433.00	313.25	1900.00	0.1600	418.81	510.00	0.82	431.29	490.00	0.88
1/17/2023	37.80	700.00	493.06	1500.00	0.3300	675.47	630.00	1.07	697.05	680.00	1.03
2/7/2023	20.40	127.00	93.69	1500.00	0.0600	123.05	460.00	0.27	126.52	450.00	0.28
3/8/2023	16.30	412.00	288.34	1300.00	0.2200	397.34	460.00	0.86	410.23	470.00	0.87

3.3.8.6 Mercury – Human Health Criterion

Oregon's human health water quality criterion for mercury is expressed in terms of a fish tissue concentration rather than a water column concentration. A Willamette Basin Mercury TMDL was established by EPA on December 30, 2019. According to the EPA TMDL and the State of Oregon Water Quality Management Plan, this facility must conduct mercury monitoring and develop and implement a mercury minimization plan tailored to the facility's potential to discharge mercury.

The proposed permit includes a requirement for the permittee to develop and submit a mercury minimization plan (in Schedule A) and to conduct associated effluent monitoring (in Schedule B). Once the plan is submitted to DEQ for review, it must go on public notice for public review before being incorporated into the permit by reference.

3.4 Antibacksliding

As indicted in Section 3.2, the proposed permit includes an increase in dry and wet weather mass load limits for $CBOD_5$ and TSS. Although antibacksliding provisions generally do not allow relaxation of effluent limits in permit renewals, Section 402(o)(2)(A) of the Clean Water Act allow relaxation when "material and substantial alterations or additions to the permitted facility" justify less stringent effluent limitations.

Since the issuance of the existing permit in 2011, a substantial modification and upgrade was completed at the Tri-City WRRF with construction of the MBR treatment system with UV disinfection in 2011 (see Section 2.1). The installation of the MBR treatment system dramatically improved the WRRF's overall treatment capacity and capabilities. Collectively, these upgrades are considered a "material and substantial alteration or addition to the permitted facility" for the exception to antibacksliding listed under Section 402(o)(2)(A). The new MBR treatment system not only increased treatment capacity (which allows for higher dry and wet weather mass loads), but new system also improved the overall quality of the effluent being discharged by the WRF. Overall, the higher dry and wet weather mass loads will not impact water quality, will meet water quality standards and are consistent with antidegradation requirements (See following Section 3.5). As such, the higher dry and wet weather mass loads may be incorporated into the proposed permit.

3.5 Antidegradation

DEQ must ensure the permit complies with Oregon's antidegradation policy found in OAR 340-041-0004. This policy is designed to protect water quality by limiting unnecessary degradation from new or increased sources of pollution.

In comparison to the existing 2011 permit, the proposed permit contains higher dry and wet weather $CBOD_5$ and TSS mass load limits (see Section 3.2). This is due to the installation of the MBR treatment system which improved the WRRF's overall treatment capacity and capabilities. All other permit limits are either the same or more restrictive.

Since the proposed permit contains higher mass load limits compared to the existing permit, DEQ performed an antidegradation review. The first step in this review was to determine if the increased loads would likely result in any measurable change in water quality. If a measurable change in water quality is likely to occur, then an in-depth antidegradation analysis is required. If it is determined that no measurable change is likely to occur, then no further anti-degradation review is required.

For the increase in the $CBOD_5$ mass load limit, the potential impact on water quality is a reduction of the dissolved oxygen levels in the receiving water. Per OAR 340-041-0004(3)(d), up to a 0.1 mg/L decrease in dissolved oxygen within a stream reach is not considered a reduction in water quality so long as it has no adverse effects on threatened and endangered species.

The permittee conducted water quality modeling to assess the impacts of the $CBOD_5$ mass load increase on dissolved oxygen levels in the Willamette River. CE-QUAL-W2 modeling was employed using $CBOD_5$ mass loads that were much higher than those being proposed in the permit. This conservative modeling, which was reviewed by DEQ, indicated that a dissolved oxygen reduction of 0.1 mg/L or greater due to the $CBOD_5$ mass load increase will not occur.[15] Based on this analysis, DEQ determined that no reduction in water quality due to the $CBOD_5$ mass load is expected to occur and no further anti-degradation review is required.

[15] *Tri-City WRRF Mass Load Calculation Methodology.* West Yost and Carollo Engineers for Water Environment Services. Final – May 2023.

For the TSS mass load increase and the potential to reduce water quality by a measurable amount, DEQ compares the impact of the discharge on water quality against a *de minimis* threshold. For most pollutants that have water quality criteria, DEQ policy[16] is to consider a reduction in assimilative capacity of 2.5 % or less to be a *de minimis* impact to water quality. There is no water quality criterion for TSS, so a parallel approach was used where a 2.5 % or less increase over the baseline receiving stream TSS concentration is considered *de minimis*. An analysis of the proposed increase to the TSS mass load limits estimates that there will be a maximum increase of 1.0 % over the baseline receiving stream TSS concentrations. This represents a de minimis, or non-measurable, impact on water quality.

Since it was found that there will be no measurable reduction in water quality due to the proposed mass load increases, no further anti-degradation analysis is required.

Except for the $CBOD_5$ and TSS mass load limits as discussed above, the proposed permit contains the same or slightly lower discharge loadings as the existing permit. Permit renewals with the same or slightly lower discharge loadings as the previous permit are not considered to lower water quality from the existing condition. DEQ is not aware of any information that existing limits are not protective of the receiving stream's designated beneficial uses. DEQ is also not aware of any existing uses present within the water body that are not currently protected by standards developed to protect the designated uses. Therefore, DEQ has determined that the proposed discharge complies with DEQ's antidegradation policy. DEQ's antidegradation worksheet for this permit renewal is available upon request.

3.6 Whole Effluent Toxicity

Whole effluent toxicity (WET) tests are used to determine the treated wastewater's aggregate toxic effect on aquatic organisms. Wastewater samples are collected, and aquatic organisms are subjected to a range of concentrations in controlled laboratory experiments. EPA recommends that WET tests be used in NPDES permits together with requirements based on chemical-specific water quality criteria.

WET tests are used to determine the percentage of effluent that produces an adverse effect on a group of test organisms. The measured effect may be fertilization, growth, reproduction, or survival. EPA's methodology includes both an acute test and a chronic test. An acute WET test is considered to show toxicity if adverse effects occur at effluent concentrations less than what is found at the edge of the zone of immediate dilution (ZID). A chronic WET test is considered to show toxicity if adverse effects occur at effluent concentration less than what is known to occur at the edge of the mixing zone.

WET tests will be conducted during the next permit term in accordance with Schedules B and D of the permit. The dilution series to be used for the WET testing is indicated in testing methodology described in Schedule D of the permit.

[16] DEQ Memorandum from Jennifer Wigal: *Procedures to determine if a new or increased load would be a de minimis lowering of water quality*, May 2, 2018.

3.7 Groundwater

The treatment facility does not have any basins, ponds or lagoons that have the potential to leach into the groundwater. No groundwater monitoring or limits are required.

4. Schedule A: Other Limitations

4.1 Mixing Zone

Schedule A describes the regulatory mixing zone as discussed above in Section 3.

4.2 Biosolids

Schedule A of the permit requires the facility to apply biosolids according to their Biosolids Management Plan. In addition, Schedule A requires the following:

- Apply at or below agronomic rates,
- The permittee must have written site authorization for each location from DEQ before land applying and abide by the restrictions for each site,
- Prior to application, the permittee must ensure that biosolids meet one of the pathogen reduction standards under 40 CFR 503.32 and one of the vector attraction reduction standards under 40 CFR 503.33, and
- The permittee must not apply biosolids containing pollutants in excess of the ceiling concentrations for the nine metals shown in Schedule A of the permit.

4.3 Recycled Water

The permittee does not currently operate a recycled water program but may develop one during the term of this permit. If the permittee chooses to develop a recycled water program, a comprehensive recycled water use plan meeting the requirements in OAR 340-055 will be submitted to DEQ for review and approval; appropriate actions must also be made to OHA and WRD. The recycled water use plan, including the locations of any proposed irrigation projects, will be made available for public comment.

Schedule A of the permit requires the permittee to apply recycled water according to their recycled water use plan. Schedule A also restricts the application of recycled water to prevent the following:

- Irrigating above agronomic rates,
- Adverse impact to groundwater,
- Offsite surface runoff or subsurface drainage through drainage tile, and
- Creation of odors, fly and mosquito breeding, or other nuisance conditions.

5. Schedule B: Monitoring and Reporting Requirements

Schedule B of the permit describes the minimum monitoring and reporting necessary to demonstrate compliance with the proposed effluent limits. In addition, monitoring for other parameters is required to better characterize the effluent quality and the receiving stream. This data will be used during the next permit renewal. Detailed monitoring frequency and reporting requirements are in Schedule B of the proposed permit. The permit also includes monitoring requirements for the Industrial Pretreatment program. The required monitoring, reporting and frequency for many of the parameters are based on DEQ's monitoring and reporting matrix guidelines, permit writer judgment, and to ensure the needed data is available for the next permit renewal.

6. Schedule C: Compliance Schedules and Conditions

The proposed permit contains new water quality-based effluent limits for ammonia for Outfall 001. These limits will go into effect after Outfall 002 becomes fully operational in early 2026 and will apply only to dry season discharges from Outfall 001 from May 1 through October 31. The facility is unable to meet this limit for Outfall 001 upon permit issuance. The proposed permit contains a compliance schedule that allows time for the WRRF to make facility modifications in order to meet the new limits. The facility modifications include the construction of Outfall 002 and the development of an Optimization Study to determine feasible operation changes that can be made to the WRRF's existing treatment processes to minimize effluent ammonia concentrations. These operation changes will be employed while Outfall 002 is being constructed. The compliance schedule lays out a series of milestones for the Optimization Study and outfall construction which, upon completion, will enable the permittee to meet the permit's water quality-based effluent limits (see 40 CFR 122.47 and OAR 340-041-0061(12)). DEQ has reviewed the facility's proposed schedule for the Optimization Study and construction of Outfall 002, and has determined that the proposed compliance schedule is efficient and timely, requiring the permittee to meet the final limits as soon as possible.

7. Schedule D: Special Conditions

The proposed permit contains the following special conditions. The conditions include the following:

7.1 Inflow and Infiltration

A requirement to submit an updated inflow and infiltration plan in order to reduce groundwater and stormwater from entering the collection system.

7.2 Emergency Response and Public Notification Plan

A requirement to develop and submit an emergency and spill response plan or ensure the existing one is current per General Condition B.8 in Schedule F.

7.3 Recycled Water Use Plan

The permittee does not currently operate a recycled water use program. Should the permittee pursue a recycled water program over the next permit term, this condition requires the permittee to develop and maintain a recycled water use plan that meet the requirements in OAR 340-055-0025. The plan must also include location-specific information describing where and how recycled water is managed to protect public health and the environment.

7.4 Exempt Wastewater Reuse at the Treatment System

A condition that exempts the permittee from the recycled water requirements in OAR 340-055, when recycled water is used for landscape irrigation at the treatment facility or for in-plant processes, such as in plant maintenance activities.

7.5 Biosolids Management Plan

A requirement to manage all biosolids in accordance with a DEQ-approved biosolids management plan and land application plan. The biosolids management plan and the land application plan must meet the requirements in OAR 340-050-0031 and describe where and how the land application of biosolids is managed to protect public health and the environment.

The permittee's biosolids management plan and land application plan were updated in September 2022 and received DEQ approval on November 1, 2022. The plan includes all sites authorized by DEQ for land application of biosolids.

7.6 Wastewater Solids Transfers

A condition that allows the facility to transfer treated or untreated wastewater solids to other in-state or out-of-state facilities that are permitted to accept the wastewater solids.

7.7 Whole Effluent Toxicity Testing

The permittee is required to perform WET testing to ensure the aggregate of toxics is not negatively impacting aquatic life. This condition describes the test procedures and requirement for the WET testing. The WET testing will begin after Outfall 002 becomes operational in late 2025. A dilution series has been specified on the basis of the mixing zone analysis for Outfall 002.

7.8 Operator Certification

The permittee is required to have a certified operator consistent with the size and type of treatment plant covered by the permit per OAR 340-049-0005. This special condition describes the requirements relating to operator certification.

7.9 Outfall Inspection for Outfall 001 and Outfall 002 As-Builts

This condition requires the permittee to inspect Outfall 001 and submit a report to DEQ regarding its condition by the date listed in Table B1 of the permit. This condition also requires the permittee to submit As-Built drawings of Outfall 002 by the same date listed in Table B1 of the permit.

8. Schedule E: Pretreatment Activities

As described in Section 2.5, the permittee implements an industrial pretreatment program that was initially approved by DEQ in December 1983 and was subjected to a DEQ compliance audit in December 2018. Schedule E includes specific requirements on how WES is expected to administer and implement its formal pretreatment program. Schedule E also identifies specific document submittal due dates related to some of the pretreatment program components.

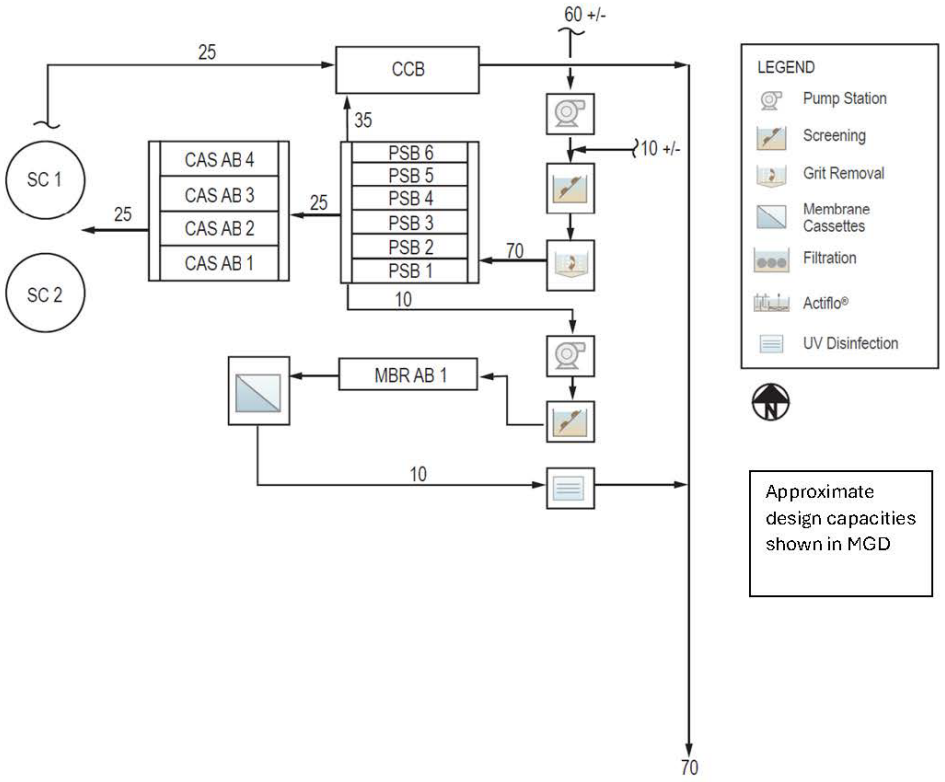
Schedule E, Condition 13 requires that WES submit a complete report on or before March 31 that describes the pretreatment activities conducted during the previous calendar year. In addition, Schedule E, Condition 14 requires WES to submit substantial and non-substantial pretreatment program modification requests to DEQ for approval.

9. Schedule F: NPDES General Conditions

Schedule F contains the following general conditions that apply to all NPDES permittees. These conditions are reviewed by EPA on a regular basis.

- Section A. Standard Conditions
- Section B. Operation and Maintenance of Pollution Controls
- Section C. Monitoring and Records
- Section D. Reporting Requirements
- Section E. Definitions

Appendix A: Process Flow Chart



Existing Tri-City WRRF Process Flow Schematic

Appendix B: Existing Permit Limits

SCHEDULE A

1. Waste Discharge Limitations not to be exceeded after permit effective date.

a. Treated Effluent Outfall 001

(1) May 1 - October 31:

Parameter	Average Effluent Concentrations Monthly	Weekly	Monthly* Average lb/day	Weekly* Average lb/day	Daily* Maximum lbs
$CBOD_5$ (See Note 1)	10 mg/L	15 mg/L	1050	1750	2100
TSS	10 mg/L	15 mg/L	1400	2100	2800

* Average Dry Weather Design Flow for the Facility after the expansion is 11.9 MGD. Summer mass load limits remain the same as the pervious permit.

Other parameters	Limitations
BOD and TSS Removal Efficiency	Shall not be less than 85% based on a monthly average for BOD_5 and shall not be less than 85% based on a monthly average for TSS.

(2) November 1 - April 30:

Parameter	Average Effluent Concentrations Monthly	Weekly	Monthly* Average lb/day	Weekly* Average lb/day	Daily* Maximum lbs
$CBOD_5$ (See Note 1)	25 mg/L	40 mg/L	2800	4500	5600
TSS	30 mg/L	45 mg/L	3400	5100	6800

*The winter mass load limits are based upon average wet weather design flow prior to expansion (13.5 MGD). The daily mass load limit is suspended on any day in which the flow into the treatment facility exceeds 23.8 MGD (twice the design average dry weather flow).

(3) Other Parameters (year-round)

Parameter	Limitations
E. coli Bacteria	Shall not exceed 126 organisms per 100 mL monthly geometric mean. No single sample shall exceed 406 organisms per 100 mL. (See Note 2)
pH	Shall be within the range of 6.0 - 9.0
BOD_5 and TSS Removal Efficiency	Shall not be less than 85% based on a monthly average for BOD_5, and shall not be less than 85% based on a monthly average for TSS.
Total Chlorine Residual	Shall not exceed an average monthly concentration of 0.02 mg/L and a maximum daily concentration of 0.04 mg/L
Ammonia (Interim limit, See note 3)	Shall not exceed a monthly average of 15 mg/L

(4) No wastes may be discharged or activities conducted that violate water quality standards adopted in OAR 340-041 for the Willamette basin except in the regulatory mixing zone and as provided for in OAR 340-045-0080.

The regulatory mixing zone is that portion of the Willamette River which extends 300 feet downstream of the point of discharge. The zone of initial dilution shall include that portion of the Willamette River which extends 30 feet downstream of the point of discharge.

(5) One of the three temperature thermal load limit options below apply as follows:

(A). When the permittee measures effluent temperature and effluent flow for use in determining compliance with the temperature thermal load, the temperature thermal load limits shall not exceed a rolling 7 day average of 144 million Kcals/Day.

(B). When the permittee measures effluent flow, effluent temperature and receiving stream flow for use in determining compliance with the temperature thermal load from the table below or the resultant value of 'a' is greater than zero, the temperature thermal load limits will be based on the range of receiving stream flow shown below and shall not exceed the corresponding ETL in million Kcals/day.

Stream Flow	ETL
When the River flow (cfs) is greater than,	the temperature thermal load shall not exceed a rolling 7 day average of (million Kcals/Day)
0	144
6429	150
6873	153
7362	155
8323	161
9962	171
17294	216

(C). When the permittee measures effluent flow, effluent temperature, receiving stream flow, and receiving stream temperature for use in determining compliance with the temperature thermal load from the table below and the resultant value of 'a' is equal to zero, the temperature thermal load limits will be based on the range of receiving stream flow shown below and shall not exceed the corresponding thermal load in million Kcals/day.

Stream Flow	ETL
When the River flow (cfs) is greater than,	the TTL shall not exceed a rolling 7 day average of (million Kcals/Day)
0	156
6429	162
6873	165
7362	168
8323	173
9962	183
17294	229

(D). When the permittee measures, effluent flow, effluent temperature and receiving stream flow and uses the receiving stream flow for calculating the waste load allocation expressed as excess thermal load, the following equation will be used to determine the permit limits.

$$ETL = (((m \times Q_R)+b) - a) \times Q_{PS} \times 2.447 \times (T_{PS}-T_{RC})$$
$$= ((0.00004872 \times Q_R + 0.985) - 0.1) \times 10.67 \times 2.447 \times (24.8 - 20)$$

(c) The creation of odors, fly and mosquito breeding or other nuisance conditions;
(d) The overloading of land with nutrients, organics, or other pollutant parameters;
(e) Impairment of existing or potential beneficial uses of groundwater.

2. Prior to use, the recycled water must receive treatment to the appropriate Class as defined in OAR 340-055:

Class C

Oxidized and must reduce Total Coliform to 240 organisms per 100 mL in two consecutivesamples, and a seven-day median of 23 organisms per 100 mL.

Class B

Oxidized and must reduce Total Coliform to a 7-day median of 2.2 organisms per 100 mL and a maximum of 23 organisms per 100 mL.

Class A

Oxidized, filtered, and

Prior to disinfection, turbidity must not exceed an average of 2 nephelometric turbidity units (NTUs) within a 24-hour period, 5 NTUs more than five percent of the time within a 24-hour period and 10 NTUs at any time.

After disinfection, Total Coliform must not exceed a median of 2.2 organisms per 100 mL based on results of the last seven days that analyses have been completed, and 23 total coliform organisms per 100 mL in any single sample.

3. All use of recycled water must conform to the Recycled Water Use Plan approved by the Department. Upon approval of the Recycle Water Use Plan, the Plan will become enforceable through this permit.

4. Groundwater

No activities will be conducted that could cause an adverse impact on existing or potential beneficial uses of groundwater.

c. Biosolids
All activities pertaining to the management, treatment and disposal of the biosolids and maintenance of the land application sites shall be conducted in accordance with the approved Biosolids Management Plan as required in Schedule D, item 1 of this permit, and any approved amendments. No changes or amendments may be made in the approved plan without written approval by the Department.

d. Groundwater
No activities shall be conducted that could cause an adverse impact on existing or potential beneficial uses of groundwater.

NOTES:

1. The $CBOD_5$ concentration limits are considered equivalent to the minimum design criteria for BOD_5 specified in OAR 340-041. These limits and $CBOD_5$ mass limits may be adjusted (up or down) by permit action if more accurate information regarding $CBOD_5/BOD_5$ becomes available.

2. If a single sample exceeds 406 organisms per 100 mL, then five consecutive re-samples may be taken at four-hour intervals beginning within 28 hours after the original sample was taken. If the log mean of the five re-samples is less than or equal to 126 organisms per 100 mL, a violation shall not be triggered.

3. Ammonia interim limit of 15 mg/L has been set until requirements in MAO #WQ/M-NWR-11-046 are completed. This limit shall no longer apply once the permittee meets the MAO requirements.

   If the permittee fails to complete the anticipated capital improvement requirements in the MAO by December 1, 2012, then the permittee's Total Ammonia discharge rate during the dry weather flow shall not exceed a monthly average of 9.4 mg/L, and a daily maximum of 20.1 mg/L. During wet weather, ammonia shall not exceed a monthly average of 16.0 mg/L and a daily maximum of 37.8 mg/L as determined by the Reasonable Potential Analysis.

MODIFICATION NO.1

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
WASTE DISCHARGE PERMIT

Department of Environmental Quality
Northwest Region – Portland Office
2020 SW 4th Ave., Suite 400, Portland, OR 97201
Telephone: (503) 229-5263

Issued pursuant to ORS 468B.050 and The Federal Clean Water Act

ISSUED TO:

Tri-City Service District
150 Beavercreek Rd, Suite 430
Oregon City, OR 97045

SOURCES COVERED BY THIS PERMIT:

Type of Waste	Outfall Number	Outfall Location
Treated Wastewater	001	R.M. 25.5
Recycled Water	097-099	Irrigation

FACILITY TYPE AND LOCATION:

Activated Sludge and Membrane Bio-Reactor
15941 S Agnes Avenue
Oregon City, OR 97045

RECEIVING STREAM INFORMATION:

Basin: Willamette
Sub-Basin: Lower Willamette
Receiving Stream: Willamette River
LLID: 1227618456580 25.5 D
County: Clackamas

Treatment System Class: Level IV
Collection System Class: Level IV

EPA REFERENCE NO: OR-003125-9

This modification was initiated by the DEQ.

This permit modification is issued based on the land use findings in the permit record.

Tiffany Yelton-Bram, Water Quality Manager
Northwest Region

Date signed: 6/18/2014

Changes to Schedule A

1. **DELETE Condition 1.c:**

~~c. *Biosolids*~~
~~*All activities pertaining to the management, treatment and disposal of the biosolids and maintenance of the land application sites shall be conducted in accordance with the approved Biosolids Management Plan as required in Schedule D, item 1 of this permit, and any approved amendments. No changes or amendments may be made in the approved plan without written approval by the Department.*~~

2. **SUBSTITUTE new Condition 1.c:**

c. Biosolids
The permittee may land apply biosolids or provide biosolids for sale or distribution, subject to the following conditions:

1. The permittee must manage biosolids in accordance with its DEQ-approved Biosolids Management Plan and Land Application Plan.
2. Except when used for land reclamation and approved by DEQ, biosolids must be applied at or below the agronomic rate required for maximum crop yield.
3. The permittee must obtain written site authorization from DEQ for each land application site prior to land application (see Schedule D, Condition 2) and follow the site-specific management conditions in the DEQ-issued site authorization letter.
4. Biosolids must meet one of the pathogen reduction standards under 40 CFR §503.32 and one of the vector attraction reduction standards under 40 CFR §503.33.
5. Pollutants in biosolids may not exceed the ceiling concentrations shown in the Table (A.1.c) below. Biosolids exceeding the pollutant concentrations in the Table (A.1.c.) below must be applied at a rate that does not exceed the corresponding cumulative pollutant loading rates.

Table A.1.c: Biosolids Limits

Pollutant	Ceiling concentrations[1] (mg/kg)	Pollutant concentrations[1] (mg/kg)	Cumulative pollutant loading rates[1] (kg/ha)
Arsenic	75	41	41
Cadmium	85	39	39
Copper	4300	1500	1500
Lead	840	300	300
Mercury	57	17	17
Molybdenum	75	N/A	N/A
Nickel	420	420	420
Selenium	100	100	100
Zinc	7500	2800	2800

Note: [1] Biosolids pollutant limits are described in 40 CFR Part 503.13, which uses the terms *ceiling concentrations*, *pollutant concentrations*, and *cumulative pollutant loading rates*. Biosolids containing pollutants in excess of the ceiling concentrations may not be applied to the land. Biosolids containing pollutants in excess of the pollutant concentrations, but below the ceiling concentrations, may be applied to the land; however, the total quantity of biosolids applied may not exceed the cumulative pollutant loading rates.

MODIFICATION NO.2

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
WASTE DISCHARGE PERMIT

Department of Environmental Quality
Northwest Region – Portland Office
2020 SW 4th Ave., Suite 400, Portland, OR 97201
Telephone: (503) 229-5263

Issued pursuant to ORS 468B.050 and The Federal Clean Water Act

ISSUED TO:

Tri-City Service District
150 Beavercreek Rd, Suite 430
Oregon City, OR 97045

SOURCES COVERED BY THIS PERMIT:

Type of Waste	Outfall Number	Outfall Location
Treated Wastewater	001	R.M. 25.5
Recycled Water	097-099	Irrigation

FACILITY TYPE AND LOCATION:

Activated Sludge and Membrane Bio-Reactor
15941 S Agnes Avenue
Oregon City, OR 97045

RECEIVING STREAM INFORMATION:

Basin: Willamette
Sub-Basin: Lower Willamette
Receiving Stream: Willamette River
LLID: 1227618456580 25.5 D
County: Clackamas

Treatment System Class: Level IV
Collection System Class: Level IV

EPA REFERENCE NO: OR-003125-9

This modification was initiated by the Tri-City Service District.

This permit modification is issued based on the land use findings in the permit record.

Tiffany Yelton-Bram, Water Quality Manager
Northwest Region

Date signed: 4/14/2016

Changes to Schedule A

1. **ADD TO Condition 1.a (3) – Proposed additions shown in red. Deletions shown in strikeouts**

(3) Other Parameters (year-round)

Parameter	Limitations
Total Chlorine Residual (applicable when Chlorine is in use)	Must ~~Shall~~ not exceed an average monthly concentration of 0.02 mg/L and a maximum daily concentration of 0.04 mg/L. (See Note 4)
Peracetic acid residual	Must not exceed a maximum daily concentration of 1.00 mg/L Must not exceed a monthly average concentration of 0.70 mg/L (See Note 5)

2. **ADD New Notes 4 and 5**

4. The permittee is authorized to transition from using gaseous chlorine to peracetic acid as the primary disinfectant during the pilot test period described in Schedule C. The permittee will not be required to meet the permit's existing chlorine residual limitation while peracetic acid is in use. However, the chlorine residual limitation will remain in effect when chlorine is utilized as the CAS wastewater disinfectant.

5. Upon meeting the requirements of Schedule C, the permittee is authorized to permanently transition from using gaseous chlorine to peracetic acid as the primary disinfectant.

Appendix C: Temperature RPA for Thermal Plume Migration Blockage

Attachment C-1: Thermal Plume Migration Blockage for Outfall 001

Temperature Thermal Plume Limitations within the Mixing Zone Rule (OAR 340-041-0053(2)(d))

Sections 5.6 and 6.5 of Temperature IMD

This rule only applies to receiving streams with salmonid uses. For migration blockage, applies to upstream migration of anadromous salmonits (See associated notes in the "Thermal Plumes Instructions".) This spreadsheet assesses compliance with OAR 340-042-0053(2)(d) subparts C and D. Subparts A and B need to be assessed separately (see Thermal Plumes Instructions).

Facility Name: Tri-City WRRF - Outfall 001 **Date: November 16, 2023**

OAR 340-041-0053(2)(d)(C): Thermal Shock 25 deg C at 5% of the stream cross section			OAR 340-041-0053(2)(d)(D): Migration Blockage 21 deg C at 25% of the stream cross section		
Enter data into white cells below:		Data Metric/Source	Enter data into white cells below:		Data Metric/Source
7Q10 =	cfs		7Q10 =	5902 cfs	Mixing Zone Memorandum
Ambient Temperature=	°C		Ambient Temperature =	21 °C	AQWMS River Data - above 21C
Effluent Flow =	mgd		Effluent Flow =	17.2 mgd	Mixing Zone Study - Maximum Monthly Avg
Max Daily Effluent Temperature =	°C		Max 7dAM Effluent Temperature =	24.6 °C	Maximum effluent temperature 2017-2021
5% of 7Q10 =	0.0 cfs		25% of 7Q10 =	1475.5 cfs	
5% dilution =	#DIV/0! dilution = (Qr*0.05)/Qe + 1		25% dilution =	56 dilution = (Qr*0.25)/Qe + 1	
Temperature at 5% cross section =	#DIV/0! °C		Temperature at 25% cross section =	21.1 °C	
		#DIV/0!	ΔT at 25% Stream Flow=	0.1 °C	No Reasonable Potential
Notes:					

Attachment C-2: Thermal Plume Migration Blockage for Outfall 002

Temperature Thermal Plume Limitations within the Mixing Zone Rule (OAR 340-041-0053(2)(d))

Sections 5.6 and 6.5 of Temperature IMD

This rule only applies to receiving streams with salmonid uses. For migration blockage, applies to upstream migration of anadromous salmonits (See associated notes in the "Thermal Plumes Instructions".) This spreadsheet assesses compliance with OAR 340-042-0053(2)(d) subparts C and D. Subparts A and B need to be assessed separately (see Thermal Plumes Instructions).

Facility Name: Tri-City WRRF - Outfall 002 **Date: November 16, 2023**

OAR 340-041-0053(2)(d)(C): Thermal Shock 25 deg C at 5% of the stream cross section			OAR 340-041-0053(2)(d)(D): Migration Blockage 21 deg C at 25% of the stream cross section		
Enter data into white cells below:		Data Metric/Source	Enter data into white cells below:		Data Metric/Source
7Q10 =	cfs		7Q10 =	5989 cfs	Mixing Zone Memorandum
Ambient Temperature=	°C		Ambient Temperature =	21 °C	AQWMS River Data - above 21C
Effluent Flow =	mgd		Effluent Flow =	17.8 mgd	Mixing Zone Study - Maximum Monthly Average
Max Daily Effluent Temperature =	°C		Max 7dAM Effluent Temperature =	24.6 °C	Maximum effluent temperature 2017-2021
5% of 7Q10 =	0.0 cfs		25% of 7Q10 =	1497.3 cfs	
5% dilution =	#DIV/0! dilution = (Qr*0.05)/Qe + 1		25% dilution =	55 dilution = (Qr*0.25)/Qe + 1	
Temperature at 5% cross section =	#DIV/0! °C		Temperature at 25% cross section =	21.1 °C	
		#DIV/0!	ΔT at 25% Stream Flow=	0.1 °C	No Reasonable Potential
Notes:					

Appendix D: Supporting Information for Flow-Based Temperature WLA and Limit

The flow-based WLA formula is derived from equation 6 of Chapter 4 (Appendix 4.5) of the Willamette River TMDL. The April 2010 DEQ document *Mainstem Willamette Reserve Capacity Analysis* allocated some of the reserve capacity to specific sources, but none to the Tri-City facility (see Table 5 of that document).

TMDL Eqn. 6 $WLA = d \cdot Q_{PS} \cdot k \cdot (T_{PS} - T_{RC})$ (See TMDL p. 4-132.)

The inputs to the equation, including certain values specific to this facility, are as follows:

- $d = ((m \cdot Q_R) + b) - a$ (TMDL Eqn. 7, p. 4-133. This calculates the variable "d" for Eqn. 6.)
  - Within the above equation, $a = 1 - \left(\frac{T_{RA_N}}{T_{RC}}\right)$ (from TMDL p. 4-133)
- m = 0.00004872 (a dimensionless value from page 4-117 of TMDL)
- Q_R = Rolling seven-day average ambient river flow (in cfs) (Variable within equation)
- b = 0.9850 (a dimensionless value from page 4-117 of TMDL)
- T_{RA_N} = 18.0°C (7-day average natural thermal potential river temperature (°C) from TMDL Table 4.37)
- T_{RC} = 20.0°C (Applicable biologically based numeric temperature criterion (°C) from TMDL p.117)
- Q_{PS} = 10.67 (Max observed effluent flow (cfs) from TMDL p.117)
- T_{ps} = 24.8°C (Rolling seven-day average maximum effluent temperatures (°C) from TMDL p.117)
- k = 2.447 (conversion factor from TMDL p.132)

Solution

1) Solve for *a*

   $a = 1 - (T_{RA\_N}/T_{RC})$

   $a = 1 - (18.0/20.0)$

   $\boldsymbol{a = 0.1}$

2) Solve for *d*

   $d = m \cdot Q_R + b - a$

   $d = 0.00004872 \cdot Q_R + 0.9850 - 0.1$

   $d = 0.00004872 \cdot Q_R + 0.8850$

3) Solve for $(T_{PS} - T_{RC})$

   $(T_{PS} - T_{RC}) = 24.8 - 20.0$

   $(T_{PS} - T_{RC}) = 4.8$

4) Plug (1) (2) (3) and the remaining input values into WLA equation:
$WLA = d \cdot Q_{PS} \cdot k \cdot (T_{PS} - T_{RC})$

$WLA = (0.00004872 \cdot Q_R + 0.8850) \cdot 10.67 \cdot 2.447 \cdot 4.8$

$WLA = (0.00004872 \cdot Q_R + 0.8850) \cdot 125.3$

$WLA = (0.00004872 \cdot Q_R \cdot 125.3) + (0.8850 \cdot 125.3)$

$WLA = 0.006105 \cdot Q_R + 110.9$

$$\boldsymbol{WLA = 0.00611 \cdot Q_R + 111\ million\ kilocalories/day}$$

The above equation is the final flow-based TMDL WLA equation for the facility, rounded to three significant figures (to be consistent with the static limit value).

Appendix E: Ammonia RPA for Outfall 001

Reasonable Potential Analysis - Fresh and Saltwater Ammonia Criteria

Ammonia RPA Calculation (2013 Criteria) Revision 3.1

RPA Run Information

Facility Name:	Tri-City WRRF
Outfall Number:	1
Permit Writer Name:	Mark W. Hynson
Date of RPA Run:	1-Nov-23
RPA Run Notes: Discharges through Outfall 001 only. No concurrent discharges from Outfall 002 located upstream. Outfall 001 expected to discharge as primary outfall until February 1, 2026.	
KEY:	-- Intermediate calc.s
* Enter data here	-- Calculated results

Enter Information Below

Enter Dilution Values			
Dilution @ ZID (from study)			3.2
Dilution @ MZ 7Q10 (from study)			27
Dilution @ MZ 30Q5 (from study)			27
Is waterbody fresh or salt water? (Fresh/Salt)			Fresh
If Saltwater, then enter salinity (ppt)			
Ambient Salinity		ppt	*
Effluent Salinity		ppt	*
Are Salmonid a designated use (OAR 340-041-0101 through 0340? (Yes/No)			Yes
Confidence Level and Probability Basis			
Confidence Level		%'ile	99%
Probability Basis		%'ile	95%

Dilution Calculations

Inputs

		ZID	MZ (7Q10)	MZ (30Q5)
Dilution Factors		3.2	27.0	27.0
Upstream Characterization			Acute	Chronic
Temperature	deg. C		24.2	24.2
pH			7.9	7.9
Alkalinity	mg/L $CaCO_3$		28.0	28.0
Effluent Characterization				
Temperature	deg. C		23.7	23.7
pH			7.5	7.5
Alkalinity	mg/L $CaCO_3$		94.0	94.0

*Calculation of pH of a mixture of two flows based on the procedure in EPA's DESCON program (EPA, 1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington D.C.)

** Selection of acute alkalinity %ile is based on pH of effluent vs ambient.

Outputs

		ZID	MZ (7Q10)	MZ (30Q5)
Upstream				
pKa		6.4	6.4	6.4
Ionization Fraction		1.0	1.0	1.0
Total Inorganic Carbon	mg/L $CaCO_3$	28.8	28.8	28.8
Effluent				
pKa		6.4	6.4	6.4
Ionization Fraction		0.9	0.9	0.9
Total Inorganic Carbon	mg/L $CaCO_3$	100.8	100.8	100.8
Mixing Zone				
Temperature	deg. C	24.0	24.2	24.2
Alkalinity	mg/L $CaCO_3$	48.6	30.4	30.4
Total Inorganic Carbon	mg/L $CaCO_3$	51.3	31.5	31.5
pKa		6.4	6.4	6.4
pH		7.6	7.8	7.8
Salinity	ppt	--	--	

Reasonable Potential Analysis

Pollutant Parameter	End of Pipe Analysis					Determine In-Stream Conc.				WQ Criteria			
	# of Samples	Highest Effluent Conc.	Coefficent of Variation	Est. Maximum Effluent Conc.	RP at end of pipe?	Ambient Conc.	Max Total Conc. at ZID	Max Total Conc. at RMZ (7Q10)	Max Total Conc. at RMZ (30Q5)	Acute CMC	Chronic Calc. (4-day avg.)	Chronic Calc. (7Q10)	Chronic Calc. (30 day avg.)
		mg/l		mg/l	(Yes/No)	mg/l	mg/l	mg/l	mg/l	mg/l	mg/L	mg/l	mg/l
Ammonia (Freshwater Salmonids)	388	40.7	0.3	40.7	Yes	0.1	12.8	1.6	1.6	5.5	1.9		0.7
Ammonia (Freshwater, Salmonids absent)	--	--	--	--	--	--	--	--	--	--	--		--
Ammonia (Salt Water)	--	--	--	--	--	--	--	--		--		--	

ZID and MZ Analysis

Pollutant Parameter	Is there Reasonable Potential to Exceed? (Yes/No)			
	Acute	Chronic (4 day avg.)	Chronic (7Q10)	Chronic (30 day avg.)
Ammonia (Freshwater Salmonids)	YES	NO		YES
Ammonia (Freshwater, Salmonids absent)	--	--		--
Ammonia (Salt Water)	--		--	

Effluent Limits

Pollutant Parameter	# of Req's Samples	Waste Load Allocations				Long Term Average					Effluent Limits	
		Acute WLA	Chronic WLA (4 day avg.)	Chronic WLA (7Q10)	Chronic WLA (30Q5)	Acute LTA	Chronic LTA (4 day avg.)	Chronic LTA (7Q10)	Chronic LTA (30Q5)	Min. LTA	Max Daily (MDL)	Monthly (AML)
	#/month	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	99%	95%
Ammonia (Freshwater Salmonids)	8	17.5	48.7		18.4	8.5	33.2		15.9	8.5	17.5	10.3
Ammonia (Freshwater, Salmonids absent)	--	--	--		--	--	--		--	--	--	--
Ammonia (Salt Water)	--	--		--		--		--		--	--	--

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