

Fact Sheet for NPDES Permit WA0024058

City of Edmonds Wastewater Treatment Plant

Date of Public Notice: May 30, 2024

Permit Effective Date: xx/xx/xxxx

Purpose of this fact sheet

This fact sheet explains and documents the decisions the Department of Ecology (Ecology) made in drafting the proposed National Pollutant Discharge Elimination System (NPDES) permit for the City of Edmonds Wastewater Treatment Plant (Edmonds WWTP).

This fact sheet complies with [Section 173-220-060 of the Washington Administrative Code \(WAC\)](#), which requires Ecology to prepare a draft permit and accompanying fact sheet for public evaluation before issuing an NPDES permit.

Ecology makes the draft permit and fact sheet available for public review and comment at least thirty (30) days before issuing the final permit. Copies of the fact sheet and draft permit for Edmonds WWTP, NPDES permit WA0024058, are available for public review and comment from May 30, 2024 until July 1, 2024. For more details on preparing and filing comments about these documents, please see **Appendix A - Public Involvement Information**.

The City of Edmonds (City) reviewed the draft permit and fact sheet for factual accuracy. Ecology corrected any errors or omissions regarding the facility's location, history, wastewater discharges, or receiving water prior to publishing this draft fact sheet for public notice.

After the public comment period closes, Ecology will summarize substantive comments and provide responses to them. Ecology will include the summary and responses to comments in this fact sheet as **Appendix H - Response to Comments**, and publish it when issuing the final NPDES permit. Ecology generally will not revise the rest of the fact sheet. The full document will become part of the legal history contained in the facility's permit file.

Summary

The City of Edmonds owns and operates a conventional activated sludge wastewater treatment plant that serves regional wastewater treatment needs for a portion of southwest Snohomish County and northwest King County. Communities served by the Edmonds WWTP include most of the City of Edmonds, the City of Mountlake Terrace, portions of the cities of Lynnwood and Shoreline, and the Town of Woodway. The treatment plant serves collection systems owned and operated by the cities of Edmonds, Lynnwood, Mountlake Terrace, Shoreline and the Olympic View Water and Sewer District.

Ecology issued the previous permit for the Edmonds WWTP on October 24, 2014. The previous permit imposed limits on carbonaceous biochemical oxygen demand, total suspended solids, fecal coliform bacteria, pH, total residual chlorine and Acute Whole Effluent Toxicity. The proposed permit contains the same limits for the above parameters. The proposed permit also removes nitrogen species that are now monitored under the City's Puget Sound Nutrient General Permit (WAG994580), expands monitoring for enterococci bacteria and phosphorus, requires sediment monitoring along with an evaluation of the plant's outfall, and requires submission of an updated Operations & Maintenance Manual.

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I. Introduction

The Federal Clean Water Act (FCWA, 1972, and later amendments in 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One mechanism for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System (NPDES), administered by the federal Environmental Protection Agency (EPA). The EPA authorized the state of Washington to manage the NPDES permit program in our state. Our state legislature accepted the delegation and assigned the power and duty for conducting NPDES permitting and enforcement to Ecology. The Legislature defined Ecology's authority and obligations for the wastewater discharge permit program in [90.48 RCW](#) (Revised Code of Washington).

The following regulations apply to domestic wastewater NPDES permits:

Procedures Ecology follows for issuing NPDES permits ([chapter 173-220 WAC](#))

Technical criteria for discharges from municipal wastewater treatment facilities ([chapter 173-221 WAC](#))

Water quality criteria for surface waters ([chapter 173-201A WAC](#))

Water quality criteria for groundwaters ([chapter 173-200 WAC](#))

Whole effluent toxicity testing and limits ([chapter 173-205 WAC](#))

Sediment management standards ([chapter 173-204 WAC](#))

Submission of plans and reports for construction of wastewater facilities ([chapter 173-240 WAC](#))

These rules require any treatment facility owner/operator to obtain an NPDES permit before discharging wastewater to state waters. They also help define the basis for limits on each discharge and for requirements imposed by the permit.

Under the NPDES permit program and in response to a complete and accepted permit application, Ecology must prepare a draft permit and accompanying fact sheet, and make them available for public review before final issuance. Ecology must also publish an announcement (public notice) telling people where they can read the draft permit, and where to send their comments, during a period of thirty days ([WAC 173-220-050](#)). (See **Appendix A-Public Involvement Information** for more detail about the public notice and comment procedures). After the public comment period ends, Ecology may make changes to the draft NPDES permit in response to comment(s). Ecology will summarize the responses to comments and any changes to the permit in **Appendix H**.

II. Background Information

Table 1. Facility Information

Applicant:	City of Edmonds
Facility Name and Address	City of Edmonds Wastewater Treatment Plant 200 Second Avenue South Edmonds, WA 98020
Contact at Facility	Name: Ross Hahn Title: WWTP Manager Telephone #: 425-771-0237 Email: ross.hahn@edmondswa.gov
Responsible Official	Name: The Honorable Michael Nelson Title: Mayor Address: 121 5 th Ave N, Edmonds, WA 98020 Telephone #: 425-771-0247 Email: mike.nelson@edmondswa.gov
Type of Treatment	Conventional Activated Sludge
Facility Location (NAD83/WGS84 reference datum)	Latitude: 47.80913 Longitude: -122.38244
Discharge Waterbody Name and Location (NAD83/WGS84 reference datum)	<u>Puget Sound Central Basin (Outfall 001)</u> North Diffuser: Latitude: 47.813056 Longitude: -122.390278 South Diffuser: Latitude: 47.811667 Longitude: -122.390833

Permit Status

Renewal Date of Previous Permit: October 24, 2014

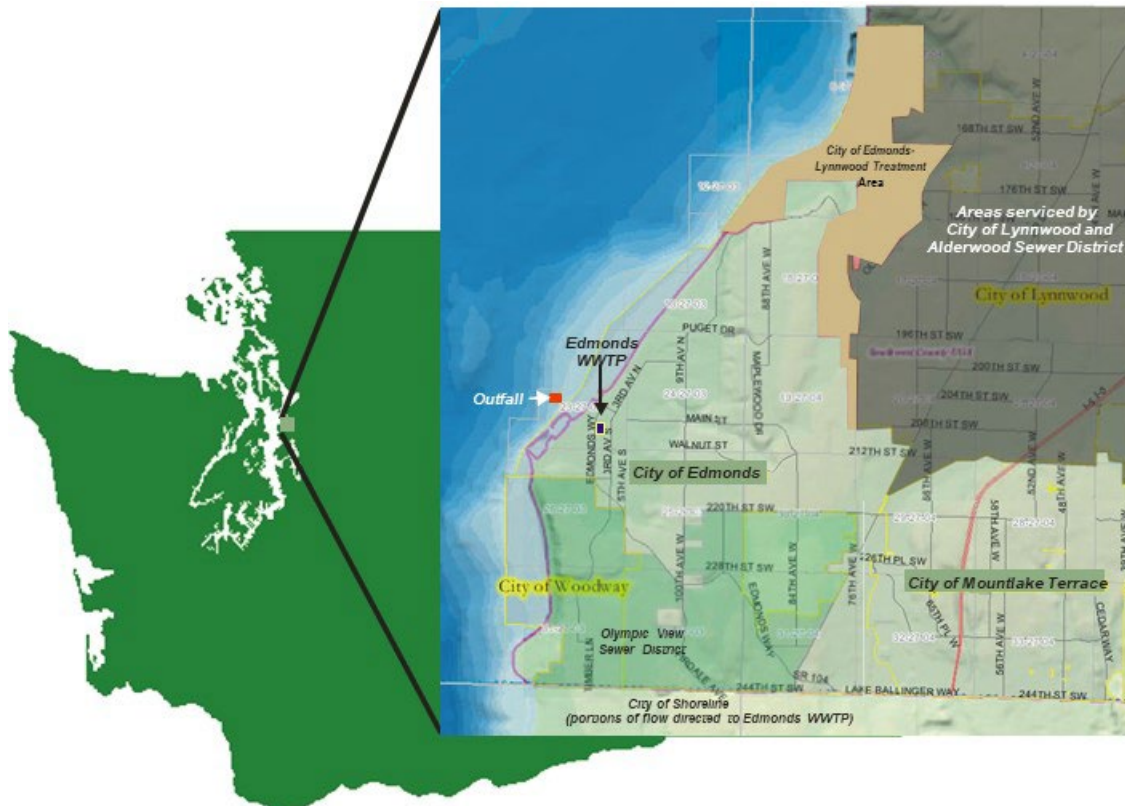
Application for Permit Renewal Submittal Date: April 1, 2019

Date of Ecology Acceptance of Application: May 8, 2019

Inspection Status

Date of Last Non-sampling Inspection: January 5, 2022

Figure 1. Facility Location Map



II.A. Facility description

1. History

Sewer service for the City of Edmonds (City) started prior to 1920 with a combined sanitary and stormwater collection system that discharged untreated wastewater to Puget Sound. In the early 1950s, the City began expanding the collection system with separate storm and sanitary systems. The City also made efforts to separate stormwater and sanitary flows in their existing combined system.

The City built its first primary treatment plant in 1957 to treat 2.0 million gallons per day (MGD) for a population of 20,000. In 1959, the City finalized agreements with the city of Mountlake Terrace and the Ronald Sewer District to treat wastewater from those service areas. At the same time, the City expanded the primary plant to serve a population of 50,000 and a design flow of 4.0 MGD. It expanded the primary treatment plant a third time in 1967 to a design flow of 7.6 MGD for a service population of 76,000. The third expansion was necessary to accommodate new flows that resulted from a treatment agreement with the Olympic View Water and Sewer District and an expansion of the Ronald Sewer District service area (now owned by the City of Shoreline).

The City started planning to convert the treatment system from primary treatment to secondary treatment in 1986. It completed construction of the new secondary plant, which is the current facility, in 1991. The plant has a design capacity of 11.8 MGD. The City constructed the existing facility using the entire available footprint, so options for expanding treatment at the existing site are limited

2. Collection system status

The City manages a 7.4 square mile service area that serves 9,262 connections within the city's boundaries. The collection system consists of 168 miles of pipe, approximately 3,300 manholes, and 15 lift stations. The City installed more than half of the system pipelines during the 10-year period between 1959 and 1968. The City's 2006 Comprehensive Sewer Plan estimated that roughly half of the system is 40 years old or older and is constructed of materials that have reached the end of their useful life.

While most of the flow from the city's service area is treated at the Edmonds WWTP, flows from the northern portion of the city are treated at the Lynnwood WWTP under an agreement with Lynnwood. The agreement provides Edmonds with a reserve capacity of 920,000 gallons per day for treatment at the Lynnwood facility. Flows from the eastern portion of the city (basins served by the Lake Ballinger Pump Station) are treated at the King County West Point WWTP under a flow-swapping agreement with King County that sends flows from King County's Richmond Beach Pump Station to the Edmonds WWTP for treatment.

The collection system within the City of Edmonds is managed by a separate division within the Edmonds' Public Works Department. Other public utility agencies operate and maintain the collection systems in areas outside of the City of Edmonds that flow to the Edmonds WWTP. The treatment plant also accepts wastewater from Washington State Ferries via a pump-out station located at the ferry dock a few blocks away.

3. Treatment processes

The Edmonds WWTP is a conventional secondary treatment plant consisting of a headworks with screening, primary clarifiers, aeration basins for biological treatment, secondary clarifiers, and chlorine disinfection. **Appendix D** contains a site plan layout for the facility.

Flow enters the facility in three separate channels dedicated to different origin sources. One channel contains flows from the City of Edmonds' collection system; one channel conveys flows from King County's Richmond Beach Lift Station; and the third channel carries flows from the City's regional partner Mountlake Terrace. Each flow channel has dedicated flow metering using ultrasonic flow sensors over Parshall flumes. Each channel is also equipped with its own 4-foot wide, mechanical bar screen with 1/4" openings. After flow measurement, the three influent paths combine and flow into two wet wells. A

flow-paced proportional sampler draws influent samples from the discharge pipe of the influent pumps.

Two constant-speed and two variable-speed, 100 hp vertical pumps, transfer wastewater from the wet wells to a splitter box that gravity feeds three primary clarifiers. Primary treated wastewater then flows to an any of the three aeration basins for secondary biological treatment. Influent mixes with return activated sludge from the secondary clarifiers in a premix box prior to the aeration basin. The City modified one of the aeration basins in 2012 to operate as a plug-flow basin and uses ultrafine-bubble diffuser bars for air supply. The Third basin is only configured to operate as completely mixed basins with fine-bubble diffuser discs. The City modified and configured the second aeration basin to a plug-flow in 2016. The third basin will remain complete mixed.

After treatment in the aeration basins, mixed liquor flows to any of the three center-feed secondary clarifiers for liquid-solids separation, including sludge settling. A manifold along the clarifier effluent weirs injects sodium hypochlorite into the flow stream of the clarified effluent. The effluent then flows to chlorine contact chambers that provide approximately one hour of disinfectant contact time at typical flow rates. A sodium bisulfite solution is added to dechlorinate the flow just as the effluent flows over a weir leaving the chlorine contact chambers and drops into an effluent wet well. Final disinfected effluent then collects in an effluent wet well prior to discharge using either gravity feed or pump feed, depending on tide levels in the receiving water. The plant operators collect flow paced samples of final effluent from the effluent wet well.

The original Ecology-approved design of the Edmonds WWTP included the capability to route flow around the secondary treatment units (aeration basins and secondary clarifiers) when flow rates exceed 22.9 MGD maximum daily flow rate. This internal bypass mechanism can divert a portion of the flow leaving the primary clarifiers and route it directly to the chlorine contact chambers, where it would blend with the portion of flow that received full secondary treatment. Although the facility's SCADA system monitors flow and provides an alarm that alerts operators when flows exceed 22.9 MGD, the bypass valve is not automated; operators must manually activate the bypass valve. According to plant staff, the City has never used this bypassing ability and has treated flows up to 26.0 MGD maximum daily flow rate through the secondary processes. The city's policy with respect to this bypass mechanism is to treat it as a safety release that staff will use only to prevent loss of property or life during extreme high flows. Any use of this capability is an unpermitted bypass that is subject to Special Condition S5.F and specific notification procedures as described in Special Condition S3.F.

4. Solid wastes/Residual Solids

The treatment facility removes solids during the treatment of the wastewater at the headworks (screenings), and at the primary and secondary clarifiers, in

addition to incidental solids (rags, scum, and other debris) removed as part of the routine maintenance of the equipment. The facility's original design included on-site incineration of all solids (primary and secondary sludge along with screenings) in a fluidized-bed incinerator. Solids removed at the headworks were macerated and dewatered prior to incineration. Settled sludge from the primary clarifiers and waste activated sludge from the secondary treatment system were concentrated with screw presses before incineration. Ash produced in the combustion process was transferred off-site to a local landfill as a non-regulated solid waste. Air emissions from the incinerator was regulated by the Puget Sound Clean Air Agency.

Changes in air pollution regulations for sludge incinerators presented challenges to the City's ability to meet mercury air emissions standards and placed a more stringent interpretation on the material the plant can feed into the incinerator. Based on EPA's interpretation of the incinerator rules, the plant's solids handling process that included incineration of screenings would have resulted in a reclassification of the incinerator as a solid waste incinerator instead of a municipal sludge incinerator. The reclassification would have resulted in even more stringent emissions standards. The incinerator reached the end of its service life, requiring extensive and ongoing maintenance. The incinerator also accounted for a major portion of the WWTP annual operations costs. Furthermore, due to its age, most replacement parts required custom fabrication as they are no longer supplied by the manufacturer. As a result, the City decided to replace the incinerator with an alternative process for future solids handling called gasification.

Gasification is the thermochemical conversion of organic material at elevated temperatures in an oxygen-starved environment. During the first quarter of 2024, The City intends to commission the replacement of the incinerator with a fluid-lift gasification system to add new technology to the solids handling process. Fluid lift gasification produces gaseous syngas and three potential solid end-products: dried Class A biosolids, carbon-rich biochar, and low-carbon concentrated mineral. The WWTP will continue to feed existing screw presses with RAW sludge, WAS and scum thickened with polymer to produce a dewatered sludge. Screenings from the headworks will be landfilled when the system is producing Class A biosolids or biochar. Screens are added to the dewatered sludge mix when the system is producing a concentrated mineral product. The dewatered sludge will then start the new process being fed to a new drum dryer and then fed by a series of mixers, bins and conveyed to the new gasification unit. The syngas will be used to power the gasification process. At the time of permit renewal, the incinerator had been demolished, the City was hauling all dewatered bio-solids for disposal in Oregon.

5. Discharge outfall

Treated and disinfected effluent from the Edmonds WWTP flows into the main basin of Puget Sound through Outfall 001. The outfall terminates in the region

between the Port of Edmonds Marina and the Washington State Ferry dock. The main effluent line is split into two lines running to two independent diffusers. Each line includes isolation valves that allow the City of Edmonds to direct all of the plant effluent flow to either line or to both lines simultaneously. Under normal operation, the City uses both diffusers at all times. The City uses a single diffuser only during times when they need to perform maintenance on a line or to perform annual operational testing of the valves. Figure 2 below illustrates the configuration of the Edmonds WWTP outfall.

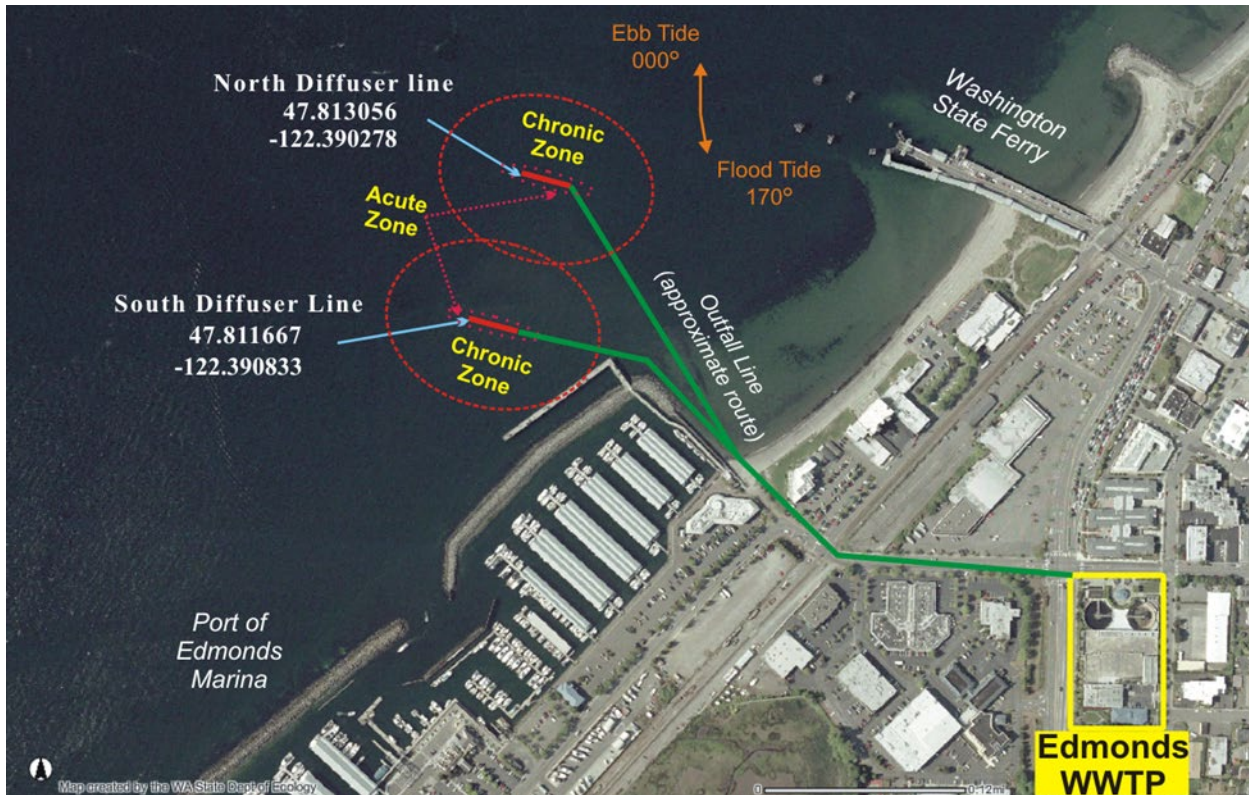


Figure 2. Outfall location

The diffuser lines are laid parallel to each other at an approximate bearing of 285° (WNW), separated by a distance of 460 feet. They are laid at a considerable slope along the sea floor such that there is more than a 10-foot difference in elevation between ports at opposite ends of each diffuser. The North Diffuser (closest to the ferry dock) terminates at a depth of approximately 65 feet (MLLW) at the following coordinates: Latitude 47.813056, Longitude -122.390278. The South Diffuser (closest to the marina) terminates at an approximate depth of 73 feet (MLLW) at the following coordinates: Latitude 47.811667, Longitude -122.390833.

Each diffuser is 160 feet long and is equipped with seven diffuser ports. The first six diffuser ports are spaced 30 feet apart and discharge in alternating directions. The seventh port is located 7 feet away from the sixth port, on the diffuser's end cap, and discharges in a direction parallel to the diffuser line. The City modified

the diffusers in 2011 by removing caps from the ports that reduced the openings to 5-inch diameters. The modified diffuser now has 8-inch diameter ports, except for the end port (#7 on each line) that has a 12-inch opening. The following illustration shows the port configuration of each diffuser line.

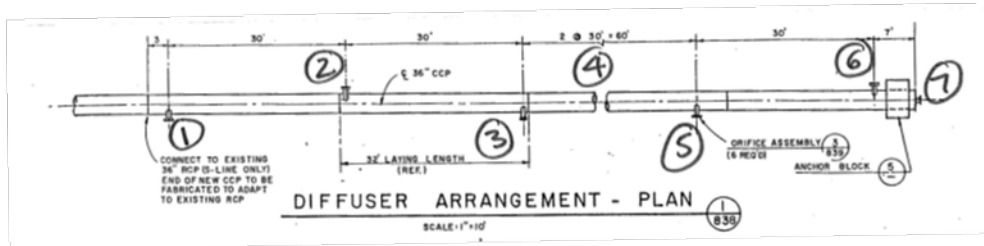


Figure 3. Outfall diffuser port configuration

The City hired Ballard Marine Construction to inspect the submerged portions of the diffuser lines on April 15, 2014. The inspection did not identify significant visible damage to either diffuser section. The report noted that the riser section of one port on the north diffuser line was missing and the diver only found six of the seven ports on the south diffuser line. The divers observed strong flow from the ports closest to shore on each diffuser line and observed light or no flow from the last two ports on each line. This flow pattern is consistent with dilution modeling done by the City prior to the 2011 modification. That modeling effort predicted low flow from the end ports when the plant was discharging in gravity mode.

II.B. Description of the receiving water

The Edmonds WWTP discharges to the northern portion of the central basin of Puget Sound. Other nearby municipal wastewater outfalls include the City of Lynnwood's WWTP outfall located approximately 3 miles to the north and the Kingston WWTP outfall located approximately 5 miles west on the opposite side of Puget Sound. Other known point-source discharges in the immediate vicinity of the Edmonds WWTP outfall include stormwater discharges from the Unocal Edmonds Bulk Fuel Farm site (General Industrial Stormwater NPDES Permit No. WAR002953) and from the Port of Edmonds boatyard work area (General Boatyard NPDES Permit No. WAG030034). The City of Edmonds is a primary Permittee for stormwater runoff within the city's limits under the Western Washington Phase II Municipal Stormwater Permit (Permit No. WAR045513).

In developing the proposed permit, Ecology used ambient data collected from its core marine monitoring station located approximately 6.3 miles northwest of Edmonds at the south end of Admiralty Inlet (Station ADM003: 47.8792°, -122.4818°). Ecology also used ambient metals data collected by King County Department of Natural Resources. Copper and zinc data from a location near Point Wells (Station ID: PTWELLS1, 47.7850°, -122.4067°), antimony data collected between Possession Point and Picnic Point and the remaining data from KC Monitoring station KSBP01 located in the northern Central Puget Sound Basin. Table 2 presents a summary of relevant ambient data based on monitoring records collected between 1999 and 2017.

Table 2. Ambient Background Data

Parameter	Value Used	Monitoring Location/Station
Temperature (95 th /90 th percentile 1-DMax)	12.95 °C/12.7°C	ADM003
pH (95 th /90 th percentile)	8.05/8 standard units	ADM003
Dissolved Oxygen (average)	7.84 mg/L	ADM003
Salinity	30.45 psu	ADM003
Total Ammonia-N (average)	34 mg/L	ADM003
Fecal Coliform (average)	2/100 mL	KSBP01
Antimony (geometric mean)	0.0857 ug/L	Between Possession Point and Picnic Point
Arsenic (90 th percentile)	1.367 ug/L	KSBP01
Cadmium (90 th percentile)	0.0693 ug/L	KSBP01
Chromium (90 th percentile)	0.135 ug/L	KSBP01
Copper (90 th percentile)	0.541 ug/L	PTWELLS1
Nickel (90 th percentile/geometric mean)	0.435 ug/L 0.412 ug/L	KSBP01
Silver (90 th percentile)	0.0262 ug/L	KSBP01
Zinc (90 th percentile)	1.135 ug/L	PTWELLS1

II.C. Wastewater influent characterization

The Edmonds WWTP monitors influent flow and waste loading to verify actual loading does not exceed approved design capacity. Table 3 summarizes facility loading, as reported on Discharge Monitoring Reports (DMRs) from November 2014 to April 2022. **Appendix E** contains complete data for all influent monitoring reported by the facility.

Table 3. Wastewater Influent Characterization

Parameter	Units	Average Monthly Value	Maximum Monthly Value
Flow	MGD	4.6	18.0
Biochemical Oxygen Demand (BOD ₅)	mg/L	253	479
BOD ₅	lbs/day	9,197	25,593

Parameter	Units	Average Monthly Value	Maximum Monthly Value
Flow	MGD	4.6	18.0
Total Suspended Solids (TSS)	mg/L	212	714
TSS	lbs/day	7,568	11,926
Carbonaceous Biochemical Oxygen Demand (CBOD ₅)	mg/L	188	439

II.D. Wastewater effluent characterization

The Edmonds WWTP reported in the permit application and DMRs concentrations of pollutants discharged to Puget Sound via Outfall 001. Table 4 summarizes effluent data for routinely monitored parameters, as reported in DMRs between November 2014 and April 2022 and continues summarizing expanded testing for conventional, non-conventional, and priority pollutants.

The previous permit required quarterly acute WET testing for compliance with limits. Between 2014 to 2021, the facility collected X number of samples. All monitoring showed compliance with acute testing requirements.

Appendix E contains complete data for all routine effluent monitoring reported by the facility.

Table 4. Wastewater Effluent Characterization

Parameter	Units	Average Monthly/ Weekly Value	Maximum Monthly/ Weekly Value
CBOD ₅	mg/L	8/10	15/25
CBOD ₅	lbs/day	312/417	1,284/2,823
CBOD ₅ Removal	%	95/-	
TSS	mg/L	9/13	25/39
TSS	lbs/day	345/482	982/2,350
TSS Removal	%	95/-	

Parameter	Units	Average Geometric Mean	Maximum Geometric Mean
Monthly Fecal Coliform	cfu/100 mL	41	170
Weekly Fecal Coliform	cfu/100 mL	116	974

Parameter	Units	Average Value Range	Minimum/Maximum Value
pH	standard units	6.9-7.3	6.1/7.7

Parameter	Units	Average Value	Maximum Value
Temperature	°C	17.9	23.2
Ammonia	mg/L-N	25	49.2
Ortho-phosphate	mg/L-P	1.9	9.4
Nitrate + Nitrite	mg/L-N	2.2	10
Total Phosphorus	mg/L-P	2.6	9.4
TKN	mg/L-N	30.7	71.4
Monthly Average Total Residual Chlorine	ug/L	83.4	200.2
Daily Maximum Total Residual Chlorine	ug/L	227.1	690.0

Parameter	Units	Detection Level/Quantitation Level	Maximum Value
Antimony	ug/L	0.3/1.0	1.07
Arsenic	ug/L	0.1/0.5	2.9
Bis(2-ethylhexyl)phthalate	ug/L	0.1/0.5	0.8
Cadmium	ug/L	0.05/0.25	0.066
Chloroform	ug/L	1.0/2.0	2.3
Hexavalent Chromium	ug/L	0.3/1.2	0.041
Copper	ug/L	0.4/2.0	15.9
Cyanide	ug/L	5/10	14
Lead	ug/L	0.1/.05	0.652
Methylene Chloride	ug/L	5/10	3.8
Mercury	ug/L	0.0002/0.0005	0.0264
Nickel	ug/L	0.1/0.5	2.84

Parameter	Units	Detection Level/Quantitation Level	Maximum Value
Selenium	ug/L	1.0/1.0	2.56
Silver	ug/L	0.04/0.2	0.1
Toluene	ug/L	1.0/2.0	1.5
Zinc	ug/L	0.5/2.5	57.9

II.E. Summary of compliance with previous permit issued

The previous permit placed effluent limits on CBOD₅, TSS, fecal coliform, pH and total residual chlorine.

The City has generally complied with the effluent limits and permit conditions throughout the duration of the permit issued on October 24, 2014 with the following exceptions. Table 5 identifies 10 numeric effluent limit violations reported by the Edmonds WWTP. In addition, the facility submitted one DMR late in March 2021 and submitted two acute WET testing reports late in 2015. Ecology assessed compliance based on its review of the facility's discharge monitoring reports (DMRs) and on inspections.

Table 5. Effluent limit violations

Date	Parameter	Units	Value	Limit Min/Max
5/1/2016	Total Residual Chlorine	ug/L	690	442
7/22/2016	Total Residual Chlorine	ug/L	510	442
7/27/2017	Total Residual Chlorine	ug/L	460	442
10/1/2017	Total Residual Chlorine	ug/L	200.16	191
4/1/2019	Fecal Coliform	#/100ml	449	400
8/1/2020	Fecal Coliform	#/100ml	577	400
12/1/2020	Fecal Coliform	#/100ml	437	400
2/1/2021	Fecal Coliform	#/100ml	974	400
1/1/2022	CBOD ₅	Percent	84.8	≥ 85
1/1/2022	TSS	Percent	84.2	≥ 85

The permit required written report submittals for acute WET testing with a semiannual frequency, pretreatment-industrial user survey, and infiltration and inflow report once during permit cycle. The Permittee generally submitted all required reports at the scheduled time with the exception of two late submittals for acute WET testing in 2015 and one infiltration and inflow report received late in 2018.

II.F. State environmental policy act (SEPA) compliance

State law exempts the issuance, reissuance or modification of any wastewater discharge permit from the SEPA process as long as the permit contains conditions that are no less stringent than federal and state rules and regulations ([RCW 43.21C.0383](#)). The exemption applies only to existing discharges, not to new discharges.

III. Proposed Permit Limits

Federal and state regulations require that effluent limits in an NPDES permit must be either technology- or water quality-based.

- Technology-based limits are based upon the treatment methods available to treat specific pollutants. Technology-based limits are set by the EPA and published as a regulation, or Ecology develops the limit on a case-by-case basis ([40 CFR 125.3](#), and [chapter 173-220 WAC](#)).
- Water quality-based limits are calculated so that the effluent will comply with the Surface Water Quality Standards ([chapter 173-201A WAC](#)), Ground Water Standards ([chapter 173-200 WAC](#)), Sediment Quality Standards ([chapter 173-204 WAC](#)), or the Federal Water Quality Criteria Applicable to Washington ([40 CFR 131.45](#))
- Ecology must apply the most stringent of these limits to each parameter of concern. These limits are described below.

The limits in this permit reflect information received in the application and from supporting reports (engineering, hydrogeology, etc.). Ecology evaluated the permit application and determined the limits needed to comply with the rules adopted by the state of Washington. Ecology does not develop effluent limits for all reported pollutants. Some pollutants are not treatable at the concentrations reported, are not controllable at the source, are not listed in regulation, and do not have a reasonable potential to cause a water quality violation.

Ecology does not usually develop limits for pollutants not reported in the permit application but may be present in the discharge. The permit does not authorize discharge of the non-reported pollutants. During the five-year permit term, the facility's effluent discharge conditions may change from those conditions reported in the permit application. The facility must notify Ecology if significant changes occur in any constituent [[40 CFR 122.42\(a\)](#)]. Until Ecology modifies the permit to reflect additional discharge of pollutants, a permitted facility could be violating its permit.

III.A. Design criteria

Under [WAC 173-220-150 \(1\)\(g\)](#), flows and waste loadings must not exceed approved design criteria. Ecology approved design criteria for this facility's treatment plant from the

facility's approved Edmonds Wastewater Treatment Plant As-Built Design Summary, prepared by CWC-HDR inc. in 1988. The table below includes design criteria from the referenced report.

Table 6. Design Criteria

Parameter	Design Quantity
Maximum Month Design Flow (MMDF)	11.8 MGD
Peak Hourly Design Flow (PHDF)	40.0 MGD
BOD ₅ Loading for Maximum Month	19,200lbs/day
TSS Loading for Maximum Month	15,900lbs/day

III.B. Technology-based effluent limits

Federal and state regulations define some technology-based effluent limits for domestic wastewater treatment plants. These effluent limits are given in [40 CFR Part 133](#) (federal) and in chapter [173-221 WAC](#) (state).

The table below identifies technology-based limits for pH, fecal coliform, CBOD₅, and TSS, as listed in [chapter 173-221 WAC](#). Sections III.F and III. G of this fact sheet describes the potential for water quality-based limits.

Table 7. Technology-based Limits

Parameter	Average Monthly Limit	Average Weekly Limit
CBOD ₅ (concentration)	25 mg/L	40 mg/L

CBOD₅ (concentration): In addition, the CBOD₅ effluent concentration must not exceed fifteen percent (15%) of the average influent concentration.

Parameter	Average Monthly Limit	Average Weekly Limit
TSS (concentration)	30 mg/L	45 mg/L

TSS (concentration): In addition, the TSS effluent concentration must not exceed fifteen percent (15%) of the average influent concentration.

Parameter	Monthly Geometric Mean Limit	Weekly Geometric Mean Limit
Fecal Coliform Bacteria	200 organisms/100 mL	400 organisms/100 mL

Parameter	Daily Minimum	Daily Maximum
pH	6.0 standard units	9.0 standard units

The existing permit has a monthly average chlorine limit of 191 µg/L and a daily maximum limit of 442 µg/L. Monitoring records demonstrate that the Edmonds WWTP is capable of routinely complying with these limits. Therefore the proposed permit retains these limits as performance-based technology limits.

Technology-based mass limits for CBOD₅ and TSS are based on [WAC 173-220-130\(3\)\(b\)](#) and [WAC 173-221-030\(11\)\(b\)](#). Ecology calculated the monthly and weekly average mass limits for CBOD₅ and Total Suspended Solids as follows:

Mass Limit	=	CL x DF x CF
Where	:	
CL	=	Technology-based concentration limits listed in the above table
DF	=	Maximum Monthly Average Design flow (MGD)
CF	=	Conversion factor of 8.34

Table 8. Technology-based Mass Limits

Parameter	Concentration Limit (mg/L)	Mass Limit (lbs/day)
CBOD ₅ Monthly Average	25	2,460
CBOD ₅ Weekly Average	40	3,936
TSS Monthly Average	30	2,952
TSS Weekly Average	45	4,430

III.C. Surface water quality-based effluent limits

The Washington State surface water quality standards ([chapter 173-201A WAC](#)) are designed to protect existing water quality and preserve the beneficial uses of Washington's surface waters. Waste discharge permits must include conditions that ensure the discharge will meet the surface water quality standards (WAC 173-201A-510). Water quality-based effluent limits may be based on an individual waste load allocation or on a waste load allocation developed during a basin wide total maximum daily load study (TMDL).

1. Numeric criteria for the protection of aquatic life and recreation

Numeric water quality criteria are listed in the water quality standards for surface waters ([chapter 173-201A WAC](#)). They specify the maximum levels of pollutants

allowed in receiving water to protect aquatic life and recreation in and on the water. Ecology uses numeric criteria along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limits, the discharge must meet the water quality-based limits.

2. Numeric criteria for the protection of human health

Numeric criteria for the protection of human health are promulgated in [Chapter 173-201A WAC](#) and [40 CFR 131.45](#). These criteria are designed to protect human health from exposure to pollutants linked to cancer and other diseases, based on consuming fish and shellfish and drinking contaminated surface waters. The water quality standards also include radionuclide criteria to protect humans from the effects of radioactive substances.

3. Narrative criteria

Narrative water quality criteria (e.g., [WAC 173-201A-240\(1\)](#); 2016) limit the toxic, radioactive, or other deleterious material concentrations that the facility may discharge to levels below those which have the potential to:

- Adversely affect designated water uses.
- Cause acute or chronic toxicity to biota.
- Impair aesthetic values.
- Adversely affect human health.

Narrative criteria protect the specific designated uses of all fresh waters ([WAC 173-201A-200, 2016](#)) and of all marine waters ([WAC 173-201A-210, 2016](#)) in the state of Washington.

4. Antidegradation

The purpose of Washington's Antidegradation Policy ([WAC 173-201A-300-330; 2016](#)) is to:

- Restore and maintain the highest possible quality of the surface waters of Washington.
- Describe situations under which water quality may be lowered from its current condition.
- Apply to human activities that are likely to have an impact on the water quality of surface water.
- Ensure that all human activities likely to contribute to a lowering of water quality, at a minimum, apply all known, available, and reasonable methods of prevention, control, and treatment (AKART).
- Apply three tiers of protection (described below) for surface waters of the state.

Tier I: ensures existing and designated uses are maintained and protected and applies to all waters and all sources of pollutions.

Tier II: ensures that waters of a higher quality than the criteria assigned are not degraded unless such lowering of water quality is necessary and in the overriding public interest. Tier II applies only to a specific list of polluting activities.

Tier III: prevents the degradation of waters formally listed as "outstanding resource waters," and applies to all sources of pollution.

A facility must prepare a Tier II analysis when all three of the following conditions are met:

- The facility is planning a new or expanded action.
- Ecology regulates or authorizes the action.
- The action has the potential to cause measurable degradation to existing water quality at the edge of a chronic mixing zone.

Facility Specific Requirements — This facility must meet Tier I requirements.

- Dischargers must maintain and protect existing and designated uses. Ecology must not allow any degradation that will interfere with, or become injurious to, existing or designated uses, except as provided for in [chapter 173-201A WAC](#).
- Ecology's analysis described in this section of the fact sheet demonstrates that the proposed permit conditions will protect existing and designated uses of the receiving water.

5. Mixing zones

A mixing zone is the defined area in the receiving water surrounding the discharge port(s), where wastewater mixes with receiving water. Within mixing zones the pollutant concentrations may exceed water quality numeric standards, so long as the discharge doesn't interfere with designated uses of the receiving water body (for example, recreation, water supply, and aquatic life and wildlife habitat, etc.) The pollutant concentrations outside of the mixing zones must meet water quality numeric standards.

State and federal rules allow mixing zones because the concentrations and effects of most pollutants diminish rapidly after discharge, due to dilution. Ecology defines mixing zone sizes to limit the amount of time any exposure to the end-of-pipe discharge could harm water quality, plants, or fish.

The state's water quality standards allow Ecology to authorize mixing zones for the facility's permitted wastewater discharges only if those discharges already receive all known, available, and reasonable methods of prevention, control, and treatment (AKART). Mixing zones typically require compliance with water quality criteria within a specified distance from the point of discharge and must not use

more than 25% of the available width of the water body for dilution [\[WAC 173-201A-400 \(7\)\(a\)\(ii-iii\)\]](#) or [\[WAC 173-201A-400\(7\)\(b\)\(ii-iii\)\]](#).

Ecology uses modeling to estimate the amount of mixing within the mixing zone. Through modeling Ecology determines the potential for violating the water quality standards at the edge of the mixing zone and derives any necessary effluent limits. Steady-state models are the most frequently used tools for conducting mixing zone analyses. Ecology chooses values for each effluent and for receiving water variables that correspond to the time period when the most critical condition is likely to occur (see Ecology's *Permit Writer's Manual*). Each critical condition parameter, by itself, has a low probability of occurrence and the resulting dilution factor is conservative. The term "reasonable worst-case" applies to these values.

The mixing zone analysis produces a numeric value called a dilution factor (DF). A dilution factor represents the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. For example, a dilution factor of 4 means the effluent is 25% and the receiving water is 75% of the total volume of water at the boundary of the mixing zone. Ecology uses dilution factors with the water quality criteria to calculate reasonable potentials and effluent limits. Water quality standards include both aquatic life-based criteria and human health-based criteria. The former are applied at both the acute and chronic mixing zone boundaries; the latter are applied only at the chronic boundary. The concentration of pollutants at the boundaries of any of these mixing zones may not exceed the numeric criteria for that zone.

Most aquatic life *acute* criteria are based on the assumption that organisms are not exposed to that concentration for more than one hour and more often than one exposure in three years. Most aquatic life *chronic* criteria are based on the assumption that organisms are not exposed to that concentration for more than four consecutive days and more often than once in three years.

The two types of human health-based water quality criteria distinguish between those pollutants linked to non-cancer effects (non-carcinogenic) and those linked to cancer effects (carcinogenic). The human health-based water quality criteria incorporate several exposure and risk assumptions. These assumptions include:

- A 70-year lifetime of daily exposures.
- An ingestion rate for fish or shellfish measured in kg/day.
- An ingestion rate of two and four tenths (2.4) liters/day for drinking water (increased from two liters/day in the 2016 Water Quality Standards update).
- A one-in-one-million cancer risk for carcinogenic chemicals.

This permit authorizes a small acute mixing zone, surrounded by a chronic mixing zone around the point of discharge ([WAC 173-201A-400](#)). The water quality standards impose certain conditions before allowing the discharger a mixing zone:

- a. Ecology must specify both the allowed size and location in a permit.

The proposed permit specifies the size and location of the allowed mixing zone (as specified below).

- b. The facility must fully apply “all known, available, and reasonable methods of prevention, control and treatment” ([AKART](#)) to its discharge.

Ecology has determined that the treatment provided at Edmonds WWTP meets the requirements of AKART.

- c. Ecology must consider critical discharge conditions.

Surface water quality-based limits are derived for the water body’s critical condition (the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or designated waterbody uses). The critical discharge condition is often pollutant-specific or waterbody-specific.

Critical discharge conditions are those conditions that result in reduced dilution or increased effect of the pollutant. Factors affecting dilution include the depth of water, the density stratification in the water column, the currents, and the rate of discharge. Density stratification is determined by the salinity and temperature of the receiving water. Temperatures are warmer in the surface waters in summer. Therefore, density stratification is generally greatest during the summer months. Density stratification affects how far up in the water column a freshwater plume may rise. The rate of mixing is greatest when an effluent is rising. The effluent stops rising when the mixed effluent is the same density as the surrounding water. After the effluent stops rising, the rate of mixing is much more gradual. Water depth can affect dilution when a plume might rise to the surface when there is little or no stratification. Ecology uses the water depth at mean lower low water (MLLW) for marine waters. Ecology’s [Permit Writer’s Manual](#) describes additional guidance on criteria/design conditions for determining dilution factors. The manual can be obtained from Ecology’s website at: <https://apps.ecology.wa.gov/publications/documents/92109.pdf>.

The following critical conditions were used to model the discharge:

- As described in **Appendix F**, Rosedale Marine Engineering updated a 2009 mixing zone model developed by Ecology to evaluate acute mixing for each individual diffuser port. The analysis of each port was based on the assumption that individual plumes do not merge in the acute or chronic zones. Water depth at MLLW for the 14 ports range from 56 feet to 73 feet. To minimize the size of the authorized mixing zone, Ecology based the overall mixing zone size on the shallowest port, which is located at 56 feet MLLW. The model also predicts less dilution for shallower diffuser ports.
- Two potentially critical conditions: summer conditions with high stratification and winter conditions with low stratification. The average June density profile with a difference of 1.20 practical salinity units (psu) between 25 meters (82 feet) and the surface represents the “summer” or high-stratification condition. The average

December density profile with a difference of 0.35 practical salinity units (psu) between 25 meters (82 feet) and the surface represents the “winter” or low stratification condition.

- 50th percentile current speeds of 0.5 knots (ebb tide) and 0.1 knots (flood tide) for chronic and human health mixing zones. The same median current speed applies for both June and December conditions.
- Acute mixing analysis assumed June 10th percentile current speed of 0.28 knots (ebb tide) and 0.02 knots (flood tide). December 10th percentile current speeds used were 0.27 knots (ebb) and 0.03 knots (flood). June’s 90th percentile current speeds for acute analysis were 0.7 knots (ebb tide) and 0.3 knots (flood tide), and December’s 90th percentile current speeds were assumed to be 0.8 knots (ebb tide) and 0.3 knots (flood tide).
- The maximum average monthly summer effluent flow of 4.7 MGD for modeling chronic and human health dilution for the June critical condition. For the December critical condition, Ecology used the maximum average monthly winter flow of 9.8 MGD.
- The highest daily maximum summer effluent flow of 7.0 MGD for modeling acute dilution for the June critical condition. For the December critical condition, Ecology used the highest daily maximum winter flow of 17.7 MGD.
- 1 DAD MAX summer effluent temperature of 22.5 degrees C and 1 DAD MAX winter effluent temperature of 18.6 degrees C.

Ambient data at critical conditions in the vicinity of the outfall was compiled from Ecology’s core marine monitoring station located at the south end of Admiralty Inlet, located approximately 6.3 miles northwest of Edmonds (Station ADM003). Current velocities were estimated based on 2009 NOAA tide and current predictions tables for a location 2.7 miles WSW of Edmonds.

Table 9. Critical conditions used to model the discharge

Critical Condition	June	December
Water depth of shallowest port at MLLW	56 feet	56 feet
Density profiles with differences in practical salinity units (PSU) listed to the right between 82 feet and the surface	1.2 psu	0.35 psu
10th percentile current speeds for acute mixing zone	0.28 knots ebb tide 0.2 knots flood tide	0.27 knots ebb tide 0.03 knots flood tide
90th percentile current speeds for acute mixing zone	0.7 knots ebb tide	0.8 knots ebb tide

Critical Condition	June	December
	0.3 knots flood tide	0.3 knots flood tide
50th percentile current speeds for chronic and human health mixing zones	0.5 knots and 0.1 knots	0.5 knots and 0.1 knots
Maximum average monthly effluent flow for chronic and human health non-carcinogen	4.7 MGD and 4.7 MGD	9.8 MGD and 9.8 MGD
Maximum daily flow for acute mixing zone	7.0 MGD	17.7 MGD
1 DAD MAX effluent temperature	22.5 degrees C	18.6 degrees C

d. Supporting information must clearly indicate the mixing zone would not:

- Have a reasonable potential to cause the loss of sensitive or important habitat.
- Substantially interfere with the existing or characteristic uses.
- Result in damage to the ecosystem.
- Adversely affect public health.

Ecology established Washington State water quality criteria for toxic chemicals using EPA criteria. EPA developed the criteria using toxicity tests with numerous organisms and set the criteria to generally protect the species tested and to fully protect all commercially and recreationally important species.

EPA sets acute criteria for toxic chemicals assuming organisms are exposed to the pollutant at the criteria concentration for one hour. They set chronic standards assuming organisms are exposed to the pollutant at the criteria concentration for four days. Dilution modeling under critical conditions generally shows that both acute and chronic criteria concentrations are reached within minutes of discharge.

The discharge plume does not impact drifting and non-strong swimming organisms because they cannot stay in the plume close to the outfall long enough to be affected. Strong swimming fish could maintain a position within the plume, but they can also avoid the discharge by swimming away. Mixing zones generally do not affect benthic organisms (bottom dwellers) because the buoyant plume rises in the water column. Ecology has additionally determined that the effluent will not exceed 33 degrees C for more than two seconds after discharge; and that the temperature of the water will not create lethal conditions or blockages to fish migration.

Ecology evaluates the cumulative toxicity of an effluent by testing the discharge with whole effluent toxicity (WET) testing.

Ecology reviewed the above information, the specific information on the characteristics of the discharge, the receiving water characteristics, and the discharge location. Based on this review, Ecology concluded that the discharge does

not have a reasonable potential to cause the loss of sensitive or important habitat, substantially interfere with existing or characteristics uses, result in damage to the ecosystem, or adversely affect public health if the permit limits are met.

- e. The discharge/receiving water mixture must not exceed water quality criteria outside the boundary of a mixing zone.

Ecology conducted a reasonable potential analysis, using procedures established by the EPA and by Ecology, for each pollutant and concluded the discharge/receiving water mixture will not violate water quality criteria outside the boundary of the mixing zone if permit limits are met.

- f. The size of the mixing zone and the concentrations of the pollutants must be minimized.

At any given time, the effluent plume uses only a portion of the acute and chronic mixing zone, which minimizes the volume of water involved in mixing. Because tidal currents change direction, the plume orientation within the mixing zone changes. The plume mixes as it rises through the water column therefore much of the receiving water volume at lower depths in the mixing zone is not mixed with discharge. Similarly, because the discharge may stop rising at some depth due to density stratification, waters above that depth will not mix with the discharge. Ecology determined it is impractical to specify in the permit the actual, much more limited volume in which the dilution occurs as the plume rises and moves with the current.

Ecology minimizes the size of mixing zones by requiring dischargers to install diffusers when they are appropriate for the discharge and the specific receiving waterbody. When a diffuser is installed, the discharge is more completely mixed with the receiving water in a shorter time. Ecology also minimizes the size of the mixing zone (in the form of the dilution factor) using design criteria with a low probability of occurrence. For example, Ecology uses the expected 95th percentile pollutant concentration, the 90th percentile background concentration, the centerline dilution factor, and the lowest flow occurring once in every ten years to perform the reasonable potential analysis.

Because of the above reasons, Ecology has effectively minimized the size of the mixing zone authorized in the proposed permit.

- g. Maximum size of mixing zone.

The authorized mixing zone does not exceed the maximum size restriction.

- h. Acute mixing zone.

- The discharge/receiving water mixture must comply with acute criteria as near to the point of discharge as practicably attainable.

Ecology determined the acute criteria will be met at 10% of the distance of the chronic mixing zone.

- The pollutant concentration, duration, and frequency of exposure to the discharge will not create a barrier to migration or translocation of indigenous organisms to a degree that has the potential to cause damage to the ecosystem.

As described above, the toxicity of any pollutant depends upon the exposure, the pollutant concentration, and the time the organism is exposed to that concentration. Authorizing a limited acute mixing zone for this discharge assures that it will not create a barrier to migration. The effluent from this discharge will rise as it enters the receiving water, assuring that the rising effluent will not cause translocation of indigenous organisms near the point of discharge (below the rising effluent).

- Comply with size restrictions.

The mixing zone authorized for this discharge complies with the size restrictions published in [chapter 173-201A WAC](#).

i. Overlap of mixing zones.

This mixing zone does not overlap another mixing zone.

III.D. Designated uses and surface water quality criteria

Applicable designated uses and surface water quality criteria are defined in [chapter 173-201A WAC](#). The tables included below summarize the criteria applicable to the receiving water's designated uses.

- Aquatic life uses are designated using the following general categories. All indigenous fish and non-fish aquatic species must be protected in waters of the state.
 - a. Extraordinary quality salmonid and other fish migration, rearing, and spawning; clam, oyster, and mussel rearing and spawning; crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing and spawning.
 - b. Excellent quality salmonid and other fish migration, rearing, and spawning; clam, oyster, and mussel rearing and spawning; crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing and spawning.
 - c. Good quality salmonid migration and rearing; other fish migration, rearing, and spawning; clam, oyster, and mussel rearing and spawning; crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing and spawning.
 - d. Fair quality salmonid and other fish migration.

The *Aquatic Life Uses* and the associated criteria for this receiving water are identified below.

1. Marine Aquatic Life Uses and Associated Criteria

Table 10. Extraordinary Quality

Criteria	Limit
Temperature Criteria – Highest 1D MAX	13°C (55.4°F)
Dissolved Oxygen Criteria – Lowest 1-Day Minimum	7.0 mg/L
Turbidity Criteria	<ul style="list-style-type: none"> • 5 NTU over background when the background is 50 NTU or less; or • A 10 percent increase in turbidity when the background turbidity is more than 50 NTU.
pH Criteria	pH must be within the range of 7.0 to 8.5 with a human-caused variation within the above range of less than 0.2 units.

- To protect shellfish harvesting, **fecal coliform** organism levels must not exceed a geometric mean value of 14 colonies/100 mL, and not have more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 43 colonies/100 mL.
- The *recreational use* is primary contact recreation. **Enterococci** organism levels within an averaging period must not exceed a geometric mean of 30 CFU or MPN per 100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample values exist) obtained within the averaging period exceeding 110 CFU or MPN per 100 mL.
- The *miscellaneous marine water uses* are wildlife habitat, harvesting, commerce and navigation, boating, and aesthetics.

III.E. Water quality impairments

Ecology has documented water quality impairments for the portion of the Puget Sound in the vicinity of the Edmonds WWTP outfall. Records show a Category 5 (TMDL needed) listing for bacteria (fecal coliform and enterococci) in the water column and for fish tissue concentrations of the following: chrysene, benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, and PCB. Ecology has not developed TMDLs for these impairments.

The following water quality-based limit evaluation demonstrates that specific waste load allocations on the Edmonds WWTP for the above parameters are not necessary. Ecology's typical TMDLs for fecal coliform bacteria use the technology-based fecal coliform limit for POTWs as the TMDL-based limit. Ecology also notes that the bacteria impairments are based on beach testing that generally samples water at a depth of 2-3 feet in locations immediately adjacent to recreational beaches. These data may not accurately represent the quality of water near the outfalls that are located approximately 1,000 feet offshore at depths of 65-75 feet. The Edmonds WWTP routinely complies with the technology-based limit and the water quality-based limit evaluation discussed in

section III.G of this fact sheet determined that more stringent limits are not necessary to ensure the discharge complies with water quality standards.

With respect to the fish tissue-based impairments, priority pollutant testing done by the City during the past permit term did not identify the presence of any of the pollutants associated with the fish tissue impairments at the respective detection limits prescribed in the previous permit. Therefore, waste load allocations for the compounds are not warranted since Ecology has no evidence of the compounds in the Edmonds WWTP discharge.

The 2014 Water Quality Assessment identified 136 impaired area 303(d) listings for dissolved oxygen in the Salish Sea and 331 Category 2 listings indicating waters of concern. Ecology's extensive ongoing scientific investigations supporting the Puget Sound Nutrient Reduction Project demonstrate that the cumulative impact of point and nonpoint sources of nutrients, specifically nitrogen, contribute to areas of dissolved oxygen depletion in Puget Sound and the Salish Sea. Ecology is developing the Puget Sound Nutrient Reduction Plan (NRP) to address dissolved oxygen impairment listings in Puget Sound in a comprehensive manner. See the Puget Sound Nutrient Reduction Project webpage (<https://ecology.wa.gov/Water-Shorelines/Puget-Sound/Helping-Puget-Sound/Reducing-Puget-Sound-nutrients/Puget-Sound-Nutrient-Reduction-Project>) for more information about this effort.

III.F. Evaluation of surface water quality-based effluent limits for narrative criteria

Ecology must consider the narrative criteria described in WAC 173-201A-260 when it determines permit limits and conditions. Narrative water quality criteria limit the toxic, radioactive, or other deleterious material concentrations that the facility may discharge which have the potential to adversely affect designated uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health.

Ecology considers narrative criteria when it evaluates the characteristics of the wastewater and when it implements all known, available, and reasonable methods of treatment and prevention (AKART) as described above in the technology-based limits section. When Ecology determines if a facility is meeting AKART it considers the pollutants in the wastewater and the adequacy of the treatment to prevent the violation of narrative criteria.

In addition, Ecology considers the toxicity of the wastewater discharge by requiring whole effluent toxicity (WET) testing when there is a reasonable potential for the discharge to contain toxics. Ecology's analysis of the need for WET testing for this discharge is described later in the fact sheet.

III.G. Evaluation of surface water quality-based effluent limits for numeric criteria

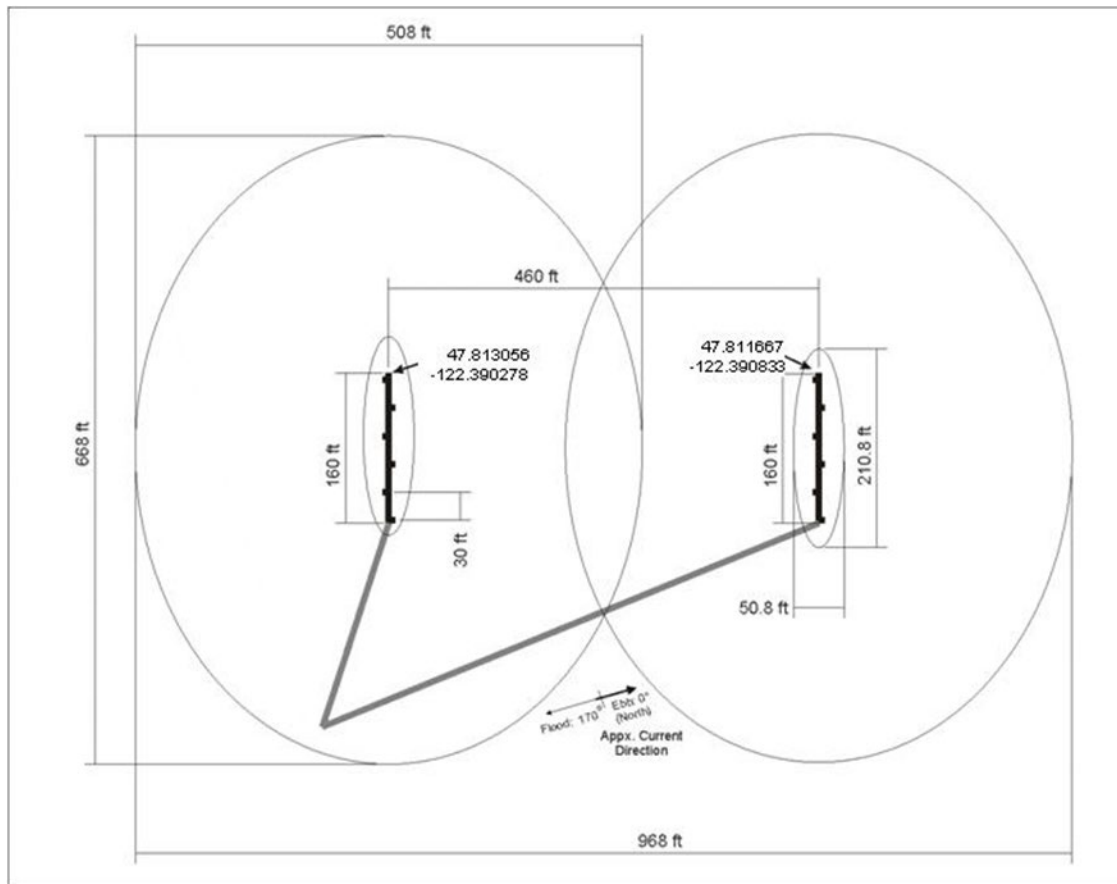
Pollutants in an effluent may affect the aquatic environment near the point of discharge (near-field) or at a considerable distance from the point of discharge (far-field). Toxic pollutants, for example, are near-field pollutants; their adverse effects diminish rapidly

with mixing in the receiving water. Conversely, a pollutant such as biochemical oxygen demand (BOD₅) is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating surface water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

With technology-based controls (AKART), predicted pollutant concentrations in the discharge exceed water quality criteria. Ecology therefore authorizes a mixing zone in accordance with the geometric configuration, flow restriction, and other restrictions imposed on mixing zones by [chapter 173-201A WAC](#).

The Edmonds WWTP discharges secondary treated effluent through Outfall 001. The 36-inch diameter outfall consists of a single line that runs from the treatment plant to Puget Sound. At the beach, the main effluent line branches into two lines that run to two diffusers. Each diffuser is 160 feet long and is equipped with six 8-inch diffuser ports and a 12-inch port. The 8-inch ports on each diffuser are spaced 30 feet apart and discharge in alternating directions that are perpendicular to the direction of the diffuser line. The 12-inch port is located 7-feet from the sixth port on the diffuser line's end cap and discharges in a direction parallel to the diffuser line. The two diffuser lines are laid parallel to each other at an approximate bearing of 285° (WNW), separated by a distance of 460 feet. The North Diffuser line (closest to the ferry dock) terminates at a depth of approximately 65 feet (MLLW) at the following coordinates: Latitude 47.811667, Longitude -122.390833. The South Diffuser line (closest to the marina) terminates at an approximate depth of 73 feet (MLLW) at the following coordinates: Latitude 47.813056, Longitude -122.390278. The following drawing illustrates the configuration of the Edmonds WWTP outfall.

Figure 4. Authorized mixing zone boundaries for Outfall 001



Chronic Mixing Zone — [WAC 173-201A-400\(7\)\(b\)](#) specifies that mixing zones must not extend in any horizontal direction from the discharge ports for a distance greater than 200 feet plus the depth of water over the discharge ports as measured during MLLW.

To minimize mixing zone size, Ecology will base the mixing zone size for both diffuser lines on the depth of the port(s) located at the shallowest depth. For the Edmonds WWTP, the shallowest depth of a port on either diffuser line is 56 feet (MLLW). Therefore, the horizontal distance of the chronic mixing zone is 256 feet from any port on either diffuser line. The mixing zone extends from the seabed to the top of the water surface.

Acute Mixing Zone — [WAC 173-201A-400\(8\)\(b\)](#) specifies that in estuarine waters a zone where acute criteria may be exceeded must not extend beyond 10% of the distance established for the chronic zone. The acute mixing zone for the two diffuser lines of Outfall 001 extends 25.6 feet in any horizontal direction from any discharge port.

Rosedale Marine Engineering determined the dilution factors that occur within these zones at the critical condition using EPA's Visual Plumes modeling

software and Ecology's mixing zone analysis protocols. The dilution factors are listed in Table 12:

Table 11. Dilution Factors (DF)

Criteria	Acute	Chronic
Aquatic Life	37	143
Human Health, Carcinogen		143
Human Health, Non-carcinogen		143

Ecology determined the impacts of dissolved oxygen deficiency, temperature, pH, fecal coliform, chlorine, ammonia, metals, nutrients and other toxics as described below, using the dilution factors in the above table. The derivation of surface water quality-based limits also takes into account the variability of pollutant concentrations in both the effluent and the receiving water.

1. Dissolved Oxygen — CBOD₅/BOD₅ and Ammonia Effects

Natural decomposition of organic material in wastewater effluent impacts dissolved oxygen in the receiving water at distances far outside of the regulated mixing zone. The 5-day Carbonaceous Biochemical Oxygen Demand (CBOD₅) of an effluent sample indicates the amount of biodegradable material in the wastewater and estimates the magnitude of oxygen consumption the wastewater will generate in the receiving water. The amount of ammonia-based nitrogen in the wastewater also provides an indication of oxygen demand potential in the receiving water.

With technology-based limits, this discharge results in a small amount of CBOD₅ relative to the large amount of dilution in the receiving water at critical conditions. Technology-based limits for CBOD₅, in combination with the Puget Sound Nutrient General Permit that addresses other sources of oxygen demand, will ensure that dissolved oxygen criteria are met in the receiving water.

2. pH

Compliance with the technology-based limits of 6.0 to 9.0 will assure compliance with the water quality standards of surface waters because of the high buffering capacity of marine water.

3. Bacteria

Ecology modeled the numbers of fecal coliform by simple mixing analysis using the technology-based limit of 400 organisms per 100 ml and a dilution factor of 143.

Under critical conditions, modeling predicts no violation of the shellfish harvesting criterion for fecal coliform. Therefore, the proposed permit includes the

technology-based effluent limit for fecal coliform bacteria. Therefore, the proposed permit includes the technology-based effluent limit for fecal coliform bacteria. Without effluent data for Enterococci, Ecology cannot determine whether the discharge will violate the recreational use criterion for Enterococci. Given that the characteristics of the receiving water and the discharge have not changed substantially since the analysis conducted in the previous permit cycle, and the transition is a change in bacterial indicator not more or less stringent than the previous criterion, the proposed permit will maintain the technology-based effluent limit for fecal coliform. In addition, the permittee will be required to monitor for both fecal coliform and Enterococci. Ecology will use this data to assess the reasonable potential to exceed the applicable water quality criterion in the next iteration of this permit.

4. Turbidity

Ecology evaluated the impact of turbidity based on the range of total suspended solids in the effluent and turbidity of the receiving water. Ecology expects no violations of the turbidity criteria outside the designated mixing zone provided the facility meets its technology-based total suspended solids permit limits.

Nutrients—Ecology's Puget Sound Nutrient Reduction Project evaluated the cumulative impact of anthropogenic sources of nutrients using the Salish Sea Model (Ahmed et al, 2019). That model's simulations predict that nutrients discharged from wastewater treatment plants have a reasonable potential to contribute to existing low dissolved oxygen levels, below state water quality criteria, in the Salish Sea (which includes Puget Sound). On December 1, 2021, Ecology issued the Puget Sound Nutrient General Permit (PSNGP) to regulate the discharge of Total Inorganic Nitrogen from 58 domestic wastewater treatment plants that discharge to marine and estuarine waters in Washington's waters of the Salish Sea (<https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Nutrient-Permit>). The Edmonds WWTP is covered by the PSNGP, which includes requirements for the control and monitoring of nutrients. This individual permit does not contain limits or other conditions related to the regulation of nutrients.

5. Toxic Pollutants (aquatic life)

Federal regulations ([40 CFR 122.44](#)) require Ecology to place limits in NPDES permits on toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. Ecology does not exempt facilities with technology-based effluent limits from meeting the surface water quality standards.

The following toxic pollutants are present in the discharge: ammonia, arsenic, , cadmium, chlorine, hexavalent chromium, copper, cyanide, lead, mercury, nickel selenium, silver and zinc. Ecology conducted a reasonable potential analysis

(See **Appendix G**) on these parameters to determine whether it would require effluent limits in this permit.

No valid ambient background data were available for, chlorine, , cyanide, lead, , mercury, selenium, and. Ecology used zero for background for these parameters. Valid ambient background data were available for ammonia, antimony, arsenic, cadmium, copper, hexavalent chromium, nickel, silver and zinc (See Table 2). Ecology used all applicable data to evaluate reasonable potential for this discharge to cause a violation of water quality standards.

Ecology determined that the reported concentrations of all chemicals listed above pose no reasonable potential to exceed the water quality criteria at the critical condition using procedures given in EPA, 1991 (**Appendix G**) and as described above. Ecology's determination assumes that this facility meets the other effluent limits of this permit.

Temperature--The state temperature standards for marine waters ([WAC 173-201A-210](#)) include multiple elements:

- Annual 1-Day maximum criteria
- Incremental warming restrictions
- Guidelines on preventing acute lethality and barriers to migration of salmonids

Ecology evaluates each criterion independently to determine reasonable potential and derive permit limits.

- Annual 1-Day maximum criteria

Each marine water body has an annual maximum temperature criterion [WAC 173-201A-210(1)(c)(i)-(ii) and WAC 173-201A-612]. These threshold criteria (e.g., 13, 16, 19, 22°C) protect specific categories of aquatic life by controlling the effect of human actions on water column temperatures. The threshold criteria apply at the edge of the chronic mixing zone. Criteria for marine waters and some fresh waters are expressed at the highest 1-Day annual maximum temperature (1-DMax). Ecology concludes that there is no reasonable potential to exceed the temperature standard when the mixture of ambient water and effluent at the edge of the chronic mixing zone is less than the criteria of 13°C.

- Incremental warming criteria

The water quality standards limit the amount of warming human sources can cause under specific situations [[WAC 173-201A-210\(1\)\(c\)\(i\)-\(ii\)](#)]. The incremental warming criteria apply at the edge of the chronic mixing zone. At locations and times when background temperatures are cooler than the assigned threshold criterion, point sources are permitted to warm the water by only a defined increment (T_i), calculated as:

$$T_i = \frac{12}{(T_{amb} - 2)}$$

This increment is permitted only to the extent doing so does not cause temperatures to exceed the annual maximum criteria.

- Guidelines to prevent acute mortality or barriers to migration of salmonids. These site-level considerations do not override the temperature criteria listed above.
 1. Instantaneous lethality to passing fish: The upper 99th percentile daily maximum effluent temperature must not exceed 33°C; unless a dilution analysis indicates ambient temperatures will not exceed 33°C 2-seconds after discharge.
 2. General lethality and migration blockage: Temperatures at the edge of a chronic mixing zone must not exceed either a 1DMax of 23°C or a 7DADMax of 22°C. When adjacent downstream temperatures are 3°C or more cooler, the 1DMax at the edge of the chronic mixing zone must not exceed 22°C.
 3. Lethality to incubating fish: The temperature must not exceed 17.5°C at locations where eggs are incubating.

6. Reasonable Potential Analysis

Annual summer maximum and incremental warming criteria: Ecology evaluated the reasonable potential for the discharge to exceed the annual summer maximum and the incremental warming criteria at the edge of the chronic mixing zone during critical conditions. No reasonable potential exists to exceed the temperature criterion where:

$$(T_{effluent95} - \text{Criterion})/DF < 0.3.$$

$T_{effluent95}$ = 95th percentile 7-DADMax or 1DMax temperature of the effluent

DF = chronic dilution factor

A temperature difference of less than 0.3°C at the edge of the mixing zone is lower than the definition of a “measurable change” as defined in WAC 173-201A-320(3).

$$(22.7 - 12.7)/143 = 0.07$$

III.H. Evaluation of human health-based water quality criteria

Washington’s water quality standards include numeric human health-based criteria for priority pollutants that Ecology must consider when writing NPDES permits. The permit application identified that the discharge contains detectable concentrations of the following pollutants of concern for human health: Antimony, Bis(2-ethylhexyl) phthalate, Chloroform, Cyanide, Methylene Chloride, Mercury, Nickel, Selenium, Toluene and Zinc.

Ecology evaluated the discharge's potential to violate the water quality standards as required by [40 CFR 122.44\(d\)](#) by following the procedures published in the [Technical Support Document for Water Quality-Based Toxics Control \(EPA/505/2-90-001\)](#) and Ecology's *Permit Writer's Manual* to make a reasonable potential determination. The evaluation showed the discharge has no reasonable potential to cause a violation of water quality standards for the parameters listed above.)

III.I. Sediment quality

The aquatic sediment standards ([chapter 173-204 WAC](#)) protect aquatic biota and human health. Under these standards Ecology may require a facility to evaluate the potential for its discharge to cause a violation of sediment standards ([WAC 173-204-400](#)). You can obtain additional information about sediments at the Aquatic Lands Cleanup Unit [website](#). (<https://ecology.wa.gov/Spills-Cleanup/Contamination-cleanup/Sediment-cleanups>)

When a permit application for a new or existing discharge is accepted, a screening-level evaluation is conducted by the permit writer and Toxic Cleanup Program-Aquatic Lands Cleanup Unit (TCP-ALCU). TCP-ALCU staff further evaluate the discharge within the context of the site location, history and make recommendations on sediment monitoring. The City performed sediment sampling near the Edmonds WWTP outfall in 1995 and 2008. The most recent 2008 sampling showed no exceedances of the sediment quality standards, therefore the previous permit did not require additional sediment sampling. Results of the screening level evaluation revealed a very low potential that discharge from the Edmonds WWTP is likely to cause sediment impacts but recent revisions to Chapter 9 of the Permit Writer's Manual, recommend sediment monitoring once every 10 years for a WWTP of Edmond's size. The frequency is to ensure contamination is not occurring and the site continues to meet the sediment management standards. Since monitoring was last conducted in 2008, the proposed permit includes sediment monitoring over the next permit cycle. Sediment monitoring guidance is available in Appendix A of the Sediment Cleanup User's Manual II (Ecology 2021).

III.J. Whole effluent toxicity

The water quality standards for surface waters forbid discharge of effluent that has the potential to cause toxic effects in the receiving waters. Many toxic pollutants cannot be measured by commonly available detection methods. However, laboratory tests can measure toxicity directly by exposing living organisms to the wastewater and measuring their responses. These tests measure the aggregate toxicity of the whole effluent, so this approach is called whole effluent toxicity (WET) testing. Some WET tests measure acute toxicity and other WET tests measure chronic toxicity.

- *Acute toxicity tests measure mortality as the significant response to the toxicity of the effluent.* Dischargers who monitor their wastewater with acute toxicity tests find early indications of any potential lethal effect of the effluent on organisms in the receiving water.
- *Chronic toxicity tests measure various sublethal toxic responses, such as reduced growth or reproduction.* Chronic toxicity tests often involve either a

complete life cycle test on an organism with an extremely short life cycle, or a partial life cycle test during a critical stage of a test organism's life. Some chronic toxicity tests also measure organism survival.

Laboratories accredited by Ecology for WET testing know how to use the proper WET testing protocols, fulfill the data requirements, and submit results in the correct reporting format. Accredited laboratory staff know about WET testing and how to calculate an NOEC, LC50, EC50, IC25, etc. Ecology gives all accredited labs the most recent version of Ecology Publication No. WQ-R-95-80, [Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria](https://apps.ecology.wa.gov/publications/documents/9580.pdf) (<https://apps.ecology.wa.gov/publications/documents/9580.pdf>), which is referenced in the permit. Ecology recommends that City of Edmonds send a copy of the acute or chronic toxicity sections(s) of its NPDES permit to the laboratory.

The previous permit included an acute WET limit and required semi-annual testing to monitor for compliance with the limit. WET testing conducted during the previous permit term demonstrated that the facility's discharge complies with the WET limit but continues to show that the effluent has a reasonable potential to cause acute toxicity in the receiving water. The proposed permit will retain the previous acute toxicity limit. The effluent limit for acute toxicity is: No acute toxicity detected in a test sample representing the acute critical effluent concentration (ACEC). The acute critical effluent concentration (ACEC) is the concentration of effluent at the boundary of the acute mixing zone during critical conditions. The ACEC equals 2.7% effluent.

Compliance with an acute toxicity limit is measured by an acute toxicity test comparing test organism survival in the ACEC (using a sample of effluent diluted to equal the ACEC) to survival in nontoxic control water. The Edmonds WWTP is in compliance with the acute toxicity limit if there is no statistically significant difference in test organism survival between the ACEC sample and the control sample. The proposed permit requires the Edmonds WWTP to monitor the effluent twice per year for Acute WET toxicity. In setting this monitoring frequency, Ecology took into account the lack of significant industrial discharges to Edmonds WWTP and the likelihood of ammonia in the effluent contributing to low survival rates in some Acute WET tests.

WET testing conducted during effluent characterization showed no reasonable potential for effluent discharges to cause receiving water chronic toxicity. The proposed permit will not include a chronic WET limit. The Edmonds WWTP must retest the effluent before submitting an application for permit renewal. In addition, the facility must recharacterize its effluent if the following occur:

- If this facility makes process or material changes which, in Ecology's opinion, increase the potential for effluent toxicity, then Ecology may (in a regulatory order, by permit modification, or in the permit renewal) require the facility to conduct additional effluent characterization
- If WET testing conducted for submittal with a permit application fails to meet the performance standards in [WAC 173-205-020](#), Ecology will assume that effluent toxicity has increased. Edmonds WWTP may demonstrate to Ecology

that effluent toxicity has not increased by performing additional WET testing after the process or material changes have been made.

III.K. Groundwater quality limits

The groundwater quality standards ([chapter 173-200 WAC](#)) protect beneficial uses of groundwater. Permits issued by Ecology must not allow violations of those standards ([WAC 173-200-100](#)).

The Edmonds WWTP does not discharge wastewater to the ground. No permit limits are required to protect groundwater.

III.L. Comparison of effluent limits with the previous permit issued on October 24, 2014

Table 12. Comparison of Existing and Proposed Effluent Limits – Outfall 001

Limit	Basis of Limit	Existing permit limit	Proposed permit limit
CBOD ₅ – Average Monthly	Technology	25 mg/L, 2,460 lbs/day	25 mg/L, 2,460 lbs/day
BOD ₅ – Average Monthly – Average Weekly	Technology	40 mg/L, 3,936 lbs/day	40 mg/L, 3,936 lbs/day
TSS – Average Monthly	Technology	30 mg/L, 2,952 lbs/day	30 mg/L, 2,952 lbs/day
TSS – Average Weekly		45 mg/L, 4,430 lbs/day	45 mg/L, 4,430 lbs/day
Fecal Coliform Bacteria – Monthly Geometric Mean	Technology	200/100 mL	200/100 mL
Fecal Coliform Bacteria – Weekly Geometric Mean	Technology	400/100 mL	400/100 mL
pH – Daily Minimum	Technology	6.0	6.0
pH – Daily Maximum	Technology	9.0	9.0
Total Residual Chlorine-Average Monthly	Water Quality	191 µg/L	141 µg/L
Total Residual Chlorine-Maximum Daily	Water Quality	442 µg/L	442 µg/L
Acute Whole Effluent Toxicity	Water Quality	No acute toxicity at the acute critical effluent concentration of 2.7% effluent	No acute toxicity at the acute critical effluent concentration of 2.7% effluent

IV. Monitoring Requirements

Ecology requires monitoring, recording, and reporting ([WAC 173-220-210](#) and [40 CFR 122.41](#)) to verify that the treatment process is functioning correctly and that the discharge complies with the permit's effluent limits.

If a facility uses a contract laboratory to monitor wastewater, it must ensure that the laboratory uses the methods and meets or exceeds the method detection levels required by the permit. The permit describes when facilities may use alternative methods. It also describes what to do in certain situations when the laboratory encounters matrix effects. When a facility uses an alternative method as allowed by the permit, it must report the test method, detection level (DL), and quantitation level (QL) on the discharge monitoring report or in the required report.

IV.A. Wastewater monitoring

The monitoring schedule is detailed in the proposed permit under Special Condition S.2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring. The required monitoring frequency is consistent with agency guidance given in the current version of Ecology's *Permit Writer's Manual* (Publication Number 92-109) for conventional activated sludge facility rated for flows greater than 5.0 MGD.

Monitoring frequencies for TSS, CBOD₅, and fecal coliform in the proposed permit are consistent with the previous permit, but are less than those recommended for activated sludge facilities with design flows greater than 5.0 MGD. Ecology believes that the monitoring and compliance history for the Edmonds WWTP warrants retaining a reduced monitoring schedule. As shown in the DMR data presented in **Appendix E**, the facility's effluent concentrations average 30% and 32% of the monthly average permit requirements for TSS and CBOD₅, respectively (percentages represent $[\text{Long Term Average, mg/L}] \div [\text{Average Monthly Limit, mg/L}]$). For fecal coliform, the ratio of LTA to AML is 21%. In addition, the facility's monitoring program produces data with relatively low coefficients of variance (COV) for TSS and CBOD₅: 0.25 for CBOD₅ and 0.44 for TSS. The low COV indicates that the lab produces consistent results for these parameters. A larger sample size from increased monitoring is not necessary to ensure data reliability. This monitoring reduction decision is consistent with Ecology's and EPA's monitoring reduction policy for exemplary performance.

The WWTP had four violations of total residual chlorine over the last permit cycle. Three were exceedances of the maximum daily limit and one exceedance of the average monthly limit. Monitoring schedule S2 of the permit includes a daily sampling frequency which is the recommended sampling frequency for activated sludge plants greater than 5.0 MGD. In response to these violations, plant staff appropriately increased monitoring when they first noticed problems with their process and continued to monitor at an increased frequency as needed. This extra monitoring is reported, as required by the permit. Based on historic practices at the plant, Ecology is confident the Edmonds WWTP will continue to provide consistent representative monitoring data for total residual chlorine at the permit-required daily frequency.

The previous permit included monitoring of nutrients (nitrogen and phosphorous) on a quarterly schedule. The proposed permit increases monitoring from quarterly to monthly for phosphorous and removes nitrogen for this discharger. Nitrogen monitoring is now managed under Ecology's Nutrient General Permit. Ecology's commitment to nutrient reduction in the Puget Sound requires data reflective of facility annual loading. Monthly

phosphorous monitoring provides data to set the foundation for establishing annual load limits and technology requirements. Ecology will use this data in the future as it develops TMDLs and establishes WLAs for phosphorus.

Monitoring of sludge quantity and quality is necessary to determine the appropriate uses of the sludge. Biosolids monitoring is required by the current state and local solid waste management program and also by EPA under [40 CFR 503](#).

Ecology updated the water contact recreation bacteria criteria, effective January 1, 2021 and eliminated all recreational uses except for primary contact criteria in both fresh and marine waters. Primary contact criteria changed to *E.coli* for freshwater and to enterococci for marine water. Because the City of Edmonds has an effluent limit based on recreation, this permit requires monitoring of both fecal coliform and enterococci during this permit cycle. This dual monitoring will help inform both Ecology and the City of Edmonds of the correlation between the two indicators. Dual monitoring requirements consist of monthly grab sampling of enterococci occurring at the same time and effluent location as the fecal coliform sample. Ecology will reevaluate the bacteria limit based on the new indicator during the next permit cycle.

IV.B. Lab accreditation

Ecology requires that facilities must use a laboratory registered or accredited under the provisions of [chapter 173-50 WAC](#), Accreditation of Environmental Laboratories, to prepare all monitoring data (with the exception of certain parameters). Ecology accredited the laboratory at this facility for analysis of the following parameters in non-potable water.

Table 13. Accredited Parameters

Parameter Name	Method Name
Biochemical Oxygen Demand, BOD/CBOD	SM 5210 B-2011
Total Suspended Solids	SM 2540 D-2011
pH	SM 4500-H+ B-2011
Total Chlorine (Residual)	SM 4500-Cl G-2011
Chemical Oxygen Demand (COD)	HACH 8000
Nitrate+Nitrite as N	HACH 10206
Nitrate as N	HACH 10206
Fecal Coliform-count	SM 9222 D (mFC)-06

V. Other Permit Conditions

V.A. Reporting and record keeping

Ecology based Special Condition S3 on its authority to specify any appropriate reporting and record keeping requirements to prevent and control waste discharges ([WAC 173-220-210](#)).

V.B. Prevention of facility overloading

Overloading of the treatment plant is a violation of the terms and conditions of the permit. To prevent this from occurring, [RCW 90.48.110](#) and [WAC 173-220-150](#) require the Edmonds WWTP to:

- Take the actions detailed in proposed permit Special Condition S.4.
- Design and construct expansions or modifications before the treatment plant reaches existing capacity.
- Report and correct conditions that could result in new or increased discharges of pollutants.

Special Condition S.4 restricts the amount of flow.

If the City intends to apply for Ecology-administered funding for the design or construction of a facility project they should contact Ecology's regional office as early as practical to discuss specific planning and design requirements required by Ecology's financial assistance program.

V.C. Operation and maintenance

The proposed permit contains Special Condition S.5 as authorized under [RCW 90.48.110](#), [WAC 173-220-150](#), [chapter 173-230 WAC](#), and [WAC 173-240-080](#). Ecology included it to ensure proper operation and regular maintenance of equipment, and to ensure that the Edmonds WWTP takes adequate safeguards so that it uses constructed facilities to their optimum potential in terms of pollutant capture and treatment.

The City completed a comprehensive Inflow and Infiltration (I&I) evaluation in 2010 to identify egregious sources of I&I to the system. Although the report stated that I&I can contribute significantly to high peak flows and collection system surcharging during storm events, the report also noted that there were no documented sanitary sewer overflows caused by the excess I&I. The previous permit did not require the City to complete further I&I investigations but required the City to provide an update on repair projects identified in the 2010 report. As a result, the City submitted an I&I Report update in 2018. The update provided the status of projects included in the City of Edmonds 2013 Sanitary Sewer Comprehensive Plan. The City conducts video inspection of approximately 33% of its collection system each year and makes minor I&I repairs at a pace of 5-7 small spot repairs per year. Between 2013 and 2018 the city began using cured-in-place pipeline (CIPP) construction methods to repair sewer mains in a citywide CIPP project. This is an ongoing project that the City continues to perform. Since 2013, the City has also replaced between 1,000-1,500 LF of older concrete sewer main annually. The City is in the process of gathering and compiling data to determine the best location to provide metering in the area of Lift Station #1. The City is also in the process of studying the sewer trunk lines adjacent to the west and south shores of Lake Ballinger and addressing any issues encountered.

Since Ecology has no documented instances of I&I causing overflows or treatment plant problems and since the City is proactively addressing I&I within their collection system, the proposed permit does not require the City to complete further I&I investigations. The proposed permit will require the City to continue providing an update on existing work identified in the City's 2013 Sanitary Sewer Comprehensive Plan and any new corrective measures as a result of ongoing studies.

V.D. Pretreatment

1. Duty to enforce discharge prohibitions

This provision prohibits the publicly owned treatment works (POTW) from authorizing or permitting an industrial discharger to discharge certain types of waste into the sanitary sewer.

- The first section of the pretreatment requirements prohibits the POTW from accepting pollutants which causes "pass-through" or "interference". This general prohibition is from [40 CFR §403.5\(a\)](#). **Appendix C** of this fact sheet defines these terms.
- The second section reinforces a number of specific state and federal pretreatment prohibitions found in [WAC 173-216-060](#) and [40 CFR §403.5\(b\)](#). These reinforce that the POTW may not accept certain wastes, which:
 - Are prohibited due to dangerous waste rules.
 - Are explosive or flammable.
 - Have too high or low of a pH (too corrosive, acidic or basic).
 - May cause a blockage such as grease, sand, rocks, or viscous materials.
 - Are hot enough to cause a problem.
 - Are of sufficient strength or volume to interfere with treatment.
 - Contain too much petroleum-based oils, mineral oil, or cutting fluid.
 - Create noxious or toxic gases at any point.

40 CFR Part 403 contains the regulatory basis for these prohibitions, with the exception of the pH provisions which are based on WAC 173-216-060.

- The third section of pretreatment conditions reflects state prohibitions on the POTW accepting certain types of discharges unless the discharge has received prior written authorization from Ecology. These discharges include:
 - Cooling water in significant volumes.
 - Stormwater and other direct inflow sources.

- Wastewaters significantly affecting system hydraulic loading, which do not require treatment.

2. Federal and state pretreatment program requirements

Ecology administers the Pretreatment Program under the terms of the addendum to the “Memorandum of Understanding between Washington Department of Ecology and the United States Environmental Protection Agency, Region 10” (1986) and [40 CFR Part 403](#). Under this delegation of authority, Ecology issues wastewater discharge permits for significant industrial users (SIUs) discharging to POTWs which have not been delegated authority to issue wastewater discharge permits. Ecology must approve, condition, or deny new discharges or a significant increase in the discharge for existing significant industrial users (SIUs) [[40 CFR 403.8 \(f\)\(1\)\(i\)\(iii\)](#)].

Industrial dischargers must obtain a permit from Ecology before discharging waste to the Edmonds WWTP [[WAC 173-216-110\(5\)](#)]. Industries discharging wastewater that is similar in character to domestic wastewater do not require a permit.

3. Routine identification and reporting of industrial users

The permit requires non-delegated POTWs to take “continuous, routine measures to identify all existing, new, and proposed significant industrial users (SIUs) and potential significant industrial users (PSIUs)” discharging to their sewer system. Examples of such routine measures include regular review of water and sewer billing records, business license and building permit applications, advertisements, and personal reconnaissance. System maintenance personnel should be trained on what to look for so they can identify and report new industrial dischargers in the course of performing their jobs. The POTW may not allow SIUs to discharge prior to receiving a permit, and must notify all industrial dischargers (significant or not) in writing of their responsibility to apply for a State Waste Discharge Permit. The POTW must send a copy of this notification to Ecology.

4. Requirements for performing an industrial user survey

This POTW has the potential to serve significant industrial or commercial users and must conduct an industrial user (IU) survey. The purpose of the IU Survey is to identify all facilities that may be subject to pretreatment standards or requirements so that Ecology can take appropriate measures to control these discharges. The POTW should identify each such user, and require them to apply for a permit before allowing their discharge to the POTW to commence. For SIUs, the POTW must require they actually are issued a permit prior to accepting their discharge. The steps the POTW must document in their IU Survey submittal include:

- a. The POTW must develop a master list of businesses that may be subject to pretreatment standards and requirements and show their disposition. This list must be based on several sources of information including business licenses, and water and sewer billing records.
- b. The POTW must canvas all the potential sources, having them either complete a survey form or ruling them out by confirming they only generate domestic wastewater.
- c. The POTW must develop a list of the SIUs and potential SIUs in all areas served by the POTW. The list must contain sufficient information on each to allow Ecology to decide which discharges merit further controls such as a state waste discharge permit.

Ecology describes the information needed in IU Survey submittals to allow Ecology to make permitting decision in the manual "Performing an Industrial User Survey". Properly completing an Industrial User Survey helps Ecology control discharges that may otherwise harm the POTW including its collection system, processes, and receiving waters. Where surveys are incomplete, Ecology may take such enforcement as appropriate and/or require the POTW to develop a fully delegated pretreatment program.

The proposed permit requires Edmonds WWTP to conduct an industrial user survey to determine the extent of compliance of all industrial users of the sanitary sewer and wastewater treatment facility with federal pretreatment regulations [[40 CFR Part 403](#) and [CWA Sections 307\(b\)](#) and [CWA Section 308](#))], with state regulations ([chapter 90.48 RCW](#) and [chapter 173-216 WAC](#)), and with local ordinances.

V.E. Solid wastes

To prevent water quality problems the facility is required in permit Special Condition S7 to store and handle all residual solids (grit, screenings, scum, sludge, and other solid waste) in accordance with the requirements of [RCW 90.48.080](#) and state water quality standards.

The final use and disposal of sewage sludge from this facility is regulated by U.S. EPA under [40 CFR 503](#), and by Ecology under [chapter 70.95J RCW](#), [chapter 173-308 WAC](#) "Biosolids Management," and [chapter 173-350 WAC](#) "Solid Waste Handling Standards." The disposal of other solid waste is under the jurisdiction of the Snohomish County Health Department.

When the Edmonds WWTP transitions from hauling to gasification, the plant will be capable of handling residual solids separately from biosolids. Screenings will be collected, washed, and compacted at the headworks for disposal as solid waste subject to chapter 173-350 WAC "Solid Waste Handling Standards." when the system is producing two of three end products: Class A biosolids and biochar. Biosolids will be processed through the gasification system. The gasification system will produce a bio-char product that qualifies as an Exceptional Quality (EQ) biosolid. Bio-char is defined as

“a form of charcoal that is produced by exposing organic waste matter (such as wood chips, crop residue, manure or biosolids) to heat in a low-oxygen environment such as gasification. An EQ biosolid is defined as a biosolid that meets low-pollutant and Class A pathogen reduction limits and must meet the criteria of 40 CFR 503.13 and EPA 832/R-93/003. EQ biosolids are considered a product that typically have a beneficial use and is virtually unregulated for use, whether used in bulk, sold or given away. The City intends on producing a bio-char that is suitable to market. Regulation of biosolids will occur under a modified version of the City’s General Permit for Biosolids Management (Permit No. BA0024058). Regulation of air emissions from the gasification system at the Edmonds WWTP is anticipated to continue under the Puget Sound Clean Air Agency.

Requirements for monitoring sewage sludge and record keeping are included in this permit. Ecology will use this information, required under [40 CFR 503](#), to develop or update local limits.

V.F. Outfall evaluation

The proposed permit requires the City of Edmonds to conduct an outfall inspection and submit a report detailing the findings of that inspection (Special Condition S.10). The inspection must evaluate the physical condition of the discharge pipe and diffusers, and evaluate the extent of sediment accumulations in the vicinity of the outfall.

V.G. General conditions

Ecology bases the standardized General Conditions on state and federal law and regulations. They are included in all individual domestic wastewater NPDES permits issued by Ecology.

VI. Permit Issuance Procedures

VI.A. Permit modifications

Ecology may modify this permit to impose numeric limits, if necessary to comply with water quality standards for surface waters, with sediment quality standards, or with water quality standards for groundwaters, based on new information from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

Ecology may also modify this permit to comply with new or amended state or federal regulations.

VI.B. Proposed permit issuance

This proposed permit meets all statutory requirements for Ecology to authorize a wastewater discharge. The permit includes limits and conditions to protect human health and aquatic life, and the beneficial uses of waters of the state of Washington. Ecology proposes to issue this permit for a term of 5 years.

VII. References for Text and Appendices

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- [Laws and Regulations](http://leg.wa.gov/LawsAndAgencyRules/Pages/default.aspx) (http://leg.wa.gov/LawsAndAgencyRules/Pages/default.aspx)
- [Permit and Wastewater Related Information](https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance) (https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance)

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Appendix A — Public Involvement Information

Ecology proposes to reissue a permit to City of Edmonds WWTP. The permit includes wastewater discharge limits and other conditions. This fact sheet describes the facility and Ecology's reasons for requiring permit conditions.

Ecology will place a Public Notice of Draft on May 30, 2024 in the Everett Herald to inform the public and to invite comment on the proposed draft National Pollutant Discharge Elimination System permit and fact sheet.

The notice:

- Tells where copies of the draft permit and fact sheet are available for public evaluation (the closest regional or field office, posted on our website).
- Offers to provide the documents in an alternate format to accommodate special needs.
- Asks people to tell us how well the proposed permit would protect the receiving water.
- Invites people to suggest fairer conditions, limits, and requirements for the permit.
- Invites comments on Ecology's determination of compliance with antidegradation rules.
- Urges people to submit their comments, in writing, before the end of the comment period.
- Tells how to request a public hearing about the proposed NPDES permit.
- Explains the next step(s) in the permitting process.

Ecology has published a document entitled [Frequently Asked Questions about Effective Public Commenting](https://apps.ecology.wa.gov/publications/documents/0307023.pdf), which is available on our website at

<https://apps.ecology.wa.gov/publications/documents/0307023.pdf>.

You may obtain further information from Ecology by telephone, 206-594-0167, or by writing to the address listed below.

Water Quality Permit Coordinator
Department of Ecology
Northwest Regional Office
P.O. Box 330316,
Shoreline, WA 98133-9716

The primary authors of this permit and fact sheet are Stephanie Allen and Israel Solomon.

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Appendix B — Your Right to Appeal

You have a right to appeal this permit to the Pollution Control Hearing Board (PCHB) within 30 days of the date of receipt of the final permit. The appeal process is governed by [chapter 43.21B RCW](#) and [chapter 371-08 WAC](#). “Date of receipt” is defined in [RCW 43.21B.001\(2\)](#) (see glossary).

To appeal you must do the following within 30 days of the date of receipt of this permit:

- File your appeal and a copy of this permit with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.
- Serve a copy of your appeal and this permit on Ecology in paper form - by mail or in person. (See addresses below.) E-mail is not accepted.

You must also comply with other applicable requirements in [chapter 43.21B RCW](#) and [chapter 371-08 WAC](#).

Address and Location Information

Service on Ecology

Street Address:

Department of Ecology
Attn: Appeals Processing Desk
300 Desmond Drive SE
Lacey, WA 98503

Mailing Address:

Department of Ecology
Attn: Appeals Processing Desk
PO Box 47608
Olympia, WA 98504-7608

E-Mail Address:

ecologyappeals@ecy.wa.gov

Appendix C — Glossary

- 1-DMax or 1-day maximum temperature** – The highest water temperature reached on any given day. This measure can be obtained using calibrated maximum/minimum thermometers or continuous monitoring probes having sampling intervals of thirty minutes or less.
- 7-DADMax or 7-day average of the daily maximum temperatures** – The arithmetic average of seven consecutive measures of daily maximum temperatures. The 7-DADMax for any individual day is calculated by averaging that day's daily maximum temperature with the daily maximum temperatures of the three days prior and the three days after that date.
- Acute toxicity** – The lethal effect of a compound on an organism that occurs in a short time period, usually 48 to 96 hours.
- AKART** – The acronym for “all known, available, and reasonable methods of prevention, control and treatment.” AKART is a technology-based approach to limiting pollutants from wastewater discharges, which requires an engineering judgment and an economic judgment. AKART must be applied to all wastes and contaminants prior to entry into waters of the state in accordance with [RCW 90.48.010](#) and [RCW 90.48.520](#), [WAC 173-200-030\(2\)\(c\)\(ii\)](#), and [WAC 173-216-110\(1\)\(a\)](#).
- Alternate point of compliance** – An alternative location in the groundwater from the point of compliance where compliance with the groundwater standards is measured. It may be established in the groundwater at locations some distance from the discharge source, up to, but not exceeding the property boundary and is determined on a site specific basis following an AKART analysis. An “early warning value” must be used when an alternate point is established. An alternate point of compliance must be determined and approved in accordance with [WAC 173-200-060\(2\)](#).
- Ambient water quality** – The existing environmental condition of the water in a receiving water body.
- Ammonia** – Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.
- Annual average design flow (AADF)** – average of the daily flow volumes anticipated to occur over a calendar year.
- Average monthly (intermittent) discharge limit** – The average of the measured values obtained over a calendar months time taking into account zero discharge days.
- Average monthly discharge limit** – The average of the measured values obtained over a calendar month's time.
- Background water quality** – The concentrations of chemical, physical, biological or radiological constituents or other characteristics in or of groundwater at a particular point in time upgradient of an activity that has not been affected by that activity, [\[WAC 173-200-020\(3\)\]](#). Background water quality for any parameter is statistically defined as the 95% upper tolerance interval with a 95% confidence based on at least eight hydraulically

upgradient water quality samples. The eight samples are collected over a period of at least one year, with no more than one sample collected during any month in a single calendar year.

Best management practices (BMP) – Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the state. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD₅ – Determining the five-day Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD₅ is used in modeling to measure the reduction of dissolved oxygen in receiving waters after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD₅ is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass – The intentional diversion of waste streams from any portion of a treatment facility.

Categorical pretreatment standards – National pretreatment standards specifying quantities or concentrations of pollutants or pollutant properties, which may be discharged to a POTW by existing or new industrial users in specific industrial subcategories.

Chlorine – A chemical used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic toxicity – The effect of a compound on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Clean water act (CWA) –The federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Compliance inspection-without sampling – A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

Compliance inspection-with sampling – A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations. In addition it includes as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the 85 percent removal requirement. Ecology may conduct additional sampling.

Composite sample – A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite" (collected at constant time intervals) or "flow-proportional" (collected

either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots).

Construction activity – Clearing, grading, excavation, and any other activity, which disturbs the surface of the land. Such activities may include road building; construction of residential houses, office buildings, or industrial buildings; and demolition activity.

Continuous monitoring – Uninterrupted, unless otherwise noted in the permit.

Critical condition – The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Date of receipt – This is defined in [RCW 43.21B.001\(2\)](#) as five business days after the date of mailing; or the date of actual receipt, when the actual receipt date can be proven by a preponderance of the evidence. The recipient's sworn affidavit or declaration indicating the date of receipt, which is unchallenged by the agency, constitutes sufficient evidence of actual receipt. The date of actual receipt, however, may not exceed forty-five days from the date of mailing.

Detection limit – The minimum concentration of a substance that can be measured and reported with 99 percent confidence that the pollutant concentration is above zero and is determined from analysis of a sample in a given matrix containing the pollutant.

Dilution factor (DF) – A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the percent effluent fraction, for example, a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

Distribution uniformity – The uniformity of infiltration (or application in the case of sprinkle or trickle irrigation) throughout the field expressed as a percent relating to the average depth infiltrated in the lowest one-quarter of the area to the average depth of water infiltrated.

Early warning value – The concentration of a pollutant set in accordance with [WAC 173-200-070](#) that is a percentage of an enforcement limit. It may be established in the effluent, groundwater, surface water, the vadose zone or within the treatment process. This value acts as a trigger to detect and respond to increasing contaminant concentrations prior to the degradation of a beneficial use.

Enforcement limit – The concentration assigned to a contaminant in the groundwater at the point of compliance for the purpose of regulation, [\[WAC 173-200-020\(11\)\]](#). This limit assures that a groundwater criterion will not be exceeded and that background water quality will be protected.

Engineering report – A document that thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report must contain the appropriate information required in [WAC 173-240-060](#) or [WAC 173-240-130](#).

Enterococci – A subgroup of fecal streptococci that includes *S. faecalis*, *S. faecium*, *S. gallinarum*, and *S. avium*. The enterococci are differentiated from other streptococci by their ability to grow in 6.5% sodium chloride, at pH 9.6, and at 10°C and 45°C.

E. coli – A bacterium in the family Enterobacteriaceae named Escherichia coli and is a common inhabitant of the intestinal tract of warm-blooded animals, and its presence in water samples is an indication of fecal pollution and the possible presence of enteric pathogens.

Fecal coliform bacteria – Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab sample – A single sample or measurement taken at a specific time or over as short a period of time as is feasible.

Groundwater – Water in a saturated zone or stratum beneath the surface of land or below a surface water body.

Industrial user – A discharger of wastewater to the sanitary sewer that is not sanitary wastewater or is not equivalent to sanitary wastewater in character.

Industrial wastewater – Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business; from the development of any natural resource; or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated stormwater and, also, leachate from solid waste facilities.

Interference – A discharge which, alone or in conjunction with a discharge or discharges from other sources, both:

- Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and
- Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to subtitle D of the SWDA), sludge regulations appearing in [40 CFR Part 501](#), the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

Local limits – Specific prohibitions or limits on pollutants or pollutant parameters developed by a POTW.

Major facility – A facility discharging to surface water with an EPA rating score of > 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Maximum daily discharge limit – The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Maximum day design flow (MDDF) – The largest volume of flow anticipated to occur during a one-day period, expressed as a daily average.

Maximum month design flow (MMDF) – The largest volume of flow anticipated to occur during a continuous 30-day period, expressed as a daily average.

Maximum week design flow (MWDF) – The largest volume of flow anticipated to occur during a continuous 7-day period, expressed as a daily average.

Method detection level (MDL) – See Detection Limit.

Minor facility – A facility discharging to surface water with an EPA rating score of < 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Mixing zone – An area that surrounds an effluent discharge within which water quality criteria may be exceeded. The permit specifies the area of the authorized mixing zone that Ecology defines following procedures outlined in state regulations ([chapter 173-201A WAC](#)).

National pollutant discharge elimination system (NPDES) – The NPDES ([Section 402 of the Clean Water Act](#)) is the federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the state of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both state and federal laws.

pH – The pH of a liquid measures its acidity or alkalinity. It is the negative logarithm of the hydrogen ion concentration. A pH of 7 is defined as neutral and large variations above or below this value are considered harmful to most aquatic life.

Pass-through – A discharge which exits the POTW into waters of the State in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation), or which is a cause of a violation of State water quality standards.

Peak hour design flow (PHDF) – The largest volume of flow anticipated to occur during a one-hour period, expressed as a daily or hourly average.

Peak instantaneous design flow (PIDF) – The maximum anticipated instantaneous flow.

Point of compliance – The location in the groundwater where the enforcement limit must not be exceeded and a facility must comply with the Ground Water Quality Standards. Ecology determines this limit on a site-specific basis. Ecology locates the point of compliance in the groundwater as near and directly downgradient from the pollutant source as technically,

hydrogeologically, and geographically feasible, unless it approves an alternative point of compliance.

Potential significant industrial user (PSIU) – A potential significant industrial user is defined as an Industrial User that does not meet the criteria for a Significant Industrial User, but which discharges wastewater meeting one or more of the following criteria:

- a. Exceeds 0.5 % of treatment plant design capacity criteria and discharges <25,000 gallons per day or;
- b. Is a member of a group of similar industrial users which, taken together, have the potential to cause pass through or interference at the POTW (e.g. facilities which develop photographic film or paper, and car washes).

Ecology may determine that a discharger initially classified as a potential significant industrial user should be managed as a significant industrial user.

Quantitation level (QL) – Also known as Minimum Level of Quantitation (ML) – The lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. It is equivalent to the concentration of the lowest calibration standard, assuming that the lab has used all method-specified sample weights, volumes, and cleanup procedures. The QL is calculated by multiplying the MDL by 3.18 and rounding the result to the number nearest to $(1, 2, \text{ or } 5) \times 10^n$, where n is an integer. (64 FR 30417).

ALSO GIVEN AS:

The smallest detectable concentration of analyte greater than the Detection Limit (DL) where the accuracy (precision & bias) achieves the objectives of the intended purpose.

(Report of the Federal Advisory Committee on Detection and Quantitation Approaches and Uses in Clean Water Act Programs Submitted to the US Environmental Protection Agency December 2007).

Reasonable potential – A reasonable potential to cause or contribute to a water quality violation, or loss of sensitive and/or important habitat.

Responsible corporate officer – A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or have gross annual sales or expenditures exceeding \$25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures ([40 CFR 122.22](#)).

Sample Maximum – No sample may exceed this value.

Significant industrial user (SIU) –

- 1) All industrial users subject to Categorical Pretreatment Standards under [40 CFR 403.6](#) and [40 CFR Chapter I, Subchapter N](#) and;
- 2) Any other industrial user that: discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling, and boiler blow-down wastewater); contributes a process wastestream that makes up 5 percent or

more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority* on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement [in accordance with [40 CFR 403.8\(f\)\(6\)](#)].

Upon finding that the industrial user meeting the criteria in paragraph 2, above, has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement, the Control Authority* may at any time, on its own initiative or in response to a petition received from an industrial user or POTW, and in accordance with [40 CFR 403.8\(f\)\(6\)](#), determine that such industrial user is not a significant industrial user.

*The term "Control Authority" refers to the Washington State Department of Ecology in the case of non-delegated POTWs or to the POTW in the case of delegated POTWs.

Slug discharge – Any discharge of a non-routine, episodic nature, including but not limited to an accidental spill or a non-customary batch discharge to the POTW. This may include any pollutant released at a flow rate that may cause interference or pass through with the POTW or in any way violate the permit conditions or the POTW's regulations and local limits.

Soil scientist – An individual who is registered as a Certified or Registered Professional Soil Scientist or as a Certified Professional Soil Specialist by the American Registry of Certified Professionals in Agronomy, Crops, and Soils or by the National Society of Consulting Scientists or who has the credentials for membership. Minimum requirements for eligibility are: possession of a baccalaureate, masters, or doctorate degree from a U.S. or Canadian institution with a minimum of 30 semester hours or 45 quarter hours professional core courses in agronomy, crops or soils, and have 5, 3, or 1 years, respectively, of professional experience working in the area of agronomy, crops, or soils.

Solid waste – All putrescible and non-putrescible solid and semisolid wastes including, but not limited to, garbage, rubbish, ashes, industrial wastes, swill, sewage sludge, demolition and construction wastes, abandoned vehicles or parts thereof, contaminated soils and contaminated dredged material, and recyclable materials.

Soluble BOD₅ – Determining the soluble fraction of Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of soluble organic material present in an effluent that is utilized by bacteria. Although the soluble BOD₅ test is not specifically described in Standard Methods, filtering the raw sample through at least a 1.2 um filter prior to running the standard BOD₅ test is sufficient to remove the particulate organic fraction.

State waters – Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater – That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a stormwater drainage system into a defined surface water body, or a constructed infiltration facility.

Technology-based effluent limit – A permit limit based on the ability of a treatment method to reduce the pollutant.

Total coliform bacteria – A microbiological test, which detects and enumerates the total coliform group of bacteria in water samples.

Total dissolved solids – That portion of total solids in water or wastewater that passes through a specific filter.

Total maximum daily load (TMDL) – A determination of the amount of pollutant that a water body can receive and still meet water quality standards.

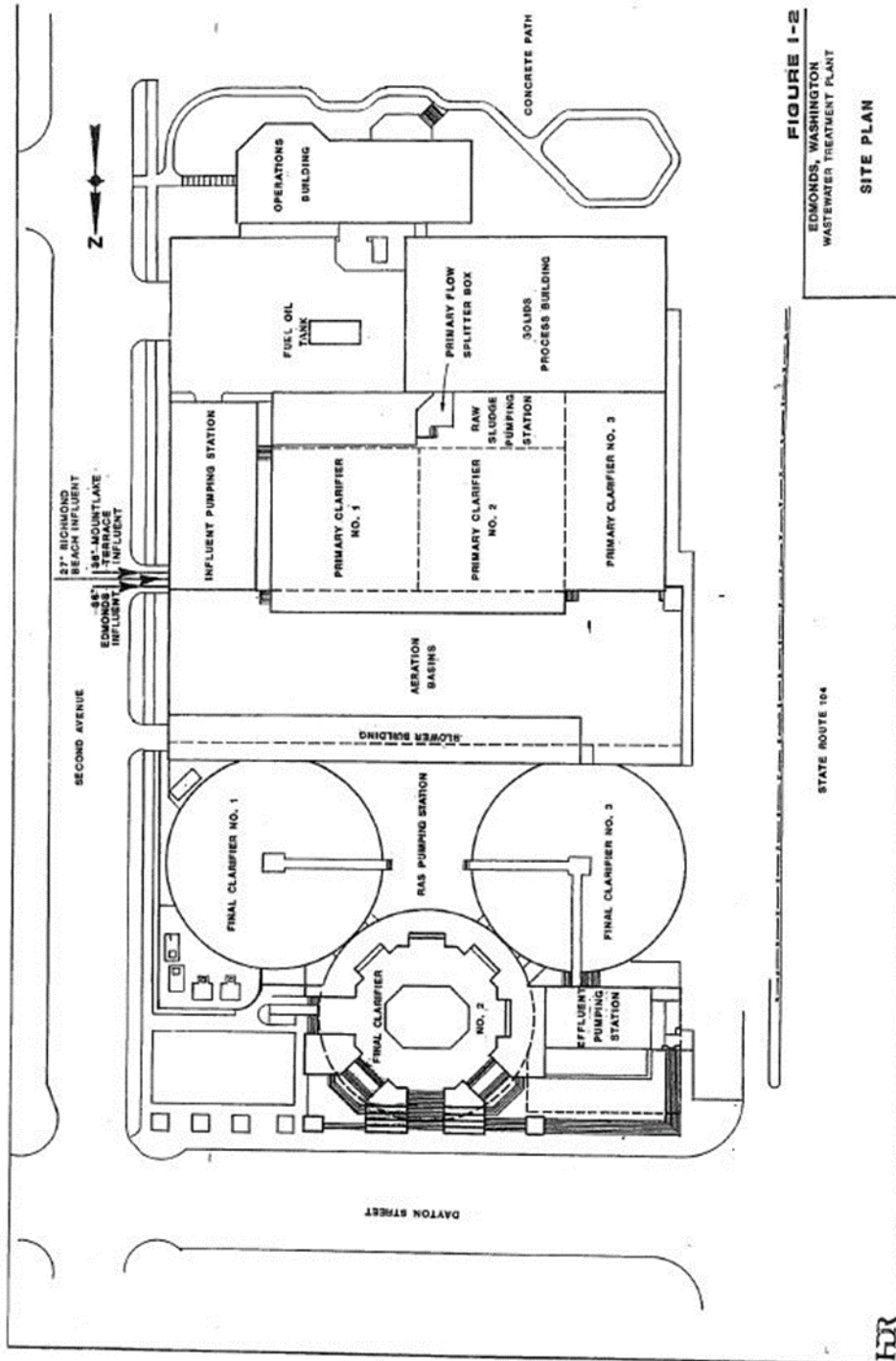
Total suspended solids (TSS) – Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

Upset – An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limits because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water quality-based effluent limit – A limit imposed on the concentration of an effluent parameter to prevent the concentration of that parameter from exceeding its water quality criterion after discharge into receiving waters.

Appendix D — Treatment Plant Layout

The following diagrams illustrate the overall layout of the Edmonds WWTP



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Appendix E — Monitoring Data Summary

Influent Monitoring Data, 2014-2022

Facility: Edmonds WWTP												
Permit No: WA0024058												
Date	Influent											
	Flow, MGD	Flow, MGD	BOD ₅ , mg/L	BOD ₅ , mg/L	BOD ₅ , ppd	BOD ₅ , ppd	TSS, mg/L	TSS, mg/L	TSS, ppd	TSS, ppd	CBOD ₅ , mg/L	CBOD ₅ , mg/L
	Monthly Average	Monthly Maximum	Monthly Average	Monthly Maximum	Monthly Average	Monthly Maximum	Monthly Average	Monthly Maximum	Monthly Average	Monthly Maximum	Monthly Average	Monthly Maximum
Nov-14	5.0	7.7	231	276	9610	11696	182	223	7441	9381	213	323
Dec-14	6.4	9.6	182	258	8756	10923	138	203	7007	10958	164	238
Jan-15	5.0	6.6	210	233	8747	9990	171	370	7078	15125	198	237
Feb-15	5.6	10.0	210	265	9233	9803	157	236	6607	8626	175	236
Mar-15	4.9	8.7	230	297	9282	12378	176	270	6740	11272	201	253
Apr-15	4.3	5.3	250	296	9071	11311	204	287	7313	9545	225	262
May-15	3.9	4.1	297	323	10187	13137	224	260	7269	8441	248	278
Jun-15	3.6	4.9	287	336	8561	10537	227	326	6850	9421	239	277
Jul-15	3.7	4.0	317	353	9799	10730	242	368	7395	11044	276	397
Aug-15	3.7	4.3	302	330	9358	10972	244	320	7406	9524	257	302
Sep-15	3.6	4.0	317	343	9774	11251	242	298	7389	8997	265	307
Oct-15	3.6	4.5	309	379	9435	11602	270	595	8086	17382	276	439
Nov-15	4.8	10.1	241	305	9876	12597	186	253	7230	9172	213	300
Dec-15	7.1	11.8	175	281	10218	15848	125	263	6919	15618	148	293
Jan-16	7.9	18.0	164	245	8443	10708	99	146	5689	7669	128	220
Feb-16	5.9	7.6	205	301	9789	13645	131	210	6203	9510	168	279
Mar-16	6.9	11.3	174	221	9646	11898	128	198	6830	8735	146	197
Apr-16	4.4	5.0	224	252	8415	9781	173	224	6329	7753	202	228
May-16	3.9	4.2	262	359	8612	11551	196	297	6429	10032	226	326
Jun-16	3.8	4.6	292	361	9450	10769	246	458	7683	13675	255	309
Jul-16	3.9	4.1	292	332	9556	11155	227	296	7312	9282	247	277
Aug-16	3.8	4.1	278	310	8865	9890	241	438	7608	11032	247	289
Sep-16	3.9	4.4	276	296	9282	10044	239	304	7703	9837	258	401
Oct-16	5.3	7.4	255	301	10109	11262	174	268	7312	10495	189	275
Nov-16	6.8	9.1	154	212	8537	10368	121	186	6983	9693	134	195
Dec-16	6.2	7.3	167	238	8454	10893	138	253	7034	13715	146	200
Jan-17	5.1	8.0	263	390	10742	17876	195	657	8110	26630	190	371
Feb-17	6.8	12.9	219	354	13620	25593	243	540	14285	31224	167	248
Mar-17	7.1	13.4	207	275	11713	15470	197	411	11320	20326	150	236
Apr-17	6.5	7.3	238	297	12791	16893	186	276	10084	15665	157	214
May-17	4.6	6.1	235	290	8777	11234	174	306	6608	9264	163	212
Jun-17	3.6	4.2	282	320	8611	10308	209	256	6355	7643	184	232
Jul-17	3.4	3.7	316	336	9092	10156	242	338	6929	9951	199	233
Aug-17	3.2	3.7	337	371	9098	10738	266	359	7033	10060	213	249
Sep-17	3.5	4.0	341	389	9830	11812	283	314	8433	10082	206	237
Oct-17	3.8	4.6	301	343	9283	10201	249	380	7821	13469	195	339
Nov-17	5.4	9.6	231	318	11718	17639	190	291	8363	12452	180	318
Dec-17	5.8	9.4	213	292	9891	12182	172	259	7925	10476	161	255
Jan-18	7.4	9.8	182	303	10763	19780	138	341	8229	22268	117	176
Feb-18	6.0	9.1	223	430	11216	19538	147	325	7471	15394	151	255
Mar-18	5.3	6.5	184	250	8026	9709	116	172	5097	6492	149	204
Apr-18	5.8	11.7	207	311	10314	12177	221	714	10390	35118	163	252
May-18	4.0	4.4	286	406	9634	12303	196	332	6583	10834	184	213
Jun-18	3.9	4.3	279	332	9139	11073	216	312	7062	10424	198	224
Jul-18	3.7	3.8	317	369	9812	11451	293	368	9009	11208	204	233
Aug-18	3.6	3.9	345	388	10506	11513	318	455	9649	13487	219	296
Sep-18	3.5	4.8	373	409	11080	12735	331	462	9763	13626	229	354
Oct-18	3.8	4.9	340	377	11058	11888	323	489	10199	14938	224	323
Nov-18	4.0	7.7	328	359	10389	13754	230	279	7745	12286	197	248
Dec-18	5.5	8.6	268	338	13534	16957	213	433	9526	19371	185	223

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Fact Sheet for NPDES Permit No. WA0024058

Permit Effective Date: XX/XX/XXXX

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Jan-19	5.4	6.9	218	284	9675	13343	163	210	7184	9648	165	231
Feb-19	5.9	8.7	247	379	11668	14813	161	250	7532	9766	180	244
Mar-19	4.7	6.0	270	371	10525	14028	204	369	7926	13972	183	236
Apr-19	4.4	5.1	257	310	9486	12722	204	354	7425	12311	172.6	220.7
May-19	4.0	4.7	327	453	10791	15528	291	454	9563	15562	244.9	376.2
Jun-19	4.0	4.3	336	412	11342	13353	322	421	10887	13935	283.9	390.6
Jul-19	3.8	4.1	326	479	10410	15516	305	433	9773	14155	241.62	404.4
Aug-19	3.7	4.0	291	371	9035	11616	275	353	8537	11040	222.66	283.8
Sep-19	3.3	4.2	263	324	7735	10055	253	307	7105	10216	201.465	253.1
Oct-19	3.5	4.8	288	320	8777	10967	245	281	7134	9345	196	264
Nov-19	3.6	4.5	286	479	8821	16572	239	493	7327	17063	212.15	293.4
Dec-19	5.4	16.8	252	335	9613	11029	188	309	7048	10051	176.919	236.4
Jan-20	6.2	7.9	161	227	8166	10223	128	190	6538	10649	116.511	154.6
Feb-20	7.1	17.7	151	221	7919	10197	131	222	7114	10541	107.7	160.3
Mar-20	4.9	5.8	228	283	9309	11317	185	213	7509	8811	137.394	161.1
Apr-20	4.4	5.4	234	294	8506	10477	223	317	8161	11315	148.817	206.8
May-20	4.3	6.2	280	316	10196	10948	264	311	9612	15926	174.9	213.4
Jun-20	4.5	5.2	281	302	10398	11488	260	317	9685	11633	149.373	164.8
Jul-20	3.9	4.3	288	327	9217	10463	268	320	8625	10649	164.047	220.9
Aug-20	3.8	4.4	320	470	10085	14654	302	483	9601	15428	176.4	218.1
Sep-20	4.1	4.8	277	369	9763	14187	271	351	9584	13674	156.729	201
Oct-20	3.9	5.7	259	287	8601	11636	259	373	8313	10494	150.9	194.5
Nov-20	4.4	5.0	258	347	9759	14102	207	297	7473	12088	144.131	215.1
Dec-20	4.4	12.2	207	282	7055	8442	167	241	6064	12240	110.2	153.5
Jan-21	6.8	14.0	126	174	7218	9155	167	524	8196	17961	80.3	124
Feb-21	5.2	7.6	149	204	6640	7673	131	160	5685	6614	90.6	122.7
Mar-21	3.7	4.3	216	244	6844	7725	179	203	5604	6670	127.238	156.6
Apr-21	3.1	3.5	224	245	5766	7125	217	323	5545	8324	157.8	256.8
May-21	2.7	2.9	292	379	6768	9062	243	323	5597	7489	210.9	293.4
Jun-21	2.7	3.4	298	325	6931	7526	279	451	6405	10532	272.1	372.6
Jul-21	2.5	2.9	329	382	6932	8211	287	357	6097	7766	287.1	326.8
Aug-21	2.5	2.6	311	385	6444	8115	279	339	5788	7392	274.433	391.8
Sep-21	2.6	3.6	285	334	6414	6793	266	318	5912	6835	237.4	292.8
Oct-21	3.0	6.2	250	279	6046	6443	248	371	5859	8138	183.2	223.6
Nov-21	4.7	6.7	188	292	7046	8466	200	521	7301	15860	145.6	216.4
Dec-21	5.1	7.1	154	188	6827	7925	152	230	6248	9514	136.7	207.3
Jan-22	7.1	17.8	152	229	8526	12572	115	193	6427	8739	127.7	203.3
Feb-22	3.6	8.3	244	302	7215	9247	203	244	5871	7876	195.419	248
Mar-22	4.3	6.7	190	214	6845	7807	164	206	5758	7879	174.1	206.5
Apr-22	3.5	5.2	227	278	6693	7645	183	254	5246	6609	200	260
MIN:	2.5	2.6	126	174	5766	6443	99	146	5097	6492	80	123
MAX:	7.9	18.0	373	479	13620	25593	331	714	14285	35118	287	439
AVE:	4.6	6.8	253	318	9197	11743	212	328	7568	11926	188	256
Median:	4.3	5.4	258	317	9282	11243	208	313	7312	10514	184	246
95th Percentile:	7.1	13.7	336	422	11693	17332	303	523	10148	19896	273	391
LIMIT:												
DESIGN:	11.8	21.5			20000				19200			

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Effluent Monitoring Data, 2014-2022

Facility:Edmonds WWTP												
Permit No: WA0024058												
Date	Effluent											
	CBOD, mg/L	CBOD, mg/L	CBOD, ppd	CBOD, ppd	CBOD % Removal	TSS, mg/L	TSS, mg/L	TSS, ppd	TSS, ppd	TSS % Removal	PH	PH
	Monthly Ave	Wkly Ave	Monthly Ave	Wkly Ave	Ave	Monthly Ave	Wkly Ave	Monthly Ave	Wkly Ave	Ave	Max	Min
Nov-14	8	9	325	396	96	9	10	364	468	95	7.2	6.5
Dec-14	9	10	438	528	95	9	11	488	663	93	6.9	6.4
Jan-15	8	10	336	416	96	10	13	435	590	94	7.1	6.5
Feb-15	7	8	305	328	96	8	10	338	418	95	7.1	6.3
Mar-15	7	9	285	379	96	7	8	294	321	96	7.2	6.6
Apr-15	8	11	290	359	96	8	12	301	5	96	7.2	6.8
May-15	12	17	397	539	95	13	19	434	597	94	7.2	6.6
Jun-15	11	15	354	533	95	17	23	511	793	93	7.7	6.9
Jul-15	9	10	282	315	97	12	18	373	559	95	7.2	6.6
Aug-15	10	11	320	339	96	15	18	461	542	94	7.2	6.6
Sep-15	11	14	342	413	96	12	13	358	403	95	7.4	6.9
Oct-15	11	12	325	363	96	12	16	365	474	95	7.3	6.9
Nov-15	8	11	306	427	96	8	11	308	434	96	7.1	6.8
Dec-15	9	11	511	693	93	11	14	646	935	89	7.0	6.4
Jan-16	9	10	582	718	93	12	13	758	987	86	7.0	6.5
Feb-16	8	8	367	453	95	9	13	435	816	93	7.0	6.4
Mar-16	7	9	396	575	95	7	9	371	452	94	7.0	6.5
Apr-16	7	7	242	270	97	6	8	201	292	97	7.3	7.0
May-16	9	15	289	506	96	8	14	254	452	96	7.3	7.1
Jun-16	8	11	267	361	97	9	11	278	347	96	7.4	7.1
Jul-16	10	11	317	353	96	14	16	446	545	94	7.5	7.0
Aug-16	11	12	339	380	96	10	11	323	373	96	7.4	7.2
Sep-16	10	12	326	399	96	11	13	343	379	96	7.4	7.0
Oct-16	8	9	320	338	96	7	9	302	428	95	7.4	7.0
Nov-16	8	11	503	693	94	9	12	529	690	92	7.4	7.0
Dec-16	7	9	365	444	95	8	11	389	574	94	7.3	6.7
Jan-17	9	15	381	564	95	7	12	301	539	95	7.2	7.0
Feb-17	6	7	362	438	96	5	7	301	428	97	7.3	6.9
Mar-17	6	7	320	381	96	5	7	292	412	97	7.2	6.9
Apr-17	5	6	287	366	97	4	4	207	243	98	7.3	7.0
May-17	6	7	227	299	96	6	9	218	273	96	7.2	7.0
Jun-17	8	9	254	280	95	8	9	232	273	96	7.4	7.1
Jul-17	6	8	186	234	97	6	7	162	194	98	7.5	7.2
Aug-17	8	11	212	267	96	6	8	163	206	98	7.5	7.3
Sep-17	9	11	273	340	96	8	10	247	302	97	7.6	7.2
Oct-17	9	13	294	438	95	8	11	238	347	97	7.5	7.3
Nov-17	7	9	305	355	96	6	7	267	386	97	7.6	7.1
Dec-17	6	7	267	373	96	5	5	222	265	97	7.3	7.0
Jan-18	6	7	378	412	94	7	8	405	456	94	7.3	7.0
Feb-18	5	5	238	274	97	5	6	236	311	97	7.5	7.0
Mar-18	6	7	260	269	96	6	8	277	333	94	7.3	7.0
Apr-18	6	8	287	400	96	4	5	211	359	97	7.2	6.9
May-18	7	11	247	371	96	7	14	236	469	96	7.3	7.1
Jun-18	7	9	244	283	96	4	6	138	180	98	7.4	7.2
Jul-18	7	9	212	274	97	5	6	140	168	98	7.5	7.2
Aug-18	7	9	218	284	97	4	5	115	141	99	7.4	7.1
Sep-18	8	11	250	316	96	8	11	225	305	98	7.5	7.2
Oct-18	9	12	284	397	96	7	7	219	340	98	7.6	7.1
Nov-18	8	10	299	458	96	5	10	177	384	98	7.4	7.0
Dec-18	13	13	596	648	93	6	9	284	406	97	7.2	6.9

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Fact Sheet for NPDES Permit No. WA0024058

Permit Effective Date: XX/XX/XXXX

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Jan-19	8	15	383	816	95	8	10	353	579	95	7.3	7.0
Feb-19	9	10	406	451	95	6	8	299	346	96	7.4	7.0
Mar-19	8	9	318	358	96	8	9	324	398	96	7.2	6.9
Apr-19	8	12	306	425	95.1	9	11	314	409	96	7.4	6.9
May-19	9	11	309	356	96.1	8	9	259	274	97	7.3	7.1
Jun-19	12	15	417	497	95.4	12	14	401	475	96	7.4	7.1
Jul-19	11	15	342	468	95.5	13	17	421	563	96	7.4	7.2
Aug-19	12	14	357	443	94.8	20	22	608	677	93	7.4	7.1
Sep-19	9	10	251	313	95.4	10	13	269	390	96	7.5	7.2
Oct-19	7	12	216	396	96.2	9	15	278	462	96	7.4	7.2
Nov-19	6	7	201	239	96.9	7	8	224	258	97	7.4	7.2
Dec-19	6	7	247	335	96.3	6	9	221	264	97	7.3	6.9
Jan-20	6	7	323	349	94.4	7	8	373	586	94	7.3	7
Feb-20	6	8	416	746	93.6	7	11	405	691	94	7.3	6.9
Mar-20	6	7	237	259	95.6	8	12	304	479	96	7.3	7.1
Apr-20	6	7	225	249	95.7	8	8	279	298	96	7.3	7.1
May-20	6	7	228	228	96.3	7	9	245	312	97	7.3	7.1
Jun-20	7	8	262	314	95.3	8	10	304	346	97	7.3	7.1
Jul-20	9	11	288	348	94.6	13	15	422	499	95	7.3	7.1
Aug-20	10	12	327	399	94.1	17	21	543	687	94	7.4	7.2
Sep-20	8	11	302	427	94.6	14	18	497	628	94	7.5	7.3
Oct-20	7	10	242	376	95.1	16	22	512	775	94	7.4	6.8
Nov-20	8	10	312	371	94.1	20	31	750	1123	90	7.4	7
Dec-20	7	10	296	568	93	15	25	531	836	90	7.4	6.8
Jan-21	5	7	298	487	93.5	8	9	418	512	95	7.4	6.7
Feb-21	4	5	192	239	94.9	7	10	329	512	94	7.3	6.8
Mar-21	6	7	189	225	95.2	7	9	232	279	96	7.4	7
Apr-21	8	9	201	254	94.9	7	8	173	221	97	7.4	7.2
May-21	7	9	164	199	96.5	12	18	276	403	95	7.5	7.2
Jun-21	10	12	219	273	96.4	14	15	324	419	95	7.4	7.1
Jul-21	12	14	249	305	95.9	22	28	461	599	92	7.4	7.1
Aug-21	15	18	312	373	94.5	25	39	517	803	90	7.4	7.1
Sep-21	7	8	167	182	96.7	11	13	239	293	96	7.4	7.1
Oct-21	8	11	181	255	95.8	11	16	249	364	96	7.2	6.8
Nov-21	8	10	282	290	94.7	12	13	444	483	94	7	6.1
Dec-21	9	16	366	588	93.5	16	34	606	1294	90	7	6.3
Jan-22	15	25	1284	2823	84.8	12	22	982	2350	84	7.4	6.7
Feb-22	5	6	156	212	97.2	6	7	187	206	97	6.9	6.6
Mar-22	8	13	303	512	95	9	6	304	651	95	6.9	6.6
Apr-22	10	12	304	373	94.7	11	21	323	405	94	7.2	6.6
MIN:	4	5	156	182	85	4	4	115	5	84	6.9	6.1
MAX:	15	25	1284	2823	97	25	39	982	2350	99	7.7	7.3
AVE:	8	10	312	417	95	9	13	345	482	95	7.3	6.9
Median:	8	10	299	372	96	8	11	304	419	96	7.3	7.0
95th Percentile:	12	15	474	693	97	17	24	607	890	98	7.5	7.2
LIMIT:	25	40	2460	3936	85	30	45	2952	4430	85	9	6
DESIGN:												

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Fact Sheet for NPDES Permit No. WA0024058

Permit Effective Date: XX/XX/XXXX

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Facility: Edmonds WWTP										
Permit No: WA0024058										
Effluent										
Date	Fecal Coliform, #/100 ml	Fecal Coliform, #/100 ml	Temperature, Degrees C	Ammonia (Total) mg/L	Reactive Phosphorus (Ortho-phosphate) (Total) (mg/L)	Nitrate + Nitrite (Total) (mg/L)	Total Phosphorus (mg/L)	TKN (mg/L)	Total Residual Chlorine (ug/L)	Total Residual Chlorine (ug/L)
	GEM	GM7	Monthly Max	Ave	Ave	Ave	Ave	Ave	Ave	Max
Nov-14	12	16							58	260
Dec-14	14	33							44	240
Jan-15	13	35		24.4	1.23	0.98	1.67	25.00	53	155
Feb-15	21	28							45	230
Mar-15	29	41							65	250
Apr-15	40	151		24.6	2.28	1.71	2.52	29.00	70	150
May-15	43	70							80	240
Jun-15	49	158							128	290
Jul-15	22	39		29.0	2.48	2.02	2.58	35.00	125	240
Aug-15	13	37							91	250
Sep-15	13	19							121	230
Oct-15	6	10		29.6	1.99	3.28	0.11	0.50	120	290
Nov-15	6	11							115	320
Dec-15	23	54							181	270
Jan-16	16	29		21.0	1.19	4.10	1.63	25.00	160	350
Feb-16	13	19							130	240
Mar-16	6	28							113	290
Apr-16	7	11		22.0	1.48	1.10	1.64	28.00	150	295
May-16	13	76							131	690
Jun-16	41	64							122	300
Jul-16	89	193		27.8	1.83	1.09	1.86	34.00	85	510
Aug-16	110	213							94	180
Sep-16	76	139							78	220
Oct-16	41	62		26.6	0.24	1.16	2.80	34.50	93	230
Nov-16	16	37							172	340
Dec-16	23	73							51	120
Jan-17	31	281		25.3	1.19	1.15	1.66	25.00	71	180
Feb-17	17	40							48	150
Mar-17	8	12							50	130
Apr-17	8	12		18.3	1.41	0.23	0.31	24.20	101	280
May-17	26	31							126	330
Jun-17	35	99							123	245
Jul-17	30	56		28.2	2.50	3.24	2.64	31.50	183	460
Aug-17	43	83							166	380
Sep-17	33	85							178	370
Oct-17	13	40		23.9	2.20	0.81	3.90	71.40	200	390
Nov-17	21	78							144	380
Dec-17	6	10							134	340
Jan-18	11	39	14.1	17.2	0.04	0.82	1.70	21.50	119	330
Feb-18	6	8							72	205
Mar-18	10	12							85	250
Apr-18	21	112	15.8	20.1	1.20	1.50	1.50	24.10	106	375
May-18	51	146							69	260
Jun-18	25	41							57	230
Jul-18	20	23	23.2	32.8	2.50	1.20	6.00	52.50	47	130
Aug-18	18	33							70	240
Sep-18	52	95							78	270
Oct-18	34	100	20.8	49.2	0.11	0.91	3.10	47.40	111	380
Nov-18	83	114							44	130
Dec-18	23	113							128	380

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Fact Sheet for NPDES Permit No. WA0024058

Permit Effective Date: XX/XX/XXXX

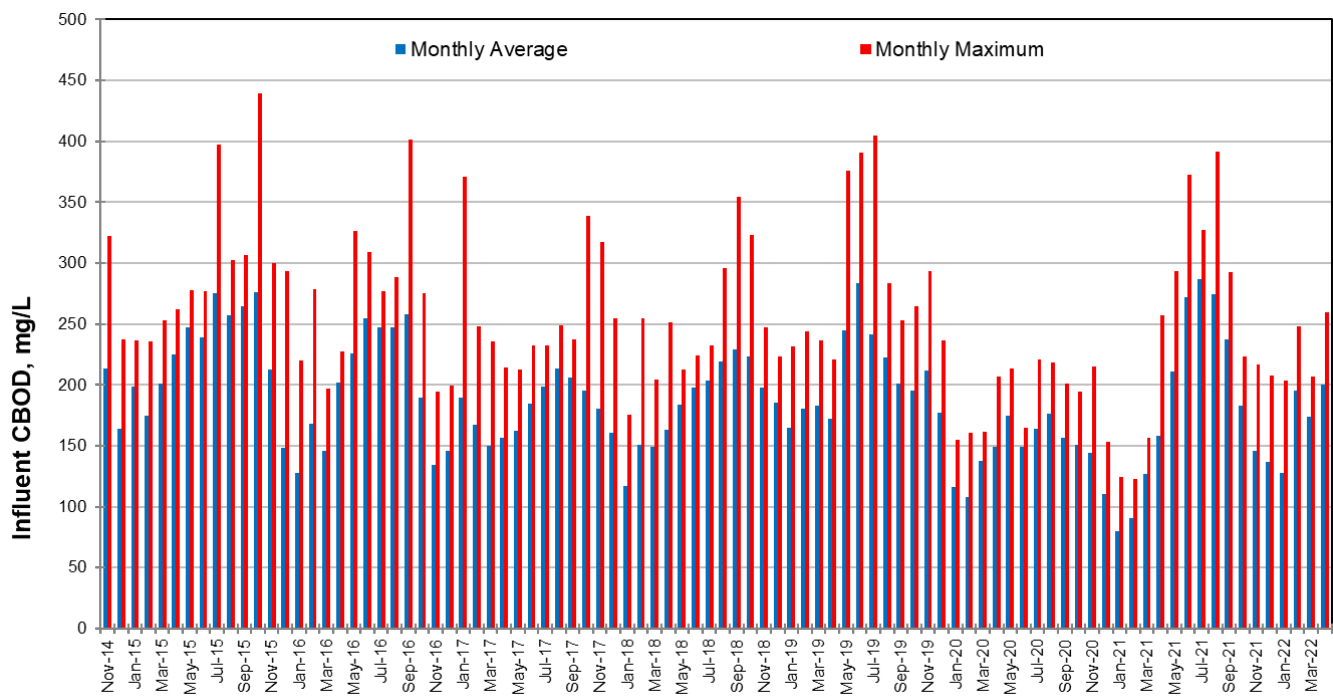
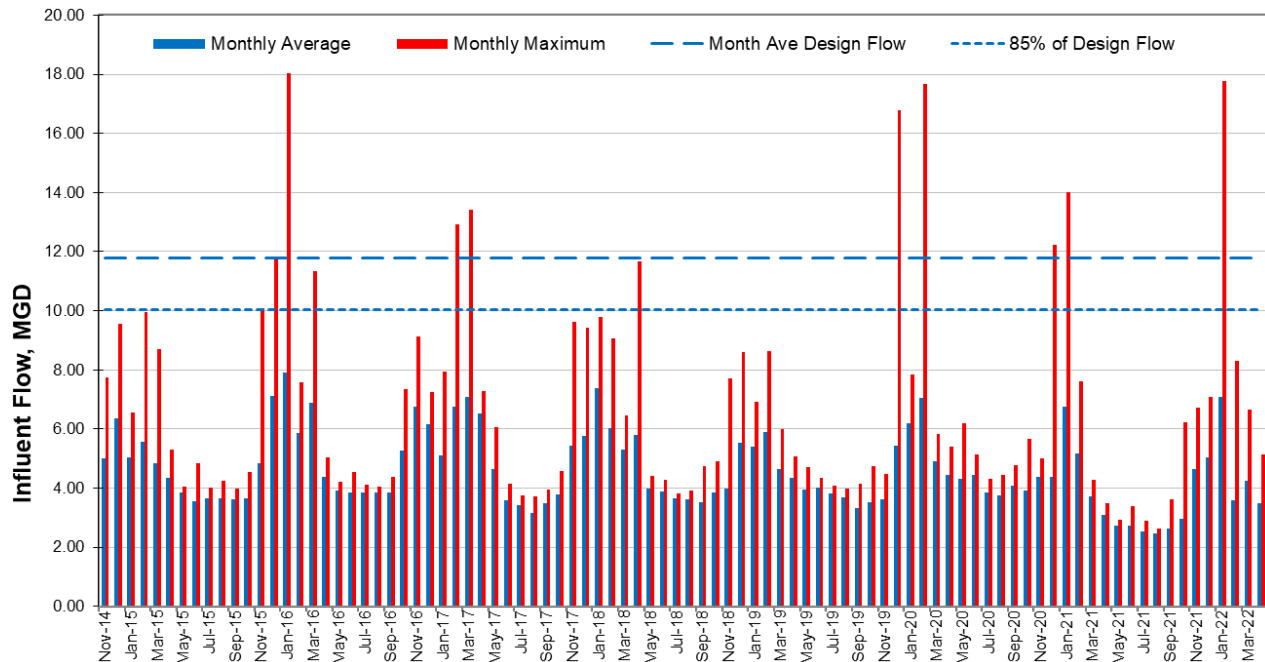
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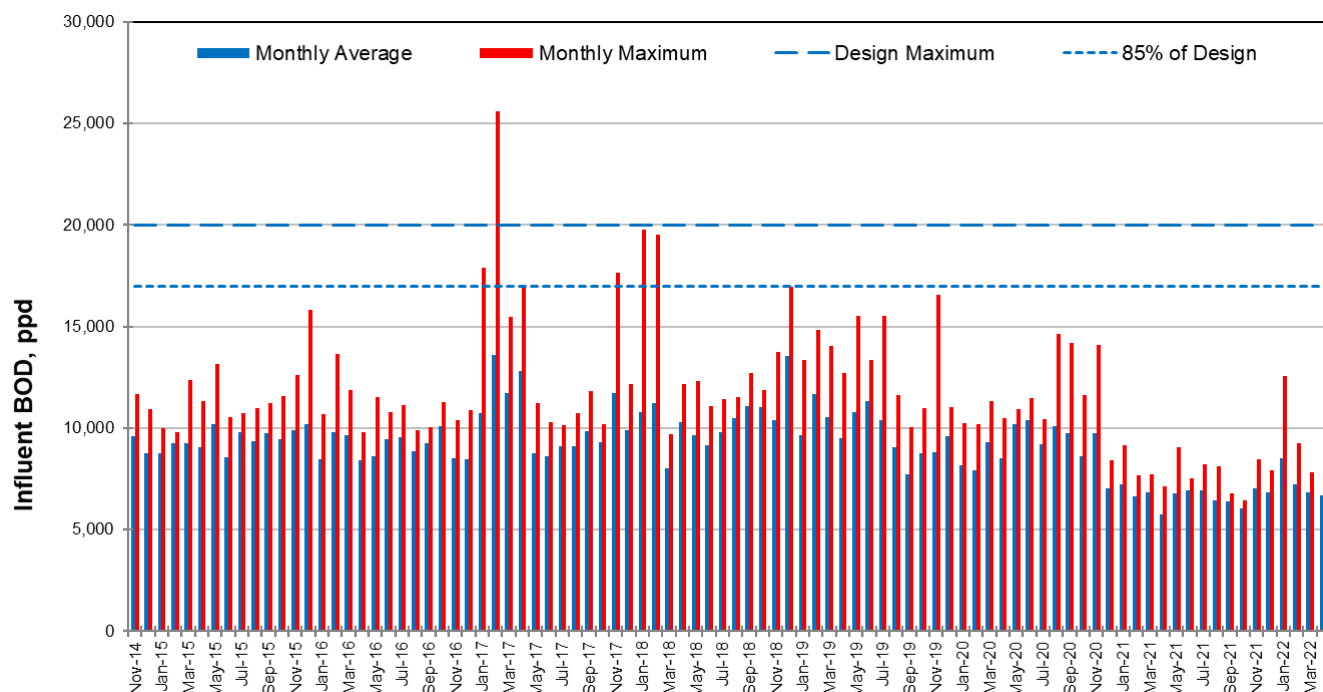
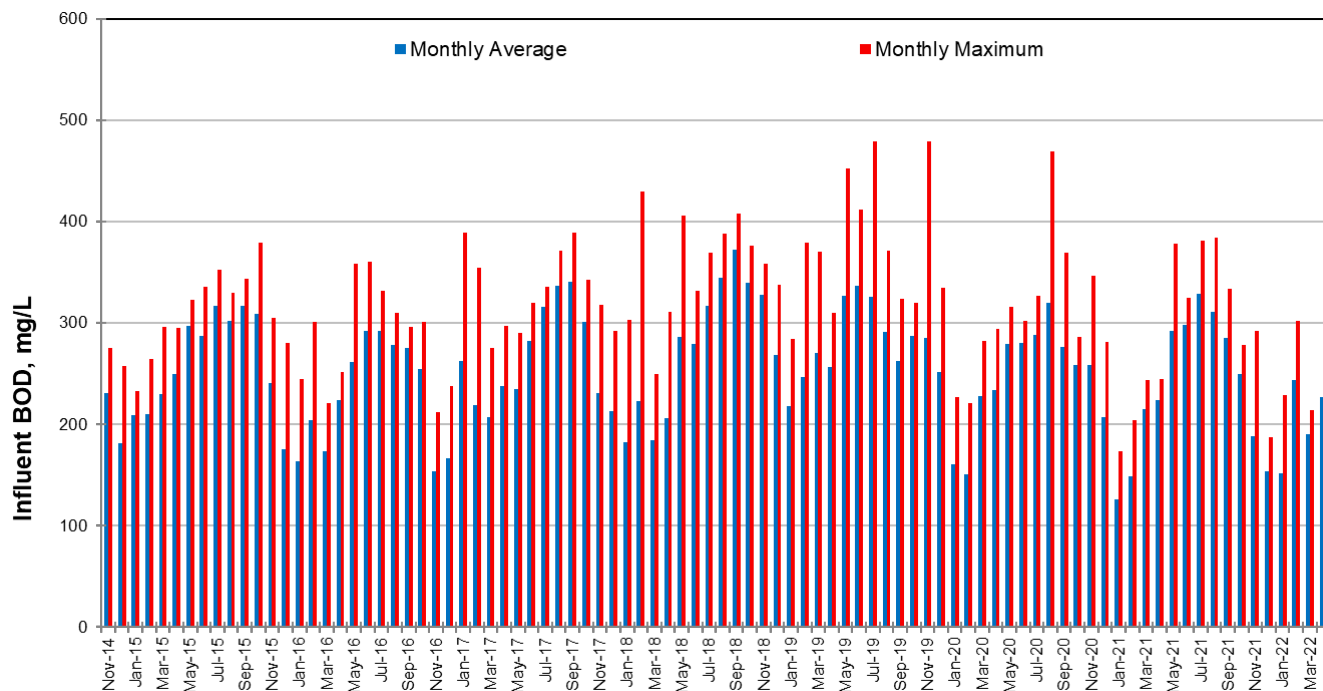
Jan-19	8	12	15.5	23.9	1.10	0.07	2.66	22.60	121	325
Feb-19	14	39							155	280
Mar-19	25	33							162	250
Apr-19	86	449		31.3	2.00	0.64	2.15	35.40	143	240
May-19	90	353							91	250
Jun-19	93	201							42	100
Jul-19	48	76		13.8	2.20	1.70	2.47	40.60	34	140
Aug-19	103	159							32	80
Sep-19	31	145							53	200
Oct-19	54	139		29.9	3.20	0.53	3.92	48.60	47	220
Nov-19	25	46							56	140
Dec-19	22	53							73	180
Jan-20	12	20		23	1.80	1.30	2.98	33.20	55	140
Feb-20	41	322							72	155
Mar-20	14	42							122	280
Apr-20	20	24		23.9	1.80	1.90	2.33	32.10	30	60
May-20	34	48							62	100
Jun-20	121	318							107	220
Jul-20	33	70		33.9	2.20	1.60	2.74	33.00	71	180
Aug-20	131	577							57	190
Sep-20	124	359							51	160
Oct-20	63	135		23.7	9.38	10.00	9.42	24.00	39	110
Nov-20	68	258							31	90
Dec-20	76	437							29	160
Jan-21	96	256		5.66	0.63	5.00	0.90	8.01	35	210
Feb-21	134	974							23	80
Mar-21	23	48							35	160
Apr-21	38	65		29	1.30	1.30	1.50	29.50	30	130
May-21	53	106							25	80
Jun-21	36	51							30	170
Jul-21	86	171		31.1	2.60	3.80	3.69	34.90	46	90
Aug-21	170	243							59	320
Sep-21	73	119							37	80
Oct-21	34	61		22.4	3.00	5.70	3.46	25.50	34	90
Nov-21	40	57							27	100
Dec-21	26	95							29	110
Jan-22	51	295		12.6	1.30	5.50	1.67	14.10	65	295
Feb-22	20	81							38	70
Mar-22	27	93							31	60
Apr-22	60	114							51	150
MIN:	6	8	14.1	5.7	0.0	0.1	0.1	0.5	22.5	60.0
MAX:	170	974	23.2	49.2	9.4	10.0	9.4	71.4	200.2	690.0
AVE:	41	116	17.9	25.0	1.9	2.2	2.6	30.7	83.4	227.1
Median:	29	68	15.8	24.4	1.8	1.3	2.5	29.5	71.0	230.0
95th Percentile:	116	356	22.7	33.5	3.1	5.6	5.2	50.9	169.3	380.0
LIMIT:	200	400							191	442
DESIGN:										
exceeds effluent limits										

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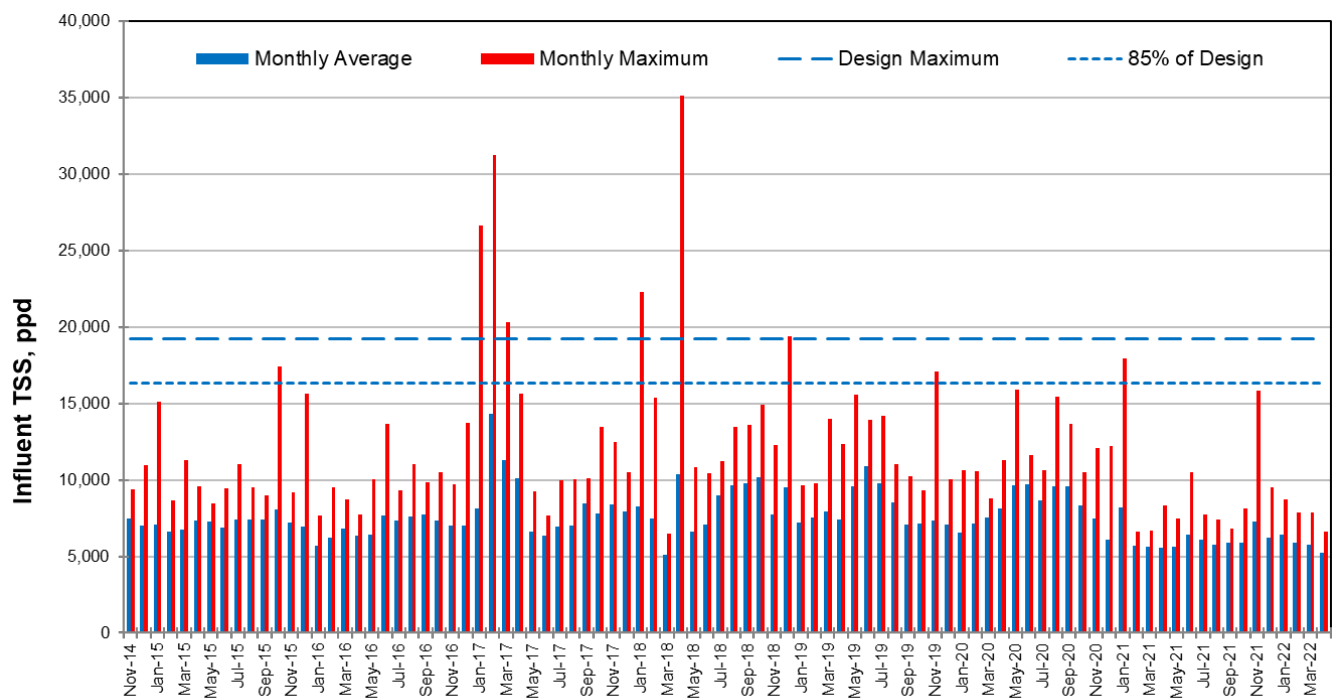
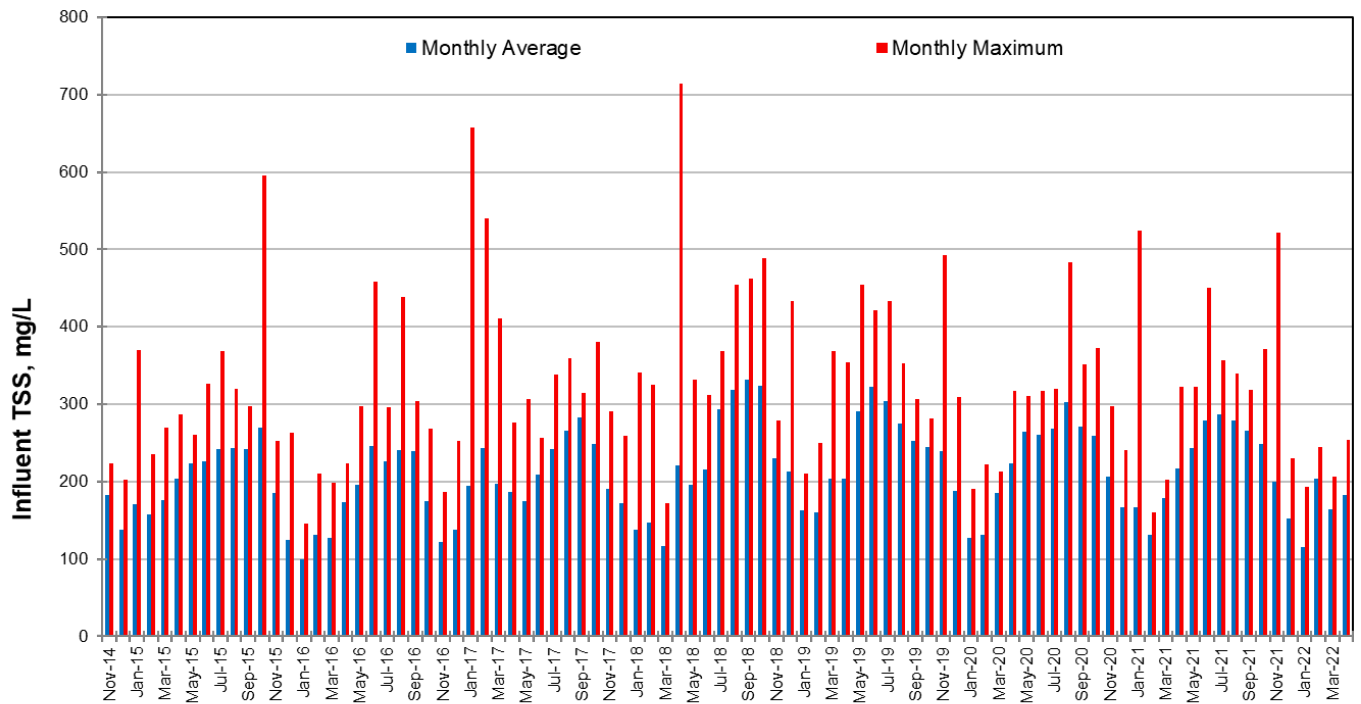
Discharge Monitoring Data, Influent Flow and CBOD, 2014-2022



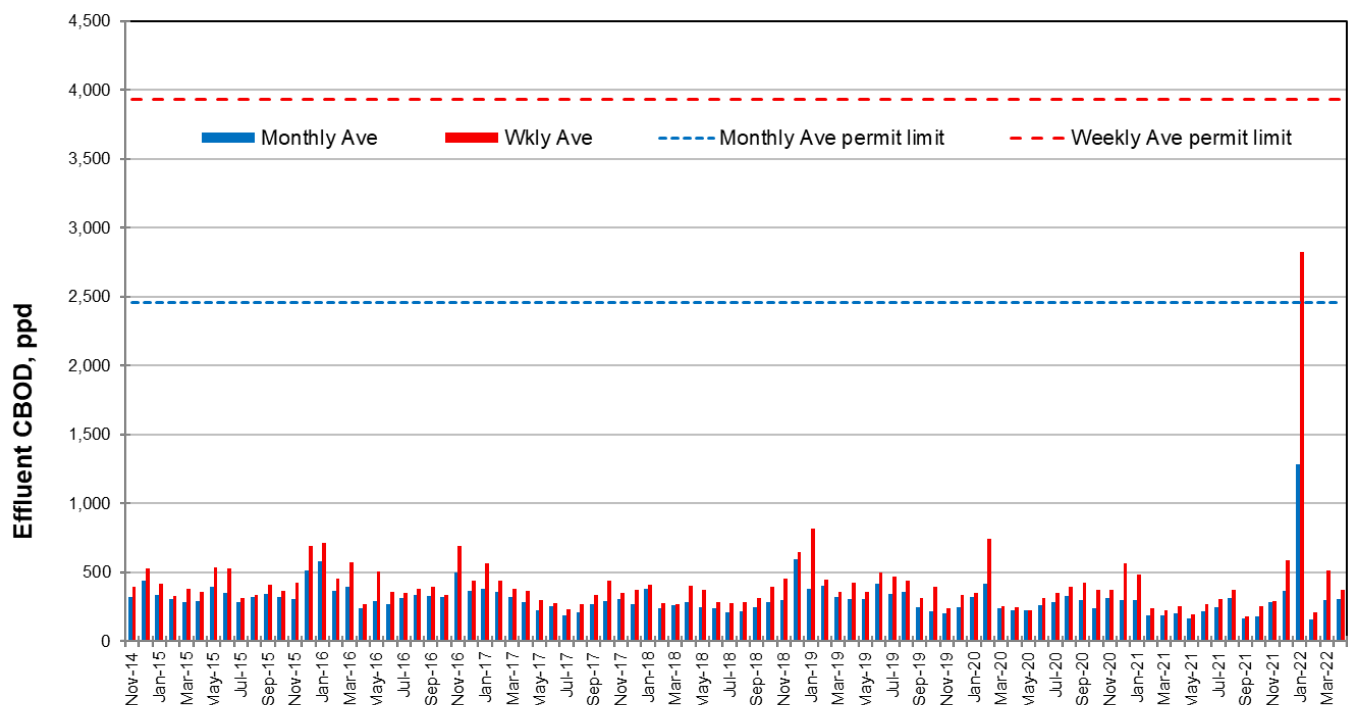
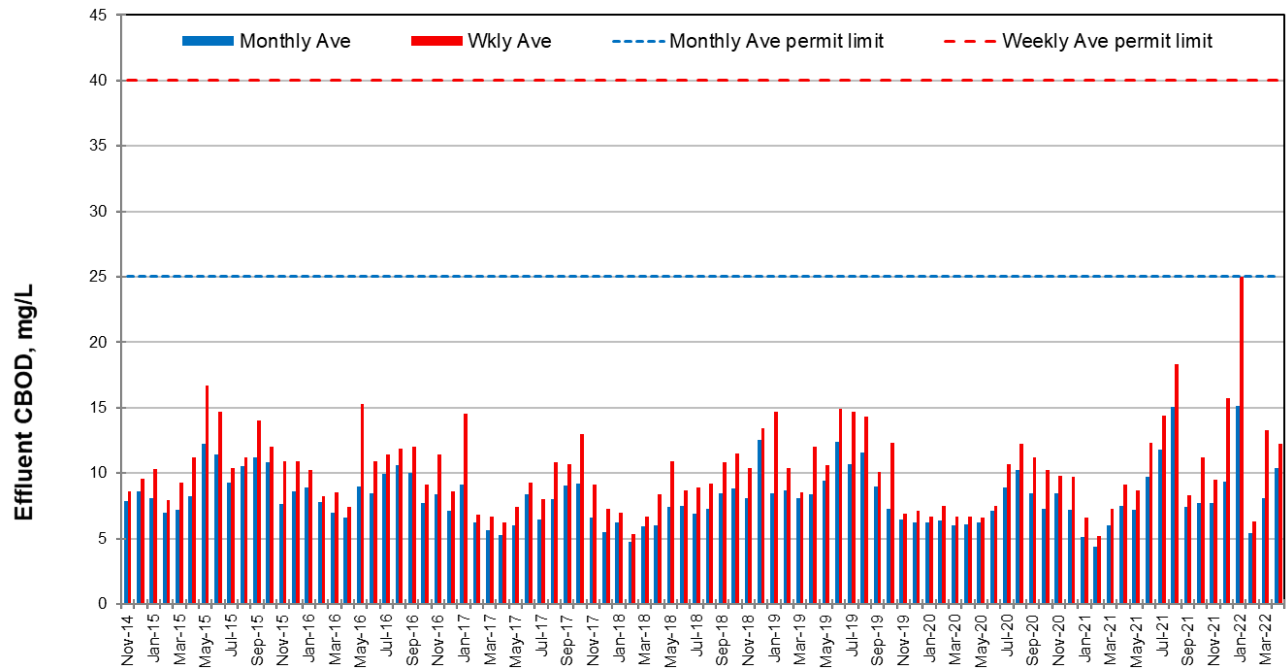
Discharge Monitoring Data, Influent BOD, 2014-2022



Discharge Monitoring Data, Influent TSS, 2014-2022

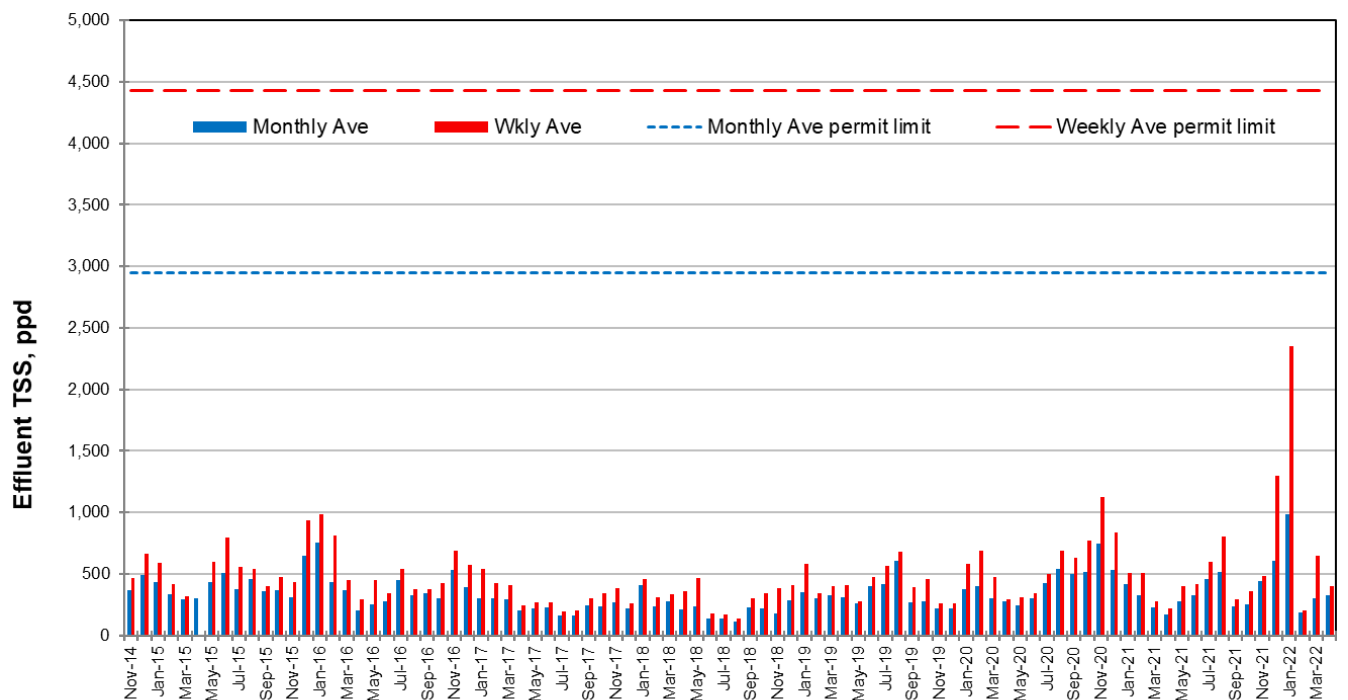
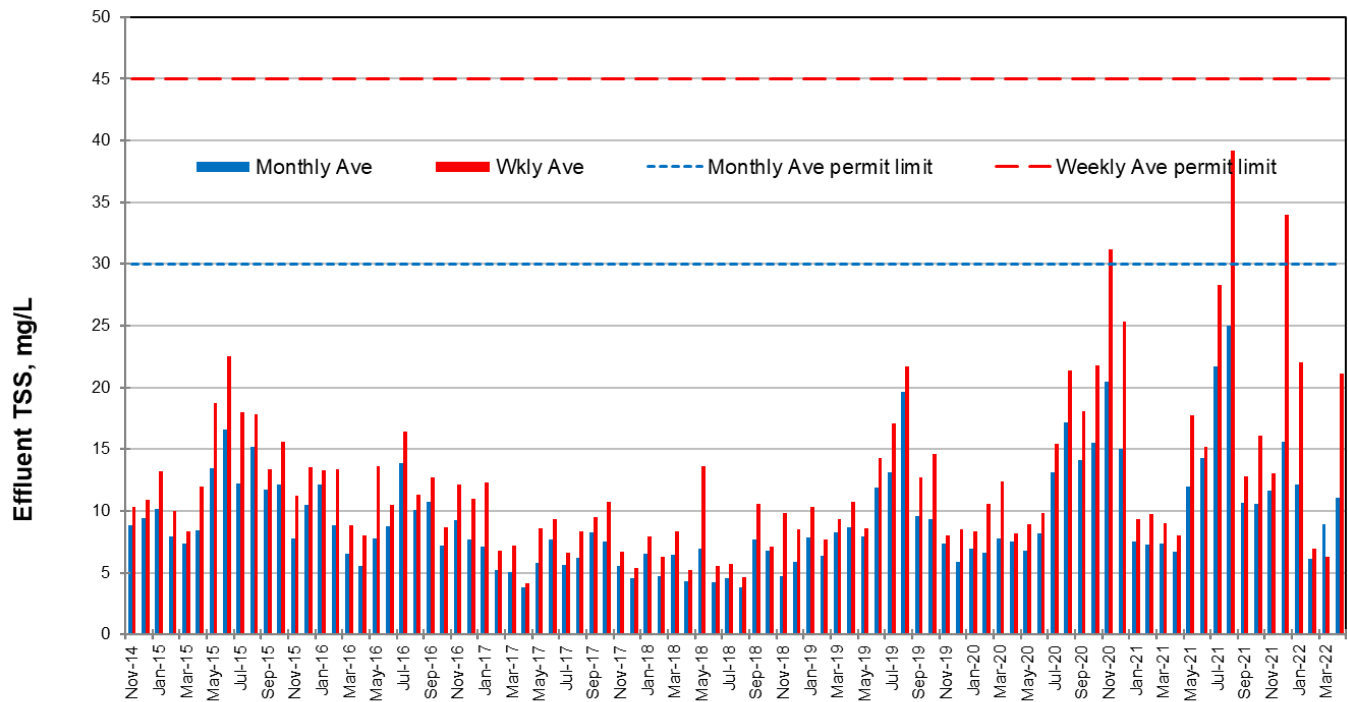


Discharge Monitoring Data, Effluent CBOD, 2014-2022

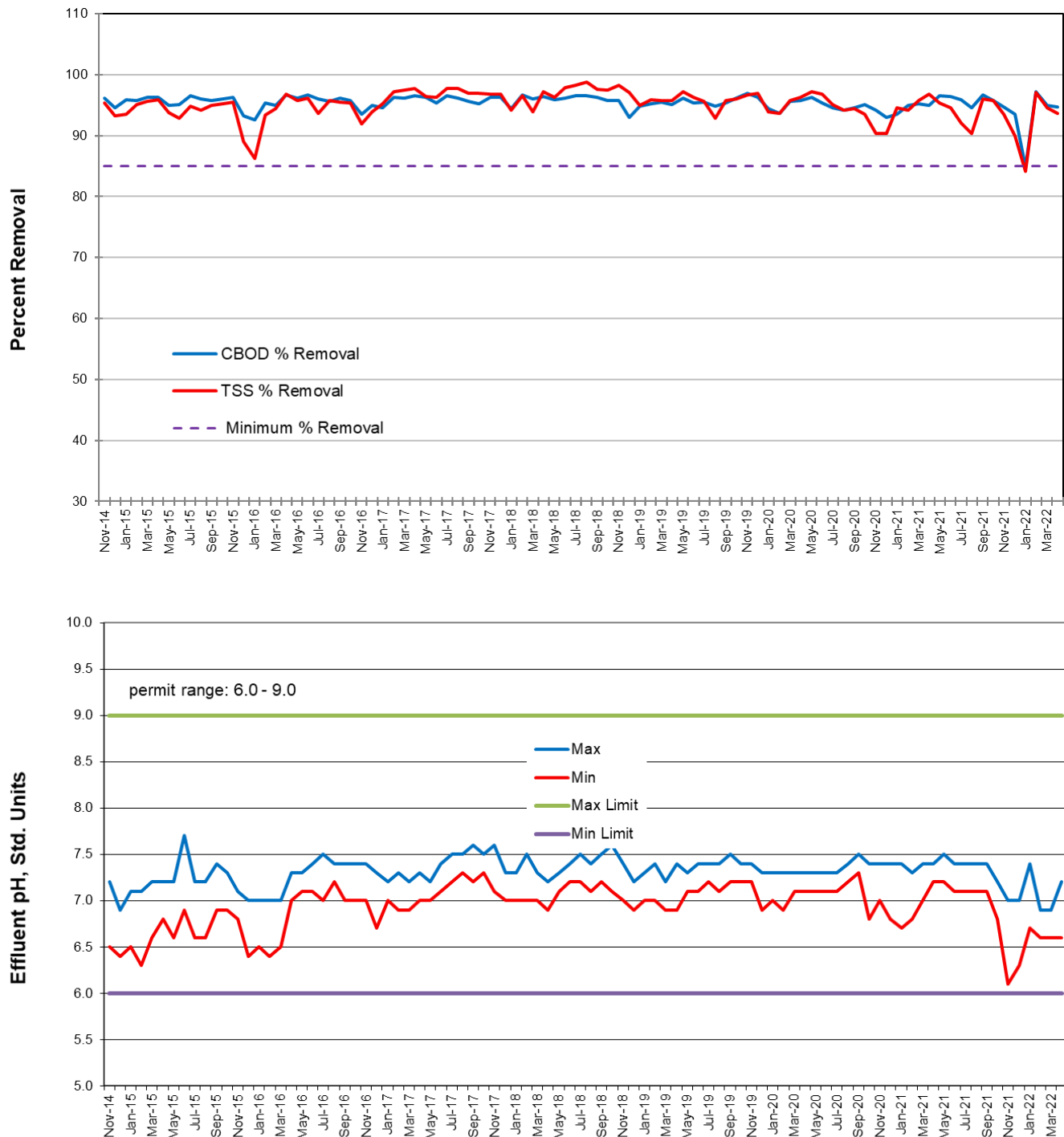


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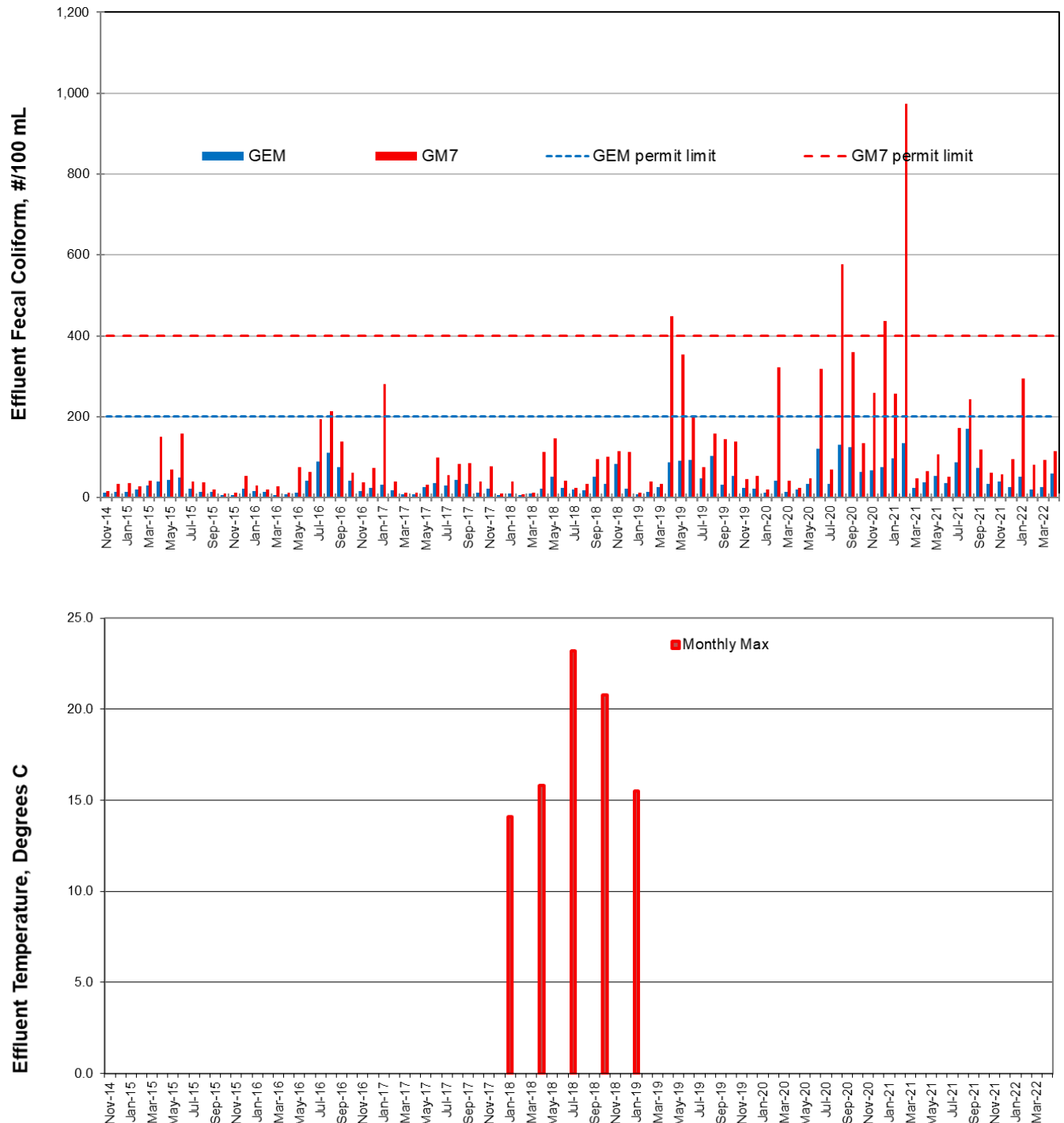
Discharge Monitoring Data, Effluent TSS, 2015-2022



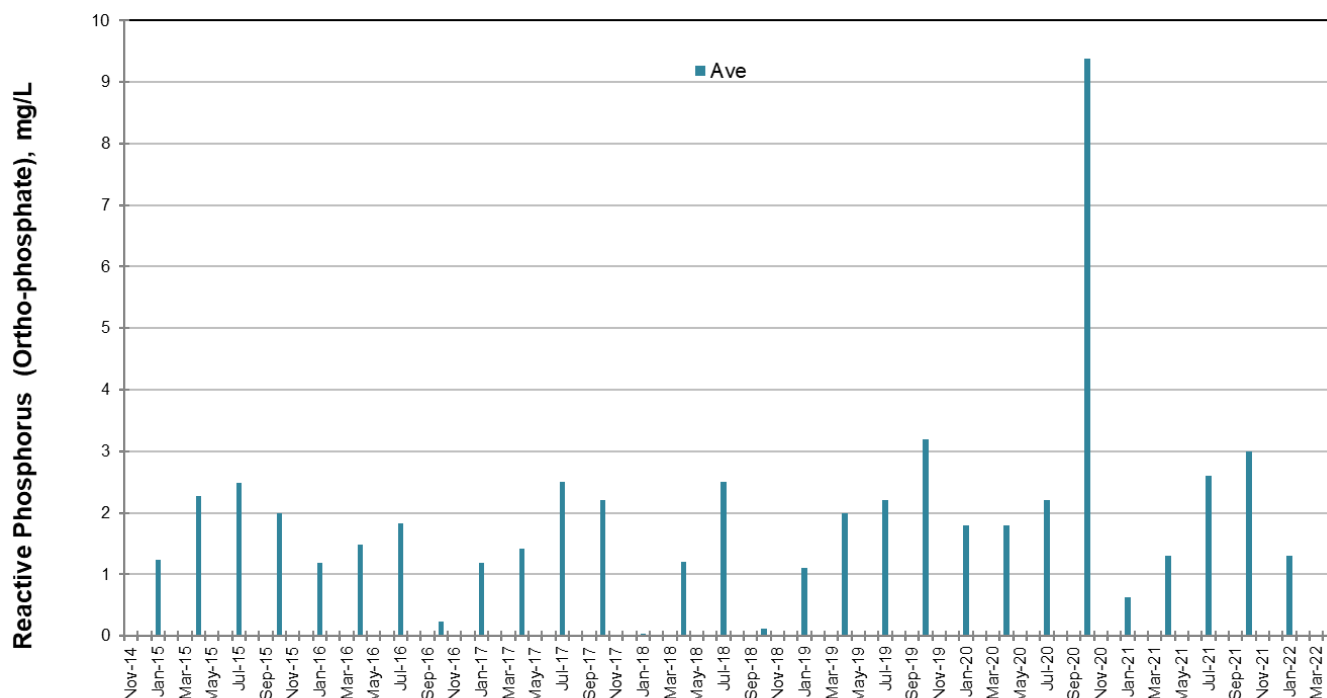
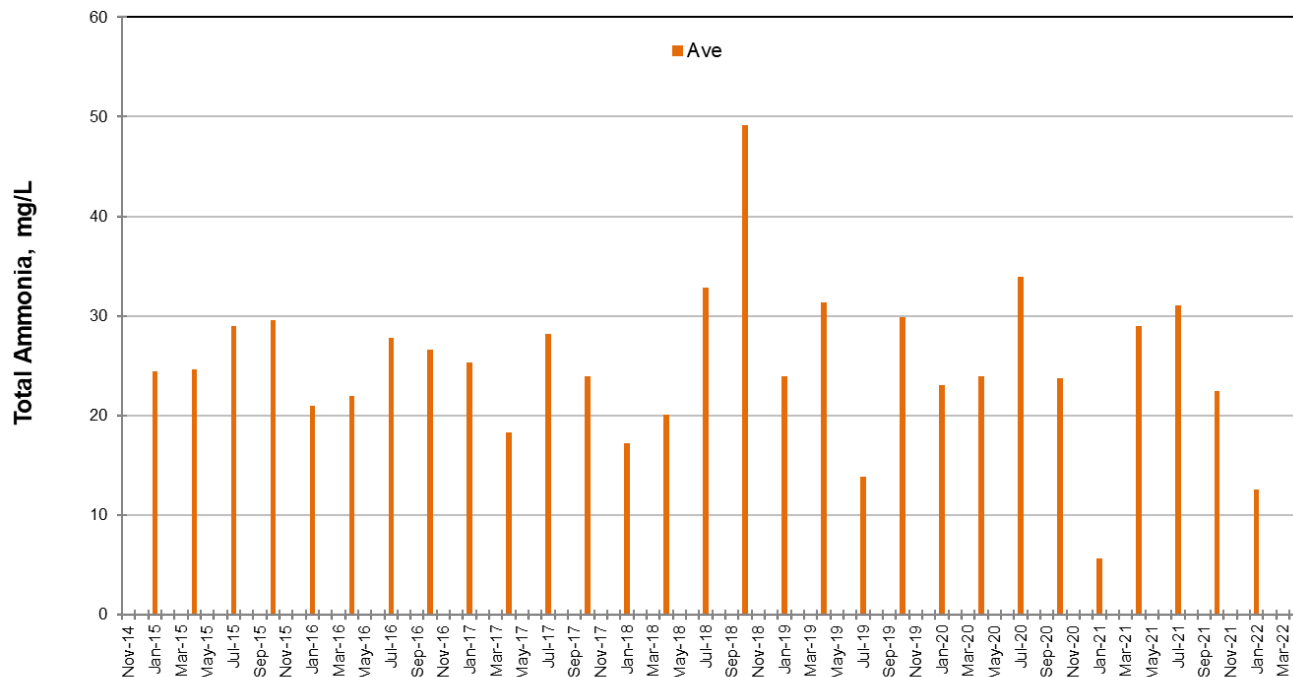
Discharge Monitoring Data, Effluent % Removal and pH, 2014-2022



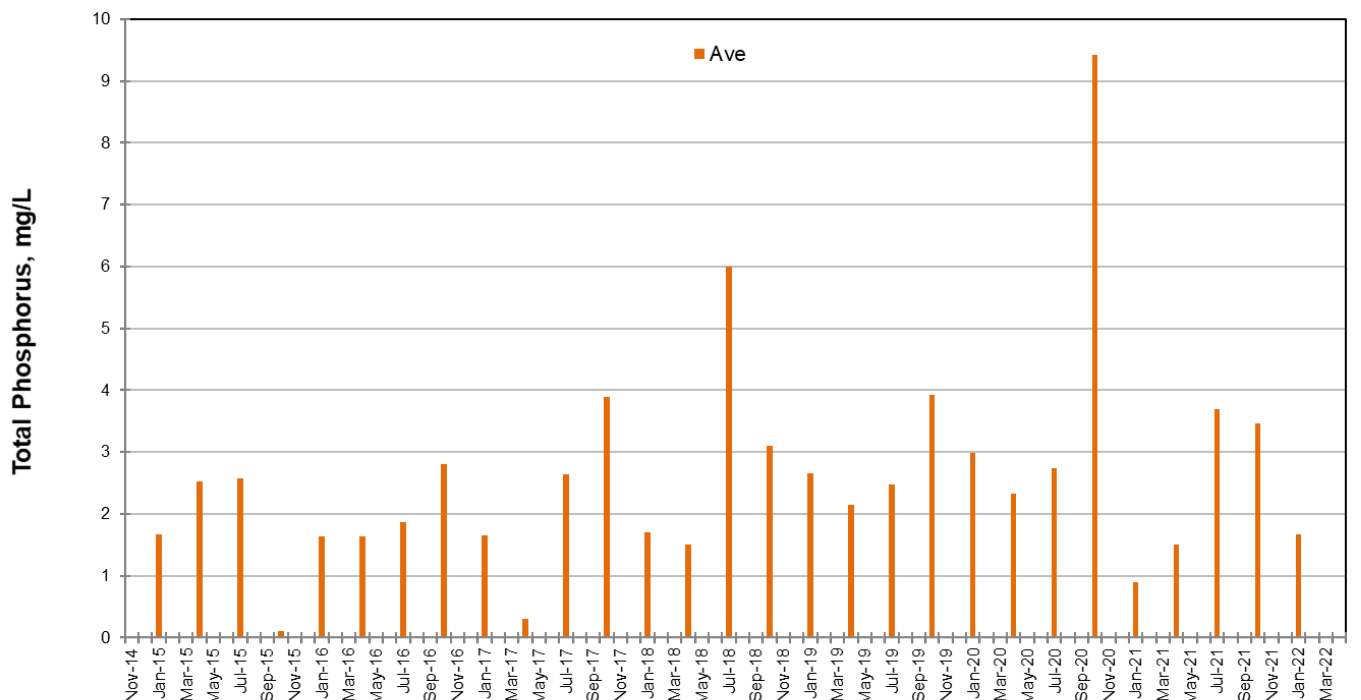
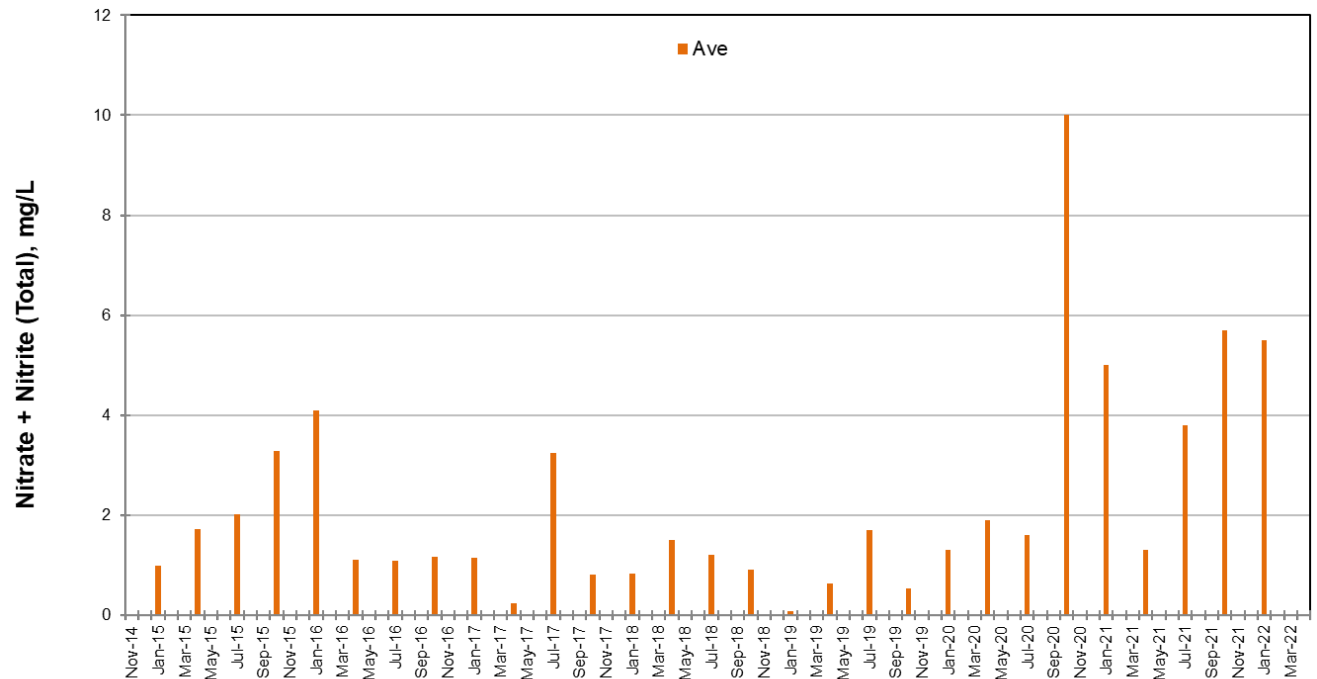
Discharge Monitoring Data, Effluent Fecal Coliform and Temperature, 2014-2022



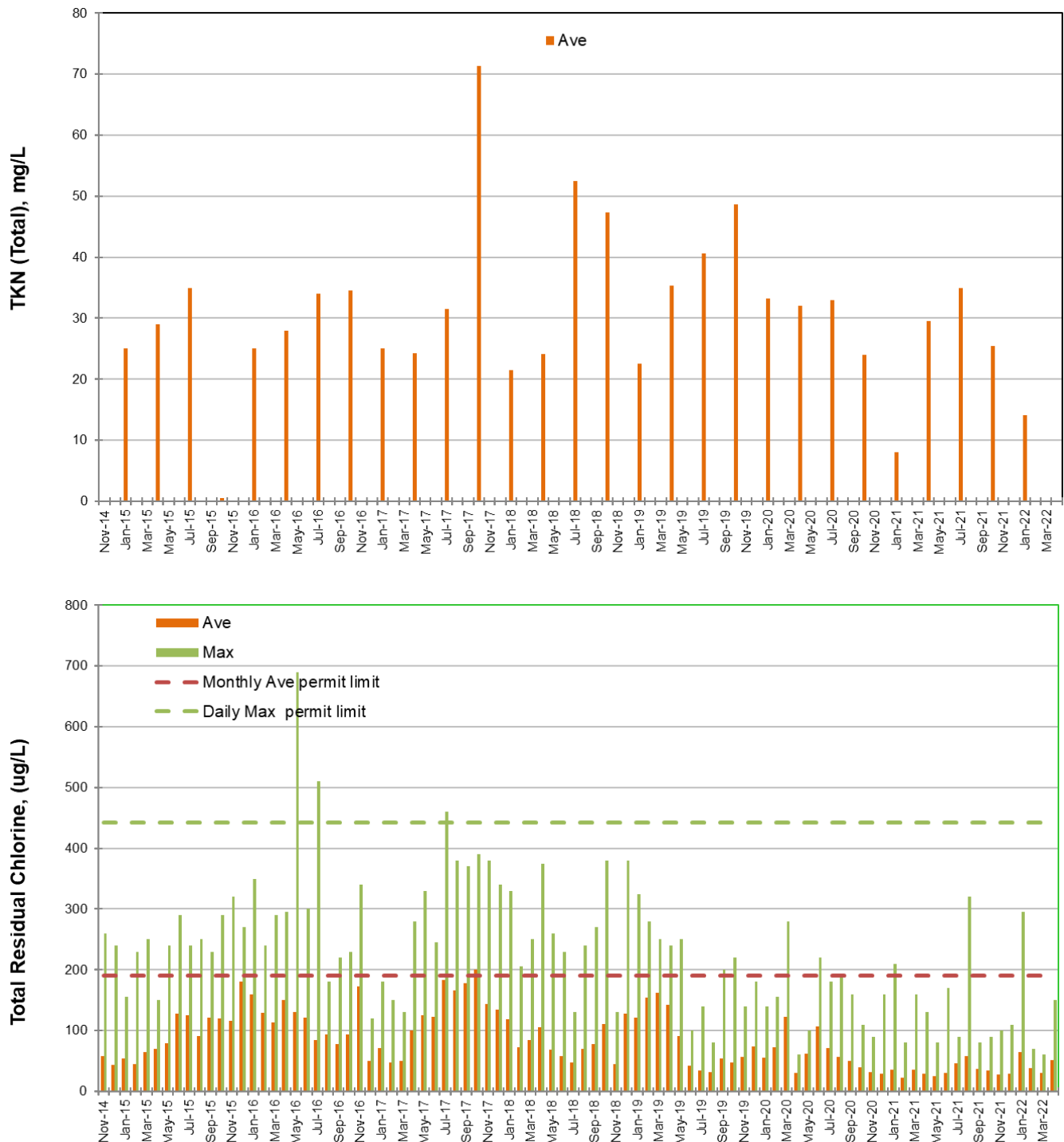
Discharge Monitoring Data, Effluent Total Ammonia and Reactive Phosphorous, 2014-2022



Discharge Monitoring Data, Effluent Nitrate+Nitrite and Total Phosphorus, 2014-2022



Discharge Monitoring Data, Effluent TKN and Total Residual Chlorine, 2014-2022



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Whole Effluent Toxicity Testing Summary

Edmonds WWTP Acute WET Test Results as NOEC/LOEC in % Effluent								
Test #	Sample Date	Start Date	Lab	Organisms	Endpoint	NOEC	LOEC	PMSD
Dec-14	12/3/2014	12/4/2014	Ranier Environmental Laboratory	Ceriodaphnia dubia	48-hour Survival	100	>100	5.00%
	12/3/2014	12/4/2014	Ranier Environmental Laboratory	Fathead Minnow	96-hour Survival	100	>100	5.60%
Jun-15	6/9/2015	6/10/2015	Ranier Environmental Laboratory	Ceriodaphnia dubia	48-hour Survival	50	100	13.70%
	6/9/2015	6/10/2015	Ranier Environmental Laboratory	Fathead Minnow	96-hour Survival	50	100	9.48%
Dec-15	12/9/2015	12/10/2015	Ranier Environmental Laboratory	Fathead Minnow	96-hour Survival	100	>100	5.60%
Jun-16	6/15/2016	6/15/2016	Ranier Environmental Laboratory	Ceriodaphnia dubia	48-hour Survival	50	100	13.60%
Dec-16	12/8/2016	12/8/2016	Ranier Environmental Laboratory	Fathead Minnow	96-hour Survival	100	>100	6.45%
Jun-17	6/13/2017	6/14/2016	Ranier Environmental Laboratory	Ceriodaphnia dubia	48-hour Survival	50	100	9.20%
Dec-17	12/6/2017	12/7/2016	Ranier Environmental Laboratory	Fathead Minnow	96-hour Survival	100	>100	9.80%
Jun-18	6/26/2018	6/26/2016	Ranier Environmental Laboratory	Ceriodaphnia dubia	48-hour Survival	100	>100	12.10%
Dec-18	12/11/2018	12/12/2016	Ranier Environmental Laboratory	Fathead Minnow	96-hour Survival	100	>100	9.46%
Jun-19	6/11/2019	6/11/2019	Ranier Environmental Laboratory	Ceriodaphnia dubia	48-hour Survival	100	>100	22.20%
Dec-19	12/18/2019	12/18/2019	Ranier Environmental Laboratory	Fathead Minnow	96-hour Survival	50	100	2.50%
Jun-20	6/10/2020	6/10/2020	Ranier Environmental Laboratory	Ceriodaphnia dubia	48-hour Survival	50	100	16.10%
Dec-20	12/1/2020	12/2/2020	Ranier Environmental Laboratory	Fathead Minnow	96-hour Survival	100	>100	2.50%
Jun-21	6/1/2021	6/2/2021	Ranier Environmental Laboratory	Ceriodaphnia dubia	48-hour Survival	50	100	9.20%
Dec-21	12/14/2021	12/14/2021	Ranier Environmental Laboratory	Fathead Minnow	96-hour Survival	100	>100	4.57%

The effluent demonstrates reasonable potential for Acute Toxicity when median survival in 100% effluent is less than 80% for a series of test or if any single test results in less than 65% survival (WAC 173-205-050)

Edmonds WWTP Acute WET Test Results as % Survival in 100% Effluent						
Test #	Sample Date	Start Date	Lab	Organisms	Endpoint	%Survival
Dec-14	12/3/2014	12/4/2014	Ranier Environmental Laboratory	Ceriodaphnia dubia	48-hour Survival	100%
	12/3/2014	12/4/2014	Ranier Environmental Laboratory	Fathead Minnow	96-hour Survival	92.50%
Jun-15	6/9/2015	6/10/2015	Ranier Environmental Laboratory	Ceriodaphnia dubia	48-hour Survival	15%
	6/9/2015	6/10/2015	Ranier Environmental Laboratory	Fathead Minnow	96-hour Survival	7.50%
Dec-15	12/9/2015	12/10/2015	Ranier Environmental Laboratory	Fathead Minnow	96-hour Survival	97.50%
Jun-16	6/15/2016	6/15/2016	Ranier Environmental Laboratory	Ceriodaphnia dubia	48-hour Survival	25%
Dec-16	12/8/2016	12/8/2016	Ranier Environmental Laboratory	Fathead Minnow	96-hour Survival	100%
Jun-17	6/13/2017	6/14/2016	Ranier Environmental Laboratory	Ceriodaphnia dubia	48-hour Survival	15%
Dec-17	12/6/2017	12/7/2016	Ranier Environmental Laboratory	Fathead Minnow	96-hour Survival	90%
Jun-18	6/26/2018	6/26/2016	Ranier Environmental Laboratory	Ceriodaphnia dubia	48-hour Survival	80%
Dec-18	12/11/2018	12/12/2016	Ranier Environmental Laboratory	Fathead Minnow	96-hour Survival	80%
Jun-19	6/11/2019	6/11/2019	Ranier Environmental Laboratory	Ceriodaphnia dubia	48-hour Survival	50%
Dec-19	12/18/2019	12/18/2019	Ranier Environmental Laboratory	Fathead Minnow	96-hour Survival	0%
Jun-20	6/10/2020	6/10/2020	Ranier Environmental Laboratory	Ceriodaphnia dubia	48-hour Survival	45%
Dec-20	12/1/2020	12/2/2020	Ranier Environmental Laboratory	Fathead Minnow	96-hour Survival	100%
Jun-21	6/1/2021	6/2/2021	Ranier Environmental Laboratory	Ceriodaphnia dubia	48-hour Survival	15%
Dec-21	12/14/2021	12/14/2021	Ranier Environmental Laboratory	Fathead Minnow	96-hour Survival	100%

Edmonds WWTP Chronic WET Test Results as NOEC/LOEC in % Effluent								
Test #	Sample Date	Start Date	Lab	Organisms	Endpoint	NOEC	LOEC	PMSD
Feb-18	2/5/2018	2/6/2018	Ranier Environmental Laboratory	Atlantic Mysid	7-day Survival	100	>100	15.60%
					Biomass	50	100	15.40%
					Weight	50	100	9.72%
	2/5/2018	2/6/2018	Ranier Environmental Laboratory	Pacific Topsmelt	7-day Survival	100	>100	13.60%
					Biomass	50	100	21.60%
					Weight	50	100	23.60%
Aug-18	8/6/2018	8/7/2018	Ranier Environmental Laboratory	Atlantic Mysid	7-day Survival	12.5	50	12.30%
					Biomass	12.5	50	17.70%
					Weight	50	100	14.40%
	8/6/2018	8/7/2018	Ranier Environmental Laboratory	Pacific Topsmelt	7-day Survival	12.5	50	13.50%
					Biomass	12.5	50	16.50%
					Weight	12.5	50	22.70%

NOEC=Concentration at which testing showed no observable effects

LOEC=Lowest concentration at which test showed an observable effect

PMSD=Percent minimum significant difference calculated for all test in sampling event

Appendix F — Mixing Zone Analysis

Rosedale Marine Engineering updated the mixing zone analysis for the Edmonds WWTP outfall in 2011 in advance of the City modifying the outfall by removing constrictor plates from each port in the diffuser. The 2011 analysis was based on a modeling effort completed by Ecology in 2009. The updated model refined predicted flow velocities from each port in the diffusers and change the port sizes to reflect the proposed modifications. The following technical memorandum presets the updated mixing zone analysis, which Ecology used as the basis for the dilution factors authorized in the proposed permit.

Memorandum



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DATE: August 1, 2011
TO: Shawn McKone, Ecology
FROM: Bill Fox, PE and Matt DeBoer, PE
RE: City of Edmonds Diffuser Port Modifications
cc: Curt Zuvela, City of Edmonds

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ATTACHMENTS:

- Attachment 1: North and South Outfall Drawings
- Attachment 2: Hydraulic Analysis Spreadsheets
- Attachment 3: Dilution Model Output
- Attachment 4: Reasonable Potential Analysis Spreadsheet



This Memorandum describes diffuser hydraulic and dilution analyses performed for the City of Edmonds in order to support planned diffuser modifications that are intended to increase hydraulic capacity of the entire outfall. Planned diffuser modifications include removal of the diffuser port caps which reduce port diameter from 8 inches to 5 inches for the six inshore ports, and from 12 inches to 5 inches for the final end port. Dilution model analyses performed based upon the modified diffuser configuration repeat the analyses performed by the Washington State Department of Ecology (Ecology) and presented in Appendix E of the National Pollutant Discharge Elimination System (NDPES) Permit Fact Sheet.

OUTFALL DESCRIPTION

Outfall drawings are provided in Attachment 1. Treated effluent is discharged through a single outfall pipe that extends from the treatment plant to the shoreline of Puget Sound, in the region between the Port of Edmonds Marina and the Washington State Ferry dock. At the beach, the outfall pipe splits into two pipelines that extend into Puget Sound and terminate at individual diffusers. Although each outfall pipeline includes isolation valves that allow the City to direct all of the plant flow to one outfall/diffuser at any given time, the City routinely uses both lines simultaneously. The isolation valves are only closed to perform maintenance or to perform annual operational testing of the valves. As such, Ecology modeled the diffusers assuming continuous simultaneous operation.

As shown in Attachment 1, each diffuser is 160 feet long and is equipped with seven diffuser ports. The first six diffuser ports are spaced 30 feet apart and discharge in alternating directions. The seventh port is located seven feet away from the sixth port, on the diffuser's end cap, and discharges in a direction parallel to the diffuser line. Each port is five inches in diameter, discharges horizontally, and is approximately 36 inches off of the seabed. The diameter of the diffuser ports is defined by end caps, which restrict port diameter from 8 inches to 5 inches for the six inshore ports, and from 12 inches to 5 inches for the final end port.

The diffusers are laid parallel to each other at an approximate bearing of 285° (WNW), separated by a distance of 460 feet. The diffusers are laid at a considerable slope along the seabed such that there is an approximately 10-foot difference in elevation between ports at opposite ends of each diffuser. The North Diffuser (closest to the ferry dock) terminates at a depth of approximately 65 feet mean lower low water (MLLW). The South Diffuser (closest to the marina) terminates at an approximate depth of 73 feet MLLW.

Table 1 identifies the approximate depth (at MLLW) and discharge direction of each port on the two diffuser lines. Port numbering starts inshore and ends at the diffuser terminus. Discharge directions are based on the port's offset from true north.

Table 1 Diffuser Port Orientation Summary

North Diffuser			South Diffuser		
Port Number	Discharge Direction (degrees)	Port Depth (feet, MLLW)	Port Number	Discharge Direction (degrees)	Port Depth (feet, MLLW)
N1	15	56	S1	15	60
N2	195	58	S2	195	61
N3	15	59	S3	15	63
N4	195	61	S4	195	65
N5	15	63	S5	15	68
N6	195	64	S6	195	70
N7	285	65	S7	285	73

HYDRAULIC ANALYSIS

Rather than assume an equal distribution of effluent flow through the diffuser, a hydraulic analysis of the diffusers was performed to determine the rate of discharge from each individual diffuser port. Equal distribution of flow is more likely to occur when diffuser ports are oriented with very little slope along the diffuser line.

Hydraulic analysis of multi-port diffusers was performed using an iterative process developed in *Diffusers for Disposal of Sewage in Sea Water* (Rawn, et al., 1960). The diffuser spreadsheet model projects port flow distribution, diffuser head loss, and other operating characteristics based on effluent flow, diffuser length, and diffuser port configuration. The spreadsheets for each combination of effluent flow condition (4 critical conditions) and diffuser configuration (3 alternatives) summarized below are provided in Attachment 2.

Critical Effluent Flow Conditions

- Acute (maximum day) winter flow
- Acute (maximum day) summer flow
- Chronic (maximum month) winter flow
- Chronic (maximum month) summer flow

Diffuser Port Configuration

- Alternative 1 – Existing Diffuser Configuration: All 5-inch ports
- Alternative 2 – Proposed Diffuser Configuration: All 8-inch ports with final 12-inch port
- Alternative 3 – Three 5-inch ports, three 8-inch ports, and final 12-inch port

In addition to the existing diffuser configuration (Alternative 1) and the proposed diffuser modifications (Alternative 2), different combinations of 5- and 8-inch ports were evaluated to determine if effluent flow could be distributed more equally among the seven diffuser ports. The port configuration of Alternative 3 provides the best port flow distribution at low flows, but does not perform well at average to high flows likely to occur routinely during the wet season. Furthermore, 8-inch ports are desirable to increase hydraulic capacity of the outfall as a whole. Therefore, the dilution model analysis was performed using the diffuser port configuration of Alternative 2 (all 8-inch ports with a final 12-inch port).

DILUTION MODEL ANALYSIS

Ecology, as presented in Appendix E of the NPDES Permit Fact Sheet, modeled the outfall as a series of independent, single-port diffusers after determining that there is a low potential for the individual plumes to merge within the mixing zone. Ecology used the USEPA approved near-field model UM3 as contained in the Visual Plumes interface (Frick et al., 2002).

The Ecology dilution analysis was repeated for this Memorandum using identical model input parameters except for port diameter and port discharge flow. The Ecology discussion of model input parameters, including port orientation and depth, ambient stratification and current velocity, and effluent temperature, is included in the NPDES Permit Fact Sheet. Port diameter and discharge flow for the different critical flow conditions are summarized in Table 2.

Table 2 Port Diameter and Discharge Flow Model Input Parameters

Port Number	Port Diameter (inches)	Winter Acute	Winter Chronic	Summer Acute	Summer Chronic
		Port Discharge (cfs)	Port Discharge (cfs)	Port Discharge (cfs)	Port Discharge (cfs)
1	8	1.78	1.21	1.07	0.96
2	8	1.76	1.16	1.00	0.88
3	8	1.74	1.10	0.93	0.79
4	8	1.70	1.01	0.81	0.65
5	8	1.64	0.88	0.64	0.40
6	8	1.60	0.79	0.50	No Flow
7	12	3.48	1.46	0.46	No Flow

The model analysis indicates that the individual plumes from the 8- and 12-inch ports are unlikely to merge within the mixing zone. Therefore, modeling the outfall as individual ports is still appropriate. Table 3 (following page) summarizes the dilution model results for the different ports and critical conditions. As shown in Table 3, at summer chronic conditions there is no flow at the final two diffuser ports (yellow highlights). Also, some non-critical model runs (green highlights) were not repeated to minimize both model iteration and Ecology review time. Model run output is provided in Attachment 3.

Based upon the model results summarized in Table 3, the new critical acute and chronic dilution values for the diffuser modifications are 37:1 and 143:1, respectively. Previous acute and chronic model results were 34:1 and 225:1, respectively. The critical chronic condition result is as anticipated and occurs during the same critical condition (summer flood tide) as previously modeled by Ecology. The decrease in model predicted dilution occurs because a higher proportion of effluent flow is being discharged from the first diffuser port (compared to previous model evaluation which assumed an equal distribution). The increase in critical acute dilution was not anticipated, but is likely explained by the fact that a large proportion of effluent flow is discharged from the final diffuser port during maximum day winter effluent flow. Dilution results for the greater flow are compensated due to the increased depth and more favorable port orientation of the final port.

REASONABLE POTENTIAL ANALYSIS

The reasonable potential to exceed water quality standards is a standard statistical test developed by EPA and adopted by Ecology (1992) to establish the need for effluent limitations in NPDES permits. Reasonable potential analysis (RPA) procedures are outlined in the *Permit Writer's Manual* (Ecology, 2008) and *Technical Support Document for Water Quality-Based Toxics Control* (USEPA 505/2-90-001, 1991).

The RPA performed by Ecology and presented in the NPDES Permit Fact Sheet was repeated for this Memorandum, with the only change being the new acute and chronic dilution factors discussed above. Effluent and receiving water data used as RPA input values by Ecology were not changed. The RPA performed for this Memorandum included the parameters ammonia, copper, and zinc. Human health parameters were not evaluated because the maximum effluent concentration cited in the NPDES Permit Fact Sheet was less than the applicable water quality standard. The Ecology spreadsheet with RPA results is provided in Attachment 4.

RPA results are summarized in Table 4. The analysis indicates there is no reasonable potential to exceed water quality standards. Table 4 also presents an "RPA Ratio" for each parameter. The RPA Ratio is the ratio of the predicted contaminant concentration at the mixing zone boundary to the regulatory standard. All of the RPA Ratio's in Table 4 are less than 1, indicating no exceedance of water quality standards. The higher the RPA Ratio, the closer the predicted contaminant concentration is to the standard. The chronic ammonia standard has the highest RPA Ratio, equal to 0.77, providing a safety factor of approximately 1.3 (reciprocal of the RPA Ratio). All other predicted contaminant concentrations are below water quality standards by a least a factor of two. The previous Ecology analysis resulted in a RPA ratio of 0.5 for the chronic ammonia standard.

Table 3 Dilution Model Results Summary

North Diffuser														
Port	Discharge Direction (Degrees)	Port Depth (ft, MLLW)	Summer				Winter				Chronic Condition			
			Acute Ebb Tide		Acute Flood Tide		Acute Ebb Tide		Acute Flood Tide		Ebb Tide, Median Velocity Dilution		Flood Tide, Median Velocity Dilution	
			10 th % Velocity Dilution	90 th % Velocity Dilution	10 th % Velocity Dilution	90 th % Velocity Dilution	10 th % Velocity Dilution	90 th % Velocity Dilution	10 th % Velocity Dilution	90 th % Velocity Dilution	10 th % Velocity Dilution	90 th % Velocity Dilution	10 th % Velocity Dilution	90 th % Velocity Dilution
N1	15	56	161	90	64	175	616	143	125	89	97	146	834	226
N2	195	58	196	99	69	172		159	166	103	100	133		240
N3	15	59	174	93	73	186		173	125	91	103	146		251
N4	195	61		103	80	186		206	168	104	108	135		272
N5	15	63		102	94	207	1,110	311	130	93	115			305
N6	195	64		115	105	221	no flow	no flow	173	107	116			328
N7	285	65	261	117	100	208	no flow	no flow	202	111	60	37	775	182
South Diffuser														
Port	Discharge Direction (Degrees)	Port Depth (ft, MLLW)	Summer				Winter				Chronic Condition			
			Acute Ebb Tide		Acute Flood Tide		Acute Ebb Tide		Acute Flood Tide		Ebb Tide, Median Velocity Dilution		Flood Tide, Median Velocity Dilution	
			10 th % Velocity Dilution	90 th % Velocity Dilution	10 th % Velocity Dilution	90 th % Velocity Dilution	10 th % Velocity Dilution	90 th % Velocity Dilution	10 th % Velocity Dilution	90 th % Velocity Dilution	10 th % Velocity Dilution	90 th % Velocity Dilution	10 th % Velocity Dilution	90 th % Velocity Dilution
S1	15	60	164	90	71	175	688	161	125	89	105	146	869	243
S2	195	61	196	99	75	171		174	166	106	106	133		253
S3	15	63	174	93	81	186		196	125	91	112	146		270
S4	195	65				186		235		107	116	135		
S5	15	68					1,358	386		95	125			
S6	195	70					no flow	no flow		111	128			
S7	285	73	266	119	124	212	no flow	no flow	207	116	63	37	871	210

Table 4 Reasonable Potential Analysis Results

Parameter	Water Quality Standard (ug/L)		Conc. at Mixing Zone (ug/L)		Limit Required	RPA Ratio	
	Acute	Chronic	Acute	Chronic		Acute	Chronic
Ammonia	5,280	793	2,271	613	No	0.43	0.77
Copper	4.8	3.1	1.4	0.7	No	0.29	0.21
Zinc	90.0	81.0	4.7	2.0	No	0.05	0.03

SUMMARY OF RESULTS

Previous Ecology analyses presented in the NPDES Permit Fact Sheet were repeated to reflect proposed diffuser modifications for the City of Edmonds outfall. In addition to diffuser port size, the Ecology model analysis was revised using varying port discharge flow rates determined through a hydraulic spreadsheet analysis of the diffusers. Critical acute and chronic dilution factors for the modified diffuser ports were predicted by the model to be 37:1 and 143:1, respectively. The change in dilution does not change the previous Ecology analysis results that indicated the effluent would have no reasonable potential to exceed water quality standards.

REFERENCES

- Ecology, 2009. *NPDES Permit WA-002405-8 and Fact Sheet*. Issued by the Washington State Department of Ecology. Olympia, WA.
- Ecology, 2008. *Permit Writer's Manual*. Washington State Department of Ecology, Water Quality Publication No. 92-109. Olympia, WA.
- Frick, et al., 2002. *Dilution Models for Effluent Discharges, 4th Edition (Visual Plumes)*. Environmental Research Division, USEPA. Athens, GA.
- Rawn, A.M. et al., 1960. *Diffusers for Disposal of Sewage in Sea Water*, Journal of Sanitary Engineering. Division of ASCE.
- USEPA, 1991. *Technical Support Document for Water Quality Based Toxics Control*. Office of Water Enforcement. Washington, D.C. EPA 505/2-90-001.

Variables from Ecology's 2009 dilution modeling used in Rosedale's 2011 update:

The preceding dilution analysis from Rosedale Marine Engineering used ambient and effluent data compiled by Ecology for dilution modeling associated with the City's 2009 permit. Ecology's long-term monitoring station located at the south end of Admiralty Inlet (Station ADM 003) provides ambient data for Puget Sound in the region near the City of Edmonds. Mixing zone analyses must consider the mixing available when the ambient water column has the greatest density and temperature stratification as well as when the water column has the least density and temperature stratification. Ecology used historic monthly data from the South Admiralty Inlet station for the period between 1990 and 2008 to determine when the highest and lowest stratification would likely occur. The analysis compared average salinity (used as a proxy for density) for each month in the period of record and the 90th percentile temperature for each month at 5-meter intervals to a depth of 25 meters. The data indicates that the highest variability (greatest stratification) occurs during the month of June; the least stratification occurs during December. The average salinity and 90th percentile temperature profiles for June and December are shown in the following table.

Depth (meters)	June		December	
	Average Salinity (psu)	90th Percentile Temperature (Deg. C)	Average Salinity (psu)	90th Percentile Temperature (Deg. C)
1	25.70	14.269	28.77	9.77
5	27.48	13.32	29.27	10.072
10	29.07	11.78	29.61	10.352
15	29.27	11.407	29.77	10.414
20	29.37	11.344	29.88	10.508
25	29.44	12.652	29.96	10.512
Variability	1.20	0.9517	0.35	0.2336

Ecology's mixing zone guidance requires evaluating mixing at a variety of current profiles. Acute mixing must consider the 90th and 10th percentile current velocities in both the ebb and flood directions. Chronic mixing must consider the median velocity in both directions. Estimated current directions and velocities used for evaluating the Edmonds WWTP outfall are based NOAA tide and current prediction tables for a location 2.7 miles WSW of Edmonds. Based on predictions for June and December 2009, critical currents are as follows:

Predicted Velocity (knots)	Flood Current: 170°		Ebb Current: 000°	
	June	December	June	December
Median Velocity	0.10	0.10	0.50	0.50
10th percentile velocity	0.01	0.01	0.30	0.30
90th percentile velocity	0.30	0.30	0.70	0.80

Effluent Variables:

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Mixing is primarily influenced by three effluent characteristics: flow rate, effluent temperature and effluent salinity. Ecology assumes a typical domestic wastewater salinity of 0.5 psu for the City of Edmonds' effluent. The City reported a maximum summer effluent temperature of 22.5 ° C and a maximum winter temperature of 18.6° C in their NPDES permit application. Using Ecology's guidance for facilities operating at less than 85% of design capacity, Ecology evaluated chronic mixing based on the highest maximum monthly Average flow over the last three years for the two seasons evaluated. Similarly, Ecology evaluated acute mixing based on the seasonal maximum daily flows reported over the last three years. Flow values used were:

Season	Chronic Flow	Acute Flow
Summer Critical (June)	4.7 MGD	7.0 MGD
Winter Critical (December)	9.8 MGD	17.7 MGD

Appendix G — Technical Calculations

Several of the Excel® spreadsheet tools used to evaluate a discharger's ability to meet Washington State water

Simple Mixing:

Ecology uses simple mixing calculations to assess the impacts of certain conservative pollutants, such as the expected increase in fecal coliform bacteria at the edge of the chronic mixing zone boundary. Simple mixing uses a mass balance approach to proportionally distribute a pollutant load from a discharge into the authorized mixing zone. The approach assumes no decay or generation of the pollutant of concern within the mixing zone. The predicted concentration at the edge of a mixing zone (C_{mz}) is based on the following calculation:

$$C_{mz} = C_a + \frac{(C_e - C_a)}{DF}$$

where: C_e = Effluent Concentration
 C_a = Ambient Concentration
 DF = Dilution Factor

Calculation of Fecal Coliform/E. Coli at Chronic Mixing Zone

INPUT	
Chronic Dilution Factor	143.0
Receiving Water [bacteria indicator], #/100 ml	2
Effluent [Bacteria indicator] - worst case, #/100 ml	400
Surface Water Criterion, #/100 ml	14
OUTPUT	
[bacteria indicator] at Mixing Zone Boundary, #/100 ml	5
Difference between mixed and ambient, #/100 ml	3
Conclusion: At design flow, the discharge has no reasonable potential to violate water quality standards for fecal coliform.	

Ammonia Criteria Calculation

Ammonia's toxicity depends on that portion which is available in the unionized form. The amount of unionized ammonia depends on the temperature, pH, and salinity of the receiving marine water. To evaluate ammonia toxicity, Ecology uses available ambient data for the critical season. Ecology calculates water quality criteria for the unionized form of ammonia in saltwater using the method specified in EPA 440/5-88-004 (Ambient Water Quality Criteria for Ammonia (Saltwater)-1989).

Marine Un-ionized Ammonia Criteria Calculation

Calculation of seawater fraction of un-ionized ammonia from Hampson (1977). Un-ionized ammonia criteria for salt water are from EPA 440/5-88-004. Revised 19-Oct-93.

INPUT	
1. Receiving Water Temperature, deg C (90th percentile):	12.7
2. Receiving Water pH, (90th percentile):	8.0
3. Receiving Water Salinity, g/kg (10th percentile):	28.9
4. Pressure, atm (EPA criteria assumes 1 atm):	1.0
5. Unionized ammonia criteria (mg un-ionized NH_3 per liter) from EPA 440/5-88-004:	
Acute:	0.233
Chronic:	0.035
OUTPUT	
Using mixed temp and pH at mixing zone boundaries?	No
1. Molal Ionic Strength (not valid if >0.85):	0.593
2. pKa8 at 25 deg C (Whitfield model "B"):	9.314
3. Percent of Total Ammonia Present as Unionized:	1.9%
4. Total Ammonia Criteria (mg/L as NH_3):	
Acute:	12.12
Chronic:	1.82
RESULTS	
Total Ammonia Criteria (mg/L as <u>N</u>)	
Acute:	9.97
Chronic:	1.50

Marine Temperature Reasonable Potential and Limit Calculation

Based on WAC 173-201A-200(1)(c)(i)–(ii) and Water Quality Program Guidance. All Data inputs must meet WQ guidelines.

INPUT	
1. Chronic Dilution Factor at Mixing Zone Boundary	143.0
2. Annual max 1DADMax Ambient Temperature (Background 90th percentile)	12.7 °C
3. 1DADMax Effluent Temperature (95th percentile)	22.7 °C
4. Aquatic Life Temperature WQ Criterion	13.0 °C
OUTPUT	
5. Temperature at Chronic Mixing Zone Boundary:	12.77 °C
6. Incremental Temperature Increase or decrease:	0.07 °C
7. Maximum Incremental Temperature Increase $12/(T-2)$	1.12 °C
8. Maximum Allowable Temperature at Mixing Zone Boundary:	13.00 °C
A. If ambient temp is warmer than WQ criterion	
9. Does temp fall within this warmer temp range?	NO
10. If YES - Use TMDL-based or performance-based limit - Do Not use this spreadsheet	---
B. If ambient temp is cooler than WQ criterion but within $12/(T_{amb}-2)$ of the criterion	
11. Does temp fall within this Incremental temp. range?	YES
12. Temp increase allowed at mixing zone boundary, if required:	NO LIMIT
C. If ambient temp is cooler than (WQ criterion - $12/(T_{amb}-2)$)	
13. Does temp fall within this Incremental temp. range?	NO
14. Temp increase allowed at mixing zone boundary, if required:	---
RESULTS	
15. Do any of the above cells show a temp increase?	NO
16. Temperature Limit if Required?	NO LIMIT

Reasonable Potential Analysis:

The spreadsheets Input 2 – Reasonable Potential, and LimitCalc in Ecology's PermitCalc Workbook determine reasonable potential (to violate the aquatic life and human health water quality standards) and calculate effluent limits. The process and formulas for determining reasonable potential and effluent limits in these spreadsheets are taken directly from the *Technical Support Document for Water Quality-based Toxics Control*, (EPA 505/2-90-001). The adjustment for autocorrelation is from EPA (1996a), and EPA (1996b).

Reasonable Potential Calculation

Facility	Edmonds WwTP
Water Body Type	Marine

Dilution Factors:		Acute	Chronic
Aquatic Life		37.0	143.0
Human Health Carcinogenic			143.0
Human Health Non-Carcinogenic			143.0

Pollutant, CAS No. & NPDES Application Ref. No.		AMMONIA, Criteria as Total NH3	ANTIMONY (INORGANIC) 7440360 1M	ARSENIC (dissolved) 7440382 2M	BIS(2-ETHYLHEXYL) PHTHALATE 117817 13B	CADMIUM - 7440439 4M Hardness dependent	CHLORINE (Total Residual) 7782505	CHLOROFORM 67663 11V	CHROMIUM(HEX) 18540299 - Dissolved	COPPER - 744058 6M Hardness dependent	CYANIDE 57125 14M	LEAD - 7439921 7M Dependent on hardness
Effluent Data	# of Samples (n)	29	9	9	5	9	2707	5	6	9	5	9
	Coeff of Variation (Cv)	0.31	0.6	0.6	0.6	0.6	0.88	0.6	0.6	0.6	0.6	0.6
	Effluent Concentration, ug/L (Max. or 95th Percentile)	33,500	1.07	2.9	0.8	0.066	230	2.3	0.041	15.9	14	0.652
	Calculated 50th percentile Effluent Conc. (when n>10)											
Receiving Water Data	90th Percentile Conc., ug/L	34		1.367		0.0693	0		0.18	0.406	0	0
	Geo Mean, ug/L		0.086		0			0			0	
Water Quality Criteria	Aquatic Life Criteria, Acute ug/L	3,966	-	69	-	42	13	-	1100	4.8	1	210
	Chronic ug/L	1,437	-	36	-	9.3	1.5	-	50	3.1	1	8.1
	WQ Criteria for Protection of Human Health, ug/L	-	180	-	0.25	-	-	1200	-	-	270	-
	Metal Criteria, Acute	-	-	1	-	0.934	-	-	-	0.83	-	0.951
	Translator, decimal	-	-	-	-	0.934	-	-	-	0.83	-	0.951
	Carcinogen?	N	N	Y	Y	N	N	Y	N	N	N	N

Aquatic Life Reasonable Potential

Effluent percentile value		0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
$s^2 = \ln(CV^2 + 1)$		0.303	0.555	0.555	0.757	0.555	0.555	0.555	0.555	0.555
$P_n = (1 - \text{confidence level})^{1/n}$		0.902	0.717	0.717	0.399	0.607	0.717	0.549	0.717	0.717
Multiplier		1.00	1.81	1.81	1.00	2.14	1.81	2.32	1.81	1.81
Max concentration (ug/L) at edge of...	Acute	938	1.472	0.071	6.216	0.178	1.041	0.879	0.030	0.030
	Chronic	268	1.394	0.070	1.608	0.179	0.570	0.228	0.008	0.008
Reasonable Potential? Limit Required?		NO	NO	NO	NO	NO	NO	NO	NO	NO

Human Health Reasonable Potential

$s^2 = \ln(CV^2 + 1)$		0.555	0.555	0.5545	0.555
$P_n = (1 - \text{confidence level})^{1/n}$		0.717	0.549	0.549	0.549
Multiplier		0.728	0.934	0.9336	0.934
Dilution Factor		143	143	143	143
Max Conc. at edge of Chronic Zone, ug/L		0.091	0.005	1.5E-02	0.091
Reasonable Potential? Limit Required?		NO	NO	NO	NO

Reasonable Potential Calculation - Page 2

Facility	Edmonds W/WTP
Water Body Type	Marine

Dilution Factors:		Acute	Chronic
Aquatic Life		37.0	143.0
Human Health Carcinogenic			143.0
Human Health Non-Carcinogenic			143.0

Pollutant, CAS No. & NPDES Application Ref. No.		METHYLENE CHLORIDE 75092 22V	MERCURY 7439976 8M	NICKEL - 7440020 3M - Dependent on hardness	SELENIUM 7782492 10M	SILVER - 7740224 11M dependent on hardness	TOLUENE 108883 25V	ZINC- 7440066 13M hardness dependent				
Effluent Data	# of Samples (n)	5	8	9	9	9	5	9				
	Coeff of Variation (Cv)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Effluent Concentration, ug/L (Max. or 95th Percentile)	3.8	0.026	2.84	2.56	0.1	1.5	57.8				
	Calculated 50th percentile Effluent Conc. (when n>10)											
Receiving Water Data	90th Percentile Conc., ug/L		0	0.4346	0	0.0262		1.135				
	Geo Mean, ug/L	0	0	0.412	0		0	0.6443				
Water Quality Criteria	Aquatic Life Criteria, Acute ug/L	-	1.8	74	290	1.3	-	90				
	Chronic	-	0.025	8.2	71	-	-	81				
	WQ Criteria for Protection of Human Health, ug/L	250	0.15	190	480	-	410	2900				
	Metal Criteria Acute	-	0.85	0.93	-	0.85	-	0.946				
	Translator, decimal	-	-	0.99	-	-	-	0.946				
	Carcinogen?	Y	N	N	N	N	N	N				

Aquatic Life Reasonable Potential

Effluent percentile value		0.950	0.950	0.950	0.950	0.950		0.950				
$s = \sqrt{\ln(CV^2+1)}$		0.555	0.555	0.555	0.555	0.555		0.555				
$P_n = (1 - \text{confidence level})^{1/n}$		0.688	0.717	0.717	0.717	0.717		0.717				
Multiplier		1.90	1.81	1.81	1.81	1.81		1.81				
Max concentration (ug/L) at edge of...	Acute	0.001	0.560	0.125	0.030	0.030		3.781				
	Chronic	0.000	0.467	0.032	0.027	0.027		1.820				
Reasonable Potential? Limit Required?		NO	NO	NO	NO	NO		NO				

Human Health Reasonable Potential

$s = \sqrt{\ln(CV^2+1)}$		0.555	0.555	0.5545	0.555		0.5545	0.5545				
$P_n = (1 - \text{confidence level})^{1/n}$		0.549	0.688	0.717	0.717		0.549	0.717				
Multiplier		0.934	0.762	0.7276	0.728		0.9336	0.7276				
Dilution Factor		143	143	143	143		143	143				
Max Conc. at edge of Chronic Zone, ug/L		0.025	1E-04	0.4236	0.013		9.8E-03	9.3E-01				
Reasonable Potential? Limit Required?		NO	NO	NO	NO		NO	NO				

Calculation of Water Quality-Based Effluent Limits:

Water quality-based effluent limits are calculated by the two-value wasteload allocation process as described on page 100 of the TSD (EPA, 1991) and shown below.

1. Calculate the acute wasteload allocation WLA_a by multiplying the acute criteria by the acute dilution factor and subtracting the background factor. Calculate the chronic wasteload allocation (WLA_c) by multiplying the chronic criteria by the chronic dilution factor and subtracting the background factor.

$$WLA_a = (\text{acute criteria} \times DF_a) - [(\text{background conc.} \times (DF_a - 1))]$$

$$WLA_c = (\text{chronic criteria} \times DF_c) - [(\text{background conc.} \times (DF_c - 1))]$$

where: DF_a = Acute Dilution Factor

DF_c = Chronic Dilution Factor

2. Calculate the long term averages (LTA_a and LTA_c) which will comply with the wasteload allocations WLA_a and WLA_c .

$$LTA_a = WLA_a \times e^{(0.5\sigma^2 - z\sigma)}$$

where: $\sigma^2 = \ln[CV^2 + 1]$

$z = 2.326$

CV = coefficient of variation = std. dev/mean

$$LTA_c = WLA_c \times e^{(0.5\sigma^2 - z\sigma)}$$

where: $\sigma^2 = \ln[(CV^2 + 4) + 1]$

$z = 2.326$

3. Use the smallest LTA of the LTA_a or LTA_c to calculate the maximum daily effluent limit and the monthly average effluent limit.

MDL = Maximum Daily Limit

$$MDL = LTA \times e^{(z\sigma - 0.5\sigma^2)}$$

where: $\sigma^2 = \ln[CV^2 + 1]$

$z = 2.326$ (99th percentile occurrence)

LTA = Limiting long term average

AML = Average Monthly Limit

$$AML = LTA \times e^{(z \sigma_n - 0.5 \sigma_n^2)}$$

where: $\sigma^2 = \ln[(CV^2 \div n) + 1]$

n = number of samples/month

z = 1.645 (95th % occurrence probability)

LTA = Limiting long term average

Appendix H — Response to Comments

[Ecology will complete this section after the public notice of draft period.]