

# Fact Sheet for NPDES and State Reclaimed Water Permit WA0029904

Warm Beach Christian Camps and Conference Center

Public Notice of Draft Date: June 10, 2020

## Purpose of this fact sheet

This fact sheet explains and documents the decisions the Department of Ecology (Ecology) made in drafting the proposed combined National Pollutant Discharge Elimination System (NPDES) and Reclaimed Water permit for Warm Beach Christian Camps and Conference Center Wastewater Treatment Plant (Warm Beach WWTP). It complies Section 173-220-060 and Section 173-219-280 of the Washington Administrative Code (WAC), which require Ecology to prepare a draft permit and accompanying fact sheet for public evaluation before issuing a NPDES or Reclaimed Water 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 Warm Beach WWTP, NPDES permit 0029904 , are available for public review and comment from June 10, 2020 until July 24, 2020. For more details on preparing and filing comments about these documents, please see **Appendix A - Public Involvement Information**.

Warm Beach Christian Camps and Conference Center (Warm Beach) 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 F - 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

Warm Beach WWTP:

1. Discharges treated effluent to a tidal channel of Puget Sound – Port Susan.
2. Produces Class B reclaimed water from domestic wastewater and distributes the water for beneficial use (irrigation) on a Warm Beach-owned horse pasture.

The proposed permit will maintain the surface water discharge (NPDES) and reclaimed water requirements in one permit document, like the previous permit.

Surface water discharge requirements:

The proposed permit contains the same NPDES effluent limits for biochemical oxygen demand (BOD<sub>5</sub>), total suspended solids (TSS), fecal coliform, pH, and total residual chlorine as the previous permit. The proposed permit includes an increase in nutrient monitoring to once per month.

Reclaimed water discharge requirements:

Warm Beach transitioned to generating Class B reclaimed water from Class A. Monitoring and use-based requirements were adjusted in this proposed permit to conform with Class B reclaimed water requirements. Ecology based requirements in the previous permit on its interim Water Reclamation and Reuse Standards, developed in collaboration with the Department of Health in 1997. The proposed permit imposes requirements contained in the recently adopted Reclaimed Water Rule 173-219 WAC, including

- An annual reclaimed water summary report.
- Cross-connection control program development.

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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 173-220 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.

In enacting the Reclaimed Water Use law, chapter 90.46 RCW, the Washington State Legislature found that it was in the best interest of present and future generations to encourage the use of reclaimed water in ways that protect the environment as well as the health and safety of all Washington citizens. The Legislature declared that the people of the state of Washington have a primary interest in the development of facilities to provide reclaimed water to replace potable water in nonpotable applications, to supplement existing surface and groundwater supplies, and to assist in meeting the future water requirements of the state. The law directed Ecology, in coordination with the Department of Health (DOH), to adopt rules for reclaimed water use. Ecology adopted the Reclaimed Water Rule, chapter 173-219 WAC, in January 2018.

RCW 90.46.220 and WAC 173-219-070 require any person proposing to generate any type of reclaimed water for a use regulated under the Reclaimed Water Use law to obtain a permit from either Ecology or DOH. The Reclaimed Water Rule designates the lead agency responsible for overseeing the engineering reviews and permitting of reclaimed water facilities based on the type of facility.

Ecology is the lead agency when the source water for reclaimed water production is an effluent from a domestic wastewater treatment or water pollution control facility that would typically require a permit from Ecology for effluent disposal to surface water under WAC 173-220 or to groundwater under WAC 173-216. Reclaimed water facility owners must obtain a permit before they may distribute or use any reclaimed water.

All reclaimed water permits issued by Ecology must specify conditions requiring the facility to adequately and reliably treat its wastewater to a level appropriate for the approved beneficial uses of the water. In addition to meeting the water quality limits, the standards require specific treatment and disinfection requirements beyond those of most conventional wastewater treatment facilities. The standards also require automated alarms, redundancy of treatment units, emergency storage, stringent operator training requirements and public notification of reclaimed water use.

Under the NPDES and reclaimed water permit programs and in response to complete and accepted NPDES and reclaimed water permit applications, Ecology must prepare a draft permit and accompanying fact sheet, and make it 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 and WAC 173-219-110). (See **Appendix A - Public Involvement Information** for more detail about the public notice and comment procedures). After the public comment period ends, Ecology will summarize the responses to comments and any changes to the permit in **Appendix F**.

## II. Background Information

**Table 1: General Facility Information**

Facility Information	
Applicant	Warm Beach Christian Camps and Conference Center
Facility Name and Address	Warm Beach WWTP 20800 Marine Drive, Stanwood, WA 98292
Contact at Facility	Kelly Wynn (360) 466-4443
Responsible Official	Ed McDowell, Executive Director 20800 Marine Drive, Stanwood, WA 98292 (360) 652-7575
Type of Treatment	Biological treatment in facultative lagoons and wetlands followed by chlorine disinfection
Discharge Waterbody Name and Location (NAD83/WGS84 reference datum)	Puget Sound – Port Susan Latitude: 48.1901 Longitude: -122.3568
Highest Class of Reclaimed Water Produced	Class B
Approved Beneficial Uses	Irrigation trees, fodder, fiber, or seed crops in pastures not accessed by milking animals

**Table 2: Permit Status**

Permit Status	
Issuance Date of Previous Permit	January 29, 2014
Application for Permit Renewal Submittal Date	July 16, 2018
Date of Ecology Acceptance of Application	August 18, 2018

**Table 3: Inspection Status**

Inspection Status	
Date of Last Inspection	October 8, 2018

**Figure 1: Facility Location Map**



## **A. Facility description**

### **History**

Warm Beach is located on a bluff north of the unincorporated community of Warm Beach, overlooking Port Susan – Puget Sound, in Snohomish County.

Warm Beach was developed in the late 1950's by the Free Methodist Denomination. Warm Beach offers programming to the general public, including summer camp, and retreat/conference space. In addition, there are several homes located within the property for staff and a continuing care retirement community. Wastewater utility service is not provided to the unincorporated community of Warm Beach, WA.

### **Collection system status**

The collection system collects wastewater from several areas of the camp and the retirement community. Wastewater is conveyed, by gravity, to the WWTP in an 8-inch sewer line.

The Warm Beach population fluctuates throughout the seasons, with increased visitation in the summer months for camps and retreats and the holiday period between November and January for the Lights of Christmas event. The population is estimated at 450 to 1,400 people.

### **Treatment processes**

Raw wastewater flows by gravity through a ductile iron influent line to a mechanical fine screen. Screened wastewater is directed to a Parshall flume equipped with an ultrasonic flowmeter for influent flow measurement.

The wastewater then flows by gravity to a facultative lagoon for physical and biological treatment. Up until recently, the lagoon was aerated. However, operators determined the additional oxygen provided by the aerators was not necessary for proper treatment. The aerator is still available for use in the lagoon, if needed.

The lagoon effluent flows by gravity to two 2-acre constructed wetlands, operated in series. The operator has the ability to isolate one wetland in order to complete maintenance. However, the selection of constructed wetlands at this facility was due to the minimal required maintenance. As wastewater flows through the wetlands, it slows down and suspended solids are trapped by vegetation and settled out.

Effluent from the wetlands is pumped to a wet well where hypochlorite is injected. The wet well functions as a chlorine contact chamber to allow proper disinfection. Chlorinated effluent is pumped through a 500µm pre-filter, then passes through the old UV channel for additional contact time. The effluent is dechlorinated with sodium metabisulfite prior to discharging to the 87,000 gallon concrete effluent basin. Effluent flow is measured after dechlorination and prior to discharge to the concrete effluent basin.

The plant staff lowers the wetlands as low as possible in the spring and shuts off the outfall pipe to Port Susan through the summer. This procedure is maintained through the summer as long as there is capacity for storage in the lagoon and constructed wetlands. The plant staff recycles the water continuously between the lagoon and the wetlands. Currently, the storage capacity at the plant is,

- Lagoon: 315,000 gallons/foot
- Wetland #1: 655,000 gallons/foot
- Wetland #2: 605,000 gallons/foot

The plant discharges treated effluent into a tidal channel of Port Susan throughout the fall and winter months.

A process schematic, Figure 3, is included in Appendix E.

### **Reclaimed water treatment process**

The Warm Beach WWTP reclaimed water system was originally designed to produce Class A reclaimed water. The facility is equipped with a Zenon model Z-box S24 membrane filtration system utilizing the ZeeWeed 1000 hollow fiber membranes.

The facility has never generated reclaimed water. During start-up of the reclaimed facility, on-going issues with turbidity, disinfection, and membrane fouling caused the facility to reevaluate the reclaimed water process. During permit application, Warm Beach decided to transition to generation and use of Class B reclaimed water. The intended beneficial use, irrigation of a horse pasture, is still an approved use for Class B reclaimed water. Warm Beach submitted an engineering report addendum, Addendum to Engineering Report: Warm Beach Christian Camp and Conference Center – Wastewater Treatment Plant Transition to Class B Reclaimed Water, on July 1, 2019 to outline the treatment process to meet Class B reclaimed water standards and treatment reliability requirements. Ecology approved the report on December 5, 2019.

The facility meets the Class B reclaimed water treatment standards through biological treatment in the facultative lagoon and wetlands and chlorine disinfection. Prior to generation of Class B reclaimed water, the facility will complete a project to install diversion piping. The diversion piping will allow plant staff to reroute improperly treated reclaimed water back to the wetlands for further treatment. Properly treated reclaimed water will be temporarily stored in the concrete effluent basin to ensure a constant flow to the irrigation lines when in use.

### **Solid wastes/Residual solids**

The treatment facilities remove solids during the treatment of the wastewater at the headworks (grit and screenings), and at the facultative lagoon, in addition to incidental solids (rags, scum, and other debris) removed as part of the routine maintenance of the equipment. Warm Beach WWTP drains grit, rags, scum, and screenings and disposes this solid waste at the local landfill. Solids removed from the facultative lagoon are hauled to the LaConner WWTP for further treatment. The LaConner WWTP has met the solid waste requirements for 3/8" screening, as required by WAC 173-308-205.

### **Discharge outfall**

The treated and disinfected effluent flows into a tidal channel of Port Susan through Outfall 001. The treated effluent is pumped from the concrete effluent basin through an 8-inch force main to a tidal channel of Port Susan. The outfall is equipped with 18 feet of 8-inch diameter HDPE pipe. The diffuser is shaped like a "T" with 9 feet of pipe on either side. There are 160 ¼-inch wide by 8-inch long slots along the diffuser length. A picture of the outfall is included in Figure 2. The facility is only authorized to discharge to the tidal channel when the outfall diffuser is under at least 1 foot of water. The Programmable Logic Controller (PLC) is set with a tide chart to automatically begin discharging when the tide is high enough to be covering the diffuser by the minimum water level.

The 1-foot limit correlates to approximately a 7 foot tide at nearby Kayak Point (*Warm Beach CCCC Wastewater Treatment Plant Reclaimed Water Treatment Facility & Pipeline final drawings*, H.R. Esvelt Engineering, March 2007). The purpose of the concrete effluent basin is to allow storage between tides. In addition, the permit limits the effluent discharge rate to 642 gpm. The effluent pump at the facility is set to 640 gpm to meet this permit requirement.

#### **Distribution system and authorized beneficial uses of reclaimed water**

Reclaimed water generated at the Warm Beach WWTP is used exclusively to irrigate a 25 acre horse pasture on Warm Beach property. Due to high precipitation and saturated ground during winter months, the facility generally limits irrigation to the dry months (approximately May to October). Treated wastewater, not to reclaimed standards, is discharged to Puget Sound during the winter months. Generated reclaimed water is accumulated in the concrete effluent basin prior to distribution to the pasture irrigation line. The purpose of the concrete effluent basin is as a buffer for irrigation water.

Reclaimed water distribution utilizes the outfall line, the same line that non-reclaimed treated effluent is disposed to the tidal channel in. The outfall line has nine ports that allow connection of an irrigation hose to distribute reclaimed water evenly throughout the field. The irrigation hose is manually moved between the ports during the course of a day. Maps of the irrigation system are included in Appendix E.

#### **Contract operations**

Warm Beach contracts the operation and maintenance of the wastewater treatment plant with Water and Wastewater Services, LLC by the terms and conditions contained in a mutually agreed upon service agreement. The proposed permit requires the submission of the service agreement to ensure it is consistent with chapters 90.46 and 90.48 RCW as required by RCW 70.150.040(9).

It is the Water Quality Program's standard procedure to identify contract operators as co-permittees on individual municipal NPDES permits, to address both state and federal requirements for permittees. However, it is not required in every case. Ecology may consider issuing the permit only to the owner; Ecology staff and managers should:

1. Consider the extent of the operator's control over the treatment system, as described in the service agreement.
2. Consider the experience and record of the operator at other facilities.
3. Consider the performance and enforcement provisions in the service agreement between the owner and the operator.
4. Review the recommendations or comments from the Attorney General's office.
5. Make a reasoned decision based on the facts, Ecology guidance, and the manner in which the entities' service agreement defines the responsibilities each will have.

Ecology decided to include the contract operator as a Co-permittee.

When a domestic wastewater facility with Co-permittees does not comply with permit conditions, Ecology will consider the roles identified in the reviewed service agreement between the owner and operator when it develops both formal and informal enforcement actions.

### **Operator certification**

Chapter 173-230 requires wastewater treatment facilities to be operated by a certified operator. In addition, chapter 173-219-250 requires an operator certified by Ecology under Chapter 173-230 to operate reclaimed water treatment facilities. Guidance in Ecology's *Permit Writer's Manual* and WAC 173-230 classify the treatment system at the Warm Beach WWTP as a Class I facility. As such, the operator in responsible charge of the day-to-day operations at the facility must, at a minimum, be rated as a Group I operator. An operator certified for at least a Group I facility must be in charge of each scheduled shift at the facility.

At the Warm Beach WWTP, Water and Wastewater Services, LLC regularly employs three certified operators ranging from a Group II to Group III. At least one operator is present Monday through Friday. Operators are on call evenings and weekends.

The distribution system is small with only one user. Reclaimed water is piped from the treatment facility to an irrigation line in the horse pasture on Warm Beach property. Therefore, Ecology will not require the facility to have an operator certified under the Department of Health's Waterworks Operator Certification program.

In addition, the Warm Beach WWTP has a compliance schedule to develop a cross-connection control program, pending review of the cross-connection control report (R4.C.a of the proposed permit). The report is required to be reviewed by a certified Cross-Connection Control Specialist (CCS) prior to submittal to Ecology. The CCS does not need to be employed full-time at the facility.

### **Water rights protection**

Chapter 90.46.120 RCW states that the owner of a wastewater treatment facility producing reclaimed water under a reclaimed water permit has the exclusive rights to that water. That right is tempered, however, by chapter 90.46.130 RCW, which states that the use of reclaimed water must not impair any existing water rights downstream of any freshwater discharge points of the facilities unless compensation or mitigation is agreed upon by the holder of the affected water right. Ecology cannot issue a reclaimed water permit unless the permit applicant demonstrates compliance with water rights protection.

The Warm Beach WWTP discharges treated wastewater to marine waters. Therefore, the distribution and use of Class B reclaimed water from the Warm Beach facility does not impair downstream water rights and complies with water rights protection requirements of the Reclaimed Water Use Law.

## B. Description of the receiving water

Warm Beach discharges to Puget Sound – Port Susan. There are no nearby point source outfalls.

Cosmopolitan Engineering conducted a dye tracer study in 2008 to determine the dilution factors for the Warm Beach discharge into Port Susan. As part of this study, temperature, pH, ammonia, and salinity data was collected. In addition, Warm Beach monitored the receiving water for temperature from June through September 2009 as part of the permit. [Dissolved oxygen data](#) was collected in 2001 at a Juniper Beach monitoring location (ID 05TJUNIP) and is available on the EIM database at <https://apps.ecology.wa.gov/eim/search/Default.aspx>. Temperature, pH, ammonia, salinity, and dissolved oxygen of the ambient water measured during the study are shown in Table 2.

**Table 4: Ambient Background Data**

Parameter	Value Used
Temperature (2008 dye tracer study)	19 °C (max) *summer
Temperature (2009 Warm Beach monitoring)	26 °C (max), 24 °C (90 <sup>th</sup> percentile) *summer
pH	7.72 standard units (max and 90 <sup>th</sup> percentile), 7.50 s.u. (min)
Total Ammonia-N	0.14 mg/L (max), 1.3 mg/L (90 <sup>th</sup> percentile)
Salinity	0.7 to 1.4 parts per thousand
Dissolved Oxygen	6.8 mg/L (min), 10.9 mg/L (max), 7.2 mg/L (10 <sup>th</sup> percentile)

## C. Wastewater influent characterization

Warm Beach reported the concentration of influent pollutants in discharge monitoring reports from February 2014 through July 2018. The influent wastewater is characterized as follows:

**Table 5: Wastewater Influent Characterization**

Parameter	Units	Average Value	Maximum Value
Flow	mgd	0.030	0.31
Parameter	Units	Average Value	Maximum Monthly Average Value
Biochemical Oxygen Demand (BOD <sub>5</sub> )	mg/L	300	510

Parameter	Units	Average Value	Maximum Value
BOD <sub>5</sub>	lbs/day	72.9	127
Total Suspended Solids (TSS)	mg/L	261	538
TSS	lbs/day	62.3	152

#### D. Wastewater effluent characterization

The Warm Beach WWTP reported the concentration of pollutants in the discharge in the permit application and in discharge monitoring reports. The tabulated data represents the quality of the wastewater effluent discharged from February 2014 through July 2018. The wastewater effluent is characterized as follows:

**Table 6: Wastewater Effluent Characterization**

Parameter	Units	Average Value	Maximum Value
Flow	mgd	0.067	0.10
Parameter	Units	Average Value (of monthly averages)	Maximum Value (of weekly averages)
BOD <sub>5</sub>	mg/L	6.14	16.6
BOD <sub>5</sub>	lbs/day	3.49	9.90
TSS	mg/L	5.17	18
TSS	lbs/day	2.90	10.2

Parameter	Units	Maximum Monthly Geometric Mean	Maximum Weekly Geometric Mean
Fecal Coliform	#/100 mL	13	13

Parameter	Units	Minimum Value	Maximum Value
pH	standard units	6.1	8.3

Parameter	Units	Average	Maximum
Total Residual Chlorine	µg/L	3.51	59 (95 <sup>th</sup> percentile-17.35)

Parameter	Units	# of Samples	Average	Maximum
Temperature (summer)	°C	3	18	19
Temperature (winter)	°C	3	3	4
Total Ammonia	mg/L as N	3	0.29	0.39
Total Kjeldahl Nitrogen	mg/L as N	3	3.02	3.84
Nitrate plus Nitrite	mg/L as N	3	0.41	1.23
Total Phosphorus	mg/L as P	3	4.87	5.86
Total Dissolved Solids	mg/L	3	306	378
Dissolved Oxygen	mg/L	3	8.8	10.3 (min-7.5)
Oil and Grease	mg/L	3	0.4	1.2

### E. Reclaimed water characterization

The facility has yet to produce reclaimed water, no characterization data is available at this time.

### F. Summary of compliance with previous permit issued

The previous permit placed effluent limits on BOD<sub>5</sub>, TSS, pH, fecal coliform, and total residual chlorine.

Warm Beach has consistently complied with the effluent limits and permit conditions throughout the duration of the permit issued on January 29, 2014, with the exception of one instance of missed sampling. Ecology assessed compliance based on its review of the facility's information in the Ecology Permitting and Reporting Information System (PARIS), discharge monitoring reports (DMRs) and on inspections.

**Table 7: Violations**

Date	Parameter	Units	Violation
12/1/2016	BOD <sub>5</sub> , Influent	mg/L; lbs/day	Missed sample

Warm Beach submitted several DMRs and other submittals later than deadlines in the permit conditions. Table 5 outlines the late permit submittals.

**Table 8: Permit Submittals**

Due Date	Submittal	Violation
7/15/2014	June 2014 DMR	Late submittal, received 7/16/2014
3/15/2015	February 2015 DMR	Late submittal, received 3/16/2015
3/31/2015	Reclaimed Water Use Summary	Late submittal, received 5/2/2016
3/15/2017	February 2017 DMR	Late submittal, received 3/28/2017
3/31/2017	Reclaimed Water Use Summary	Late submittal, never received
3/31/2018	Reclaimed Water Use Summary	Late submittal, received 4/5/2018

**G. 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.

In addition, Ecology must ensure that its decision to reissue the proposed reclaimed water permit is consistent with SEPA, Chapter 43.21C RCW. The SEPA Rules, WAC 197-11-600, allow Ecology to use existing environmental documents to satisfy this requirement. Warm Beach Christian Camps and Conference Center completed an environmental review and SEPA checklist for the reclaimed water upgrades to the treatment system on September 10, 2006. Snohomish County issued a determination of non-significance for the project on March 26, 2007. Ecology has reviewed the documents and determination and has adopted the findings for the reissuance of the proposed permit.

### 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 National Toxics Rule (40 CFR 131.36).
- 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.

#### 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 in the *Wastewater Treatment Plant Engineering Report – Effluent Treatment for Class A Reuse Project, December 2006 Addendum*, prepared by H.R. Esvelt Engineering, on July 19, 2007. The transition to Class B reclaimed water has no impact on the design criteria for the facility. The table below includes design criteria from the referenced report.

**Table 9: Design Criteria for Warm Beach WWTP**

Parameter	Design Quantity
Maximum Month Design Flow (MMDF)	0.15 MGD
BOD <sub>5</sub> Loading for Maximum Month	380 lbs/day

## B. Technology-based effluent limits

Federal and state regulations define 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). These regulations are performance standards that constitute all known, available, and reasonable methods of prevention, control, and treatment (AKART) for domestic wastewater.

The table below identifies technology-based limits for pH, fecal coliform, BOD<sub>5</sub>, and TSS, as listed in chapter 173-221 WAC. Section III.F of this fact sheet describes the potential for water quality-based limits.

**Table 10: Technology-based Limits**

Parameter	Average Monthly Limit	Average Weekly Limit
BOD <sub>5</sub> (concentration)	30 mg/L	45 mg/L
BOD <sub>5</sub> (concentration)	In addition, the BOD <sub>5</sub> effluent concentration must not exceed fifteen percent (15%) of the average influent concentration.	
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

Technology-based mass limits are based on WAC 173-220-130(3)(b) and 173-221-030(11)(b). Ecology calculated the monthly and weekly average mass limits for BOD<sub>5</sub> and Total Suspended Solids as follows:

$$\text{Mass Limit} = \text{CL} \times \text{DF} \times \text{CF}$$

where:

CL = Technology-based concentration limits listed in the above table

DF = Maximum Monthly Average Design flow (MGD)

$$\text{Mass Limit} = \text{CL} \times \text{DF} \times \text{CF}$$

$$\text{CF} = \text{Conversion factor of 8.34}$$

**Table 11: Technology-based Mass Limits**

Parameter	Concentration Limit (mg/L)	Mass Limit (lbs/day)
BOD <sub>5</sub> and TSS Monthly Average	30	38
BOD <sub>5</sub> and TSS Weekly Average	45	56

### 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).

#### Numerical criteria for the protection of aquatic life and recreation

Numerical 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 numerical 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.

#### Numerical criteria for the protection of human health

Effective numeric water quality 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 humans 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.

#### Narrative criteria

Narrative water quality criteria (e.g., WAC 173-201A-240(1); 2006) 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, 2006) and of all marine waters (WAC 173-201A-210, 2006) in the state of Washington.

### **Antidegradation**

**Description** - The purpose of Washington's Antidegradation Policy (WAC 173-201A-300-330; 2006) 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.

### **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)(i-iii) or WAC 173-201A-400(7)(b)(i-ii)].

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 numerical 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 numerical 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:

**1. 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).

**2. 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 the Warm Beach WWTP meets the requirements of AKART (see “Technology-based Limits”).

**3. 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 is available from Ecology’s website at <https://fortress.wa.gov/ecy/publications/documents/92109.pdf>.

**Table 12: Critical Conditions Used to Model the Discharge**

Critical Condition	Value
Current speeds for acute mixing zone	0.21 to 0.43 ft/sec
Current speeds for chronic and human health mixing zones	0.25 to 0.45 m/sec
Effluent flow rate	642 gpm
Receiving water temperature	19 °C
Receiving water pH	7.6 standard units

Ecology obtained ambient data at critical conditions in the vicinity of the outfall from the *Warm Beach Christian Camp Mixing Zone Study* (Cosmopolitan Engineering, October 2008).

**4. 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.

**5. 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.

**6. 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 to 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.

**7. Maximum size of mixing zone.**

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

**8. 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.

**9. Overlap of mixing zones.**

This mixing zone does not overlap another mixing zone.

#### D. Designated uses and surface water quality criteria

Applicable designated uses and surface water quality criteria are defined in chapter 173-201A WAC. In addition, the U.S. EPA set human health criteria for toxic pollutants (EPA 1992). 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.

**Table 13: Marine Aquatic Life Uses and Associated Criteria**

Excellent Quality	
Temperature Criteria – Highest 1D MAX	16°C (60.8°F)
Dissolved Oxygen Criteria – Lowest 1-Day Minimum	6.0 mg/L
Turbidity Criteria	<ul style="list-style-type: none"> <li>• 5 NTU over background when the background is 50 NTU or less; or</li> <li>• A 10 percent increase in turbidity when the background turbidity is more than 50 NTU.</li> </ul>
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 0.5 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.

The recreational uses for this receiving water are identified below.

**Table 14: Recreational Uses**

Recreational Use	Criteria
Primary Contact Recreation (expires 12/31/2020)	Fecal coliform organism levels must not exceed a geometric mean value of 14 colonies/100 mL, with not 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.
Primary Contact Recreation (effective 1/1/2021)	Enterococci organism levels within an averaging period must not exceed a geometric mean of 30 CFR 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.

## E. Water quality impairments

Ecology has documented water quality impairments of the receiving water in the vicinity of the outfall. The current Water Quality Assessment includes the following listings near the outfall:

- Listing 7218, Category 4A for Bacteria
- Listing 66370, Category 5 for Dissolved Oxygen

To address the water quality impairments, Ecology published the *Stillaguamish River Fecal Coliform, Dissolved Oxygen, pH, Mercury, and Temperature Total Maximum Daily Load – Water Quality Implementation Plan (TMDL Implementation Plan)* in June 2007.

The *TMDL Implementation Plan* noted that all WWTPs have either technology-based or water quality-based bacteria limits. In addition, no discharge from a wastewater treatment plant is allowed to exceed state water quality criteria at the outer edge of the chronic mixing zone established in the NPDES permit. The Warm Beach WWTP has water quality-based bacteria limits established in the proposed permit. In addition, during every permit review, Ecology assesses the reasonable potential for the discharge to exceed water quality criteria. The reasonable potential analysis for the Warm Beach WWTP discharge can be seen below in Section III.G of this fact sheet.

Additional measures were outlined in the *TMDL Implementation Plan* to minimize water quality impacts from the Warm Beach WWTP discharge. These included:

1. Relocating the Warm Beach WWTP outfall from the Warm Beach Creek to a tidal channel of Port Susan.
2. Proposing to discharge treated wastewater to a Warm Beach-owned horse pasture during the dry (summer) months.

Completion of the Port Susan outfall was completed in 2008. Warm Beach WWTP implemented a procedure to hold water in the lagoon and wetlands during the dry months. In addition, the facility began designing a reclaimed water treatment system in order to use reclaimed water to irrigate the horse pasture during the dry months. The facility should begin generating and using Class B reclaimed water during this permit cycle.

#### **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.

#### **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 (BOD<sub>5</sub>) 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 outfall consists of an 8-inch force main from the Warm Beach WWTP to a tidal channel of Port Susan. The outfall is equipped with a diffuser which consists of approximately 18 feet of slotted 8-inch diameter HDPE pipe. There are 160 ¼-inch wide by 8-inch long slots in the diffuser. A picture of the diffuser can be seen in Figure X. The Warm Beach WWTP discharges the effluent only at times when the receiving water level is at least one foot above the crown of the diffuser.

**Figure 2: Outfall Diffuser in Tidal Channel During Low Tide**



**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 and may not occupy more than 25% of the width of the water body as measured during MLLW.

The horizontal distance of the chronic mixing zone is 200 feet, parallel to the diffuser. The mixing zone extends from the bottom to the top of the water column.

**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 Outfall 001 extends 20 feet parallel to the diffuser.

Dilution factors were determined using a dye tracer study and were outlined in the *Warm Beach Christian Camp Mixing Zone Study* (Cosmopolitan Engineering, October 2008). The dilution factors are listed below.

**Table 15: Dilution Factors (DF)**

Criteria	Acute	Chronic
Aquatic Life	5.3	7.5
Human Health	---	7.5

Ecology determined the impacts of dissolved oxygen deficiency, pH, fecal coliform, chlorine, ammonia, and temperature 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.

**Nutrients** - The Salish Sea Model (Ahmed et al, 2019) has shown that the nutrients discharged from wastewater treatment plants contribute to low dissolved oxygen (D.O.) levels, below state water quality criteria, in Puget Sound. Nitrogen is the limiting nutrient in Puget Sound waters (Howarth and Marino, 2006; Newton and Van Voorhis, 2002). More specifically, total inorganic nitrogen (TIN), the sum of nitrate-nitrite and total ammonia, is the form of nitrogen more available for algal growth that drives eutrophication and the dissolved oxygen impairment.

Early model runs (“Bounding Scenarios”) also confirmed that circulation within the inner basins of Puget Sound distributes a portion of pollutants throughout the waters of the Sound. Discharges in one basin can affect the water quality in other basins. Thus, all wastewater discharges to Puget Sound containing inorganic nitrogen contribute to the D.O. impairment.

The Permittee’s discharge contains inorganic nitrogen. Therefore, this permit must require the Permittee to control nutrients consistent with the Clean Water Act and Washington’s Water Pollution Control Act. Water quality based effluent limits (WQBELs) are required for wastewater treatment plants discharging to surface waters when the discharge has reasonable potential to cause or contribute to an in-stream excursion above a narrative or numeric State water quality criteria (40 CFR 122.44(d)(1)(iii)).

Ecology continues to work on refining inputs and outputs of the Salish Sea Model to determine water quality impacts from both discrete point sources and watersheds entering Puget Sound. Because of the broad, far-field impacts TIN has on Puget Sound, spreadsheet tools designed for toxic pollutants (such as “Permit Calc”) cannot be used for the development of a numeric inorganic nitrogen WQBEL.

Washington State has numeric criteria for D.O. but not for nitrogen which further limits use of existing limit development spreadsheet tools. Ecology uses inorganic nitrogen as an indicator parameter for D.O., as allowed in 40 CFR 122.44(d)(vi)(C). Use of this indicator parameter requires modeling to demonstrate water quality impacts from a discharge.

Even without use of an indicator parameter, nutrients have a longer averaging period than toxics and drive both near-field and far-field effects. Modeling is necessary to quantify these far-field impacts and to derive applicable numeric WQBELs.

In a receiving water as complex as Puget Sound, the modeling work necessary to develop numeric WQBELs for each discharge is comprehensive and requires extensive internal and external review.

The inorganic nitrogen in the Permittee's discharge has reasonable potential to contribute to far-field water quality impacts. For this permit cycle, implementing a numeric WQBEL for nitrogen is infeasible. This is due to the additional modeling scenarios necessary to quantify both the Permittee's far-field water quality effect and the corresponding effluent limit necessary to prevent an exceedance of the D.O. standard.

Federal rule at 40 CFR 122.44 (d)(vi)(C) requires permits that use indicator parameters to: identify the pollutants intended to be controlled, require appropriate monitoring, and include a reopener clause. This permit meets those requirements. The rule also requires documentation here in the fact sheet on how limiting the indicator parameter will result in control of the pollutant of concern sufficiently to attain and maintain water quality standards.

The Puget Sound Nutrient Source Reduction Project, is the process for developing nutrient load allocations for human sources that are contributing to the depletion of dissolved oxygen beyond what is allowable in the state water quality standard (WAC 173-201A-210-(1)(d)). The Salish Sea Model, along with representative monitoring data, is used to evaluate the improvement from reductions of these sources as described in Ahmed, et al (2019).

As of 2020, the project is in the second year of modeling. Model runs are used to understand the significance of the far- and near-field effects of wastewater discharges to marine waters along with the anthropogenic nutrient loads from Puget Sound watersheds. With the completed model results and other best-available science and monitoring data, Ecology will establish a loading capacity for nutrients that will meet D.O. criteria in the marine waters of Puget Sound. Then Ecology will allocate the overall nutrient loading capacity amongst the wastewater discharges and watersheds.

Ecology will continue to engage stakeholders on the framework for establishing nutrient load and wasteload allocations at the Puget Sound Nutrient Forum. Permittees may also participate in the process focused on WQBEL development from the nutrient wasteload allocations. Ecology currently plans on running a third year of modeling in 2021. The need for any additional computer modeling to support the development of WQBELs beyond the current project timeline will be evaluated in 2020-2021. Ecology anticipates finalizing numeric point source nutrient load reductions that will support WQBELs by the end of 2024.

While Ecology actively pursues the necessary modeling to make development of numeric WQBELs feasible, 40 CFR 122.44(k) states that best management practices (BMPs) to control or abate the discharge of pollutants are acceptable when numeric effluent limitations are infeasible.

The Warm Beach WWTP took only three samples for nitrogen species over the previous permit cycle, see Table 3. This is insufficient data to statistically calculate a loading cap for total inorganic nitrogen; however the measured total inorganic nitrogen from the samples was less than 3 mg/L. Continued proper operation of this plant according to permit conditions will constitute BMPs. Ecology proposes to increase nutrient monitoring from three times per permit cycle to once per month. Ecology will evaluate the monitoring data and feasibility of limits during the next permit term.

**Dissolved Oxygen--BOD<sub>5</sub> 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 Biochemical Oxygen Demand (BOD<sub>5</sub>) 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.

Ecology modeled the impact of BOD<sub>5</sub> on the receiving water at critical condition and with the technology-based effluent limit for BOD<sub>5</sub> described under "Technology-Based Effluent Limits" above. The calculations to determine dissolved oxygen impacts are shown in Appendix D.

Ecology predicted no violation of the surface water quality standards for dissolved oxygen due to the impacts of biochemical oxygen demand (BOD<sub>5</sub>) under critical conditions. Therefore, the proposed permit contains the technology-based effluent limit for BOD<sub>5</sub>. The permit also does not contain a limit on ammonia based on dissolved oxygen impacts (ammonia toxicity is examined elsewhere in this fact sheet).

**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.

**Fecal Coliform** - 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 7.5. No representative ambient data for fecal coliform is available in the surrounding area, so a conservative 0 organisms/100 ml is used for the background level.

Under these critical conditions, modeling predicts possible violations of the fecal coliform criterion for the receiving water. Therefore, the proposed permit includes a water quality-based effluent limit of 105 organisms/100 mL. This is consistent with the previous permit which placed a weekly geometric mean and monthly geometric mean fecal coliform limit of 105 organisms/100 mL. The fecal coliform limits in the proposed permit are the same as those in the previous permit.

During this permit term, the water quality fecal coliform bacteria criterion will change from fecal coliform to Enterococci. Technology based effluent limits listed in WAC 173-221 were not modified with the recreational water quality standards update. The effective date of the proposed permit starts before the sunset date (12/31/2020) of the existing fecal coliform recreational standard. Because the change in bacterial indicator is not more or less stringent than the current standards, the water quality-based effluent limits will remain unchanged throughout the duration of the permit term.

**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.

**Toxic Pollutants** - 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: chlorine and ammonia. Ecology conducted a reasonable potential analysis (See Appendix D) on these parameters to determine whether it would require effluent limits in this permit.

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 used the available receiving water information as outlined in Table 1 of this fact sheet.

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

Ecology placed water quality-based chlorine limits of 33 µg/L (average monthly) and 69 µg/L (maximum daily) in the previous permit. To comply with antibacksliding (40 CFR 122.44(l)), effluent limits must be as stringent as the limits in the previous permit. In addition, the permittee has been able to comply with these limits. Therefore, the proposed permit contains the same limits.

**Temperature** - The state temperature standards [WAC 173-201A-200-210 and 600-612] include multiple elements:

- Annual summer maximum threshold criteria (June 15 to September 15)
- Supplemental spawning and rearing season criteria (September 15 to June 15)
- Incremental warming restrictions
- Protections against acute effects

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

- **Annual summer maximum and supplementary spawning/rearing criteria**

Each water body has an annual maximum temperature criterion [WAC 173-201A-200(1)(c), 210(1)(c), and Table 602]. These threshold criteria (e.g., 12, 16, 17.5, 20°C) protect specific categories of aquatic life by controlling the effect of human actions on summer temperatures.

Some waters have an additional threshold criterion to protect the spawning and incubation of salmonids (9°C for char and 13°C for salmon and trout) [WAC 173-201A-602, Table 602]. These criteria apply during specific date-windows.

The threshold criteria apply at the edge of the chronic mixing zone. Criteria for most fresh waters are expressed as the highest 7-Day average of daily maximum temperature (7-DADMax). The 7-DADMax temperature is the arithmetic average of seven consecutive measures of daily maximum temperatures. Criteria for marine waters and some fresh waters are expressed as the highest 1-Day annual maximum temperature (1-DMax).

- **Incremental warming criteria**

The water quality standards limit the amount of warming human sources can cause under specific situations [WAC 173-201A-200(1)(c)(i)-(ii), 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. These increments are permitted only to the extent doing so does not cause temperatures to exceed either the annual maximum or supplemental spawning criteria.

At locations and times when a threshold criterion is being exceeded due to natural conditions, all human sources, considered cumulatively, must not warm the water more than 0.3°C above the naturally warm condition.

When Ecology has not yet completed a TMDL, our policy allows each point source to warm water at the edge of the chronic mixing zone by 0.3°C. This is true regardless of the background temperature and even if doing so would cause the temperature at the edge of a standard mixing zone to exceed the numeric threshold criteria. Allowing a 0.3°C warming for each point source is reasonable and protective where the dilution factor is based on 25% or less of the critical flow. This is because the fully mixed effect on temperature will only be a fraction of the 0.3°C cumulative allowance (0.075°C or less) for all human sources combined.

- **Protections for temperature acute effects**

Instantaneous lethality to passing fish: The upper 99<sup>th</sup> percentile daily maximum effluent temperature must not exceed 33°C, unless a dilution analysis indicates ambient temperatures will not exceed 33°C two seconds after discharge.

General lethality and migration blockage: Measurable (0.3°C) increases in temperature at the edge of a chronic mixing zone are not allowed when the receiving water temperature exceeds either a 1DMax of 23°C or a 7DADMax of 22°C.

Lethality to incubating fish: Human actions must not cause a measurable (0.3°C) warming above 17.5°C at locations where eggs are incubating.

### **Reasonable Potential Analysis**

Ecology calculated the reasonable potential for the discharge to exceed the annual summer maximum and the incremental warming criteria (See temperature calculations in Appendix D).

The discharge is only allowed to warm the water by a defined increment when the background (ambient) temperature is warmer than the assigned threshold criterion. The ambient temperature at the outfall location is 24 °C (90<sup>th</sup> percentile) and the effluent temperature is 18.95 °C (95<sup>th</sup> percentile). The reasonable potential analysis shows a decrease in temperature of 0.67 °C due to this discharge. Based on the predicted temperature and incremental change at the edge of the chronic mixing zone, there is no reasonable potential for discharges to exceed water quality standards and no temperature limit is needed

Ecology also considered the acute effects the discharge may have in the receiving water. The Warm Beach WWTP discharges treated domestic wastewater that traditionally does not approach temperatures near 33 °C. In addition, as shown above, the effluent decreases the temperature at the chronic mixing zone boundary. Based on this analysis, the proposed permit does not include any temperature limits.

## **H. Human health**

Washington's water quality standards include numeric human health-based criteria for priority pollutants that Ecology must consider when writing NPDES permits.

Ecology determined the applicant's discharge is unlikely to contain chemicals regulated to protect human health. Ecology will reevaluate this discharge for impacts to human health at the next permit reissuance.

## **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](https://ecology.wa.gov/Spills-Cleanup/Contamination-cleanup/Sediment-cleanups) at the Aquatic Lands Cleanup Unit website at <https://ecology.wa.gov/Spills-Cleanup/Contamination-cleanup/Sediment-cleanups>.

Through a review of the discharger characteristics and of the effluent characteristics, Ecology determined that this discharge has no reasonable potential to violate the sediment management standards.

## 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.

Using the screening criteria in chapter 173-205-040 WAC, Ecology determined that toxic effects caused by unidentified pollutants in the effluent are unlikely. Therefore, this permit does not require WET testing. Ecology may require WET testing in the future if it receives information indicating that toxicity may be present in this effluent.

## 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).

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

## L. Comparison of effluent limits with the previous permit issued on January 29, 2014

**Table 16: Comparison of Previous and Proposed Effluent Limits**

Parameter	Basis of Limit	Previous Effluent Limits: Outfall # 001		Proposed Effluent Limits: Outfall # 001	
		Average Monthly	Average Weekly	Average Monthly	Average Weekly
BOD <sub>5</sub> and TSS (mg/L)	Technology	30	45	30	45
BOD <sub>5</sub> and TSS (lbs/day)	Technology	38	56	38	56

Parameter	Basis of Limit	Monthly Geometric Mean Limit	Weekly Geometric Mean Limit	Monthly Geometric Mean Limit	Weekly Geometric Mean Limit
Fecal Coliform Bacteria (# organisms/100m L)	Technology	105	105	105	105

Parameter	Basis of Limit	Limit	Limit
pH (standard units)	Technology	6.0 - 9.0	6.0 - 9.0

Parameter	Basis of Limit	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily
Total Residual Chlorine (µg/L)	Water Quality	33	69	33	69

#### IV. Proposed Reclaimed Water Limits

The Reclaimed Water Use law, Chapter 90.46 RCW requires reclaimed water generators to adequately and reliably treat reclaimed water prior to distribution and beneficial use. Chapter 173-219-270 WAC requires Ecology to include enforceable limits on water quality in the reclaimed water permits it issues. The enforceable limits are based on:

- General performance standards listed in chapter 173-219-330 WAC.
- Specific use-based requirements listed in chapter 173-219-390 WAC.
- Water quality standards for groundwater of the State of Washington in chapter 173-200 WAC when the reclaimed water authorizes groundwater recharge as a beneficial use.
- Water quality standards for surface waters of the State of Washington in chapter 173-201A WAC when the reclaimed water permit authorizes surface water augmentation or wetland enhancements as a beneficial use.
- Drinking water maximum contaminant levels in chapter 246-290-310 WAC when the permit authorizes certain groundwater recharge and surface water augmentation beneficial uses.
- Ecology applies the most stringent of the standards listed above in developing 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, monitoring, etc.). Ecology evaluated the permit application and determined the limits needed to comply with the rules and standards adopted by the State of Washington. Ecology does not develop reclaimed water limits for all reported pollutants.

Some pollutants are not treatable at the concentrations reported, are not controllable at the source, and are not listed in regulation.

Ecology does not usually develop permit limits for pollutants not reported in the permit application but may be present in the reclaimed water. The permit does not authorize the discharge of the non-reported pollutants. During the five-year permit term, the facility may change the conditions of use of its reclaimed water from those conditions reported in the permit application. The facility must notify Ecology if significant changes occur in any constituent. Until Ecology modifies the permit to reflect additional pollutants, a permitted facility could be violating its permit.

**A. Reclaimed treatment process design criteria**

Under WAC 173-219-240, flows and waste loadings must not exceed approved design criteria. Ecology approved the design for this facility’s reclaimed water treatment process in the Addendum to Engineering Report: Warm Beach Christian Camp and Conference Center – Wastewater Treatment Plant Transition to Class B Reclaimed Water on December 5, 2019. The treatment processes to generate reclaimed water are the same as those used to meet surface water discharge requirements. Therefore, there are no additional design criteria established for the reclaimed water system.

**B. Limits based on reclaimed water performance standards**

Reclaimed water produced and distributed in accordance with the proposed permit must meet minimum standards for biological oxidation, water clarity, and disinfection. The biological oxidation standard generally requires compliance with the secondary treatment requirements in chapter 173-221-040 WAC. Chapter 173-219-330 establishes the applicable performance standards for all Class A and Class B reclaimed water shown in Table 15.

**Table 17: Minimum Biological Oxidation Standards**

Parameter	Average Monthly Limit	Average Weekly Limit
Dissolved Oxygen	Must be measurably present (minimum of 0.2 mg/L)	
BOD <sub>5</sub> concentration	30 mg/L	45 mg/L
	In addition, the average BOD <sub>5</sub> effluent concentration must not exceed fifteen percent (15%) of the average influent concentration.	
TSS concentration	30 mg/L	45 mg/L
	In addition, the average TSS effluent concentration must not exceed fifteen percent (15%) of the average influent concentration.	
	<b>Minimum</b>	<b>Maximum</b>

Parameter	Average Monthly Limit	Average Weekly Limit
pH	6.0 standard units	9.0 standard units

The biological oxidation standard listed above primarily defines the minimum quality of the source water to the reclaimed treatment facility. The above limits are consistent with the technology-based wastewater standards in 173-221 WAC, see Table 8. The compliance point is typically after the last secondary treatment unit and prior to the reclaimed water filtration and disinfection systems. Since not all water reclamation facilities use separate side-stream treatment systems to produce reclaimed water, Ecology may specify alternate compliance points based on the design of each permitted facility. The compliance point for the Warm Beach WWTP is at the concrete effluent basin.

The performance standards require that dissolved oxygen be “measurably present” at the compliance point. Ecology includes a minimum limit of 0.2 mg/L in the permit for dissolved oxygen based on the quantitation level for dissolved oxygen testing using Standard Method 4500-OC/OG, as listed in Appendix A of the proposed permit.

In addition to the biological oxidation standards above for all Class A and B reclaimed water, each class of water must comply with separate standards for turbidity, a measure of water clarity, and disinfection. Warm Beach WWTP must ensure Class B reclaimed water from the permitted facility complies with following standards prior to distribution.

**Table 18: Class B Turbidity and Disinfection Standards**

	7-day median limit	Sample Maximum Limit
Total Coliform	23 CFU/100 mL	240 CFU/100 mL

### C. Distribution system limits

Chapter 173-219-370 requires that the producer and distributor of reclaimed water maintain a chlorine residual in the distribution system to prevent biological growth, prevent deterioration of the reclaimed water quality, and to protect public health. The residual requirement applies only to the distribution system conveying reclaimed water from the production facility to the point of use. It does not apply to water held in storage (in impoundments, storage tanks or storage ponds) or to water conveyed to a point of use through surface waters or groundwater. Ecology may also waive the requirement on a case-by-case basis.

As discussed in Section II.A of this fact sheet (Distribution system description), Warm Beach initially sends final reclaimed water to a concrete effluent basin in order to ensure a consistent flow of water during irrigation times. Reclaimed water is only stored for a short time in the concrete effluent basin prior to traveling a short distance through the outfall pipe to reach irrigation ports throughout the horse pasture.

The horse pasture is on land owned by Warm Beach. Ecology determined that maintenance of a chlorine residual in the distribution system is not necessary due to the management of the newly generated reclaimed water and relatively short distance to the use area. Therefore, the proposed permit does not include a chlorine residual requirement for the distribution system. If Warm Beach decides to add additional users or beneficial uses, within Warm Beach-owned property or outside, Ecology will reassess the distribution system residual chlorine limit waiver.

**D. Comparison of reclaimed water limits with the previous permit issued on January 29, 2014**

**Table 19: Comparison of Previous and Proposed Limits**

		Previous Limits		Proposed Limits	
Parameter	Monitoring Point	Average Monthly	Average Weekly	Average Monthly	Average Weekly
BOD <sub>5</sub>	Limits remain the same and are consistent with the technology-based limits presented in Table 15.				
TSS	Limits remain the same and are consistent with the technology-based limits presented in Table 15.				
Parameter	Monitoring Point	Minimum	Maximum	Minimum	Maximum
Dissolved Oxygen	Concrete effluent basin	N/A	N/A	0.2 mg/L	N/A
pH	Concrete effluent basin	Limits remain the same and are consistent with the technology-based limits presented in Table 15.			
Total Chlorine Residual	End of old UV channel, after dechlorination	1 mg/L	N/A	Monitoring only, consistent with new Reclaimed Water Rule 173-219 WAC	
Parameter	Monitoring Point	Average Monthly	Instantaneous Maximum	Average Monthly	Instantaneous Maximum
Turbidity	End of old UV channel, after dechlorination	0.2 NTU	0.5 NTU	Not applicable to Class B reclaimed water	
Parameter	Monitoring Point	7-Day Median	Sample Maximum	7-Day Median	Sample Maximum
Total Coliform	Concrete effluent basin	2.2 CFU/100 mL	23 CFU/100 mL	23 CFU/100 mL	240 CFU/100 mL

## V. 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.

In addition, Chapter 173-219-260 WAC authorizes Ecology to require monitoring, recording, and reporting in reclaimed water permits as reasonably necessary to verify that the production, distribution or storage of reclaimed water complies with the terms and conditions of the permit.

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.

### 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 sewage lagoon treatment plants <0.5 mgd.

Ecology proposes to increase total ammonia and nitrate-nitrite monitoring to a monthly frequency, from three per permit cycle in the previous permit. An explanation for this increased monitoring is included in Section III.G.

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.

### B. Reclaimed water monitoring

Reclaimed Water Condition R2.A in the proposed permit lists the detailed monitoring requirements for the Warm Beach facility. Specified monitoring frequencies take into account the quantity and variability of the reclaimed water, quantity of each of the approved uses, 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 92-09) for sewage lagoon treatment plants <0.5 mgd.

### C. 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:

**Table 20: Accredited Parameters**

<b>Warm Beach Campground Wastewater Lab</b> 20800 Marine Drive Stanwood, WA 98292 Contact: Carol Rofkar Phone: (360) 466-4443x200 Tests internal samples only		Accreditation #: W527-18 Revision Date: 4/7/2018 Expiration Date: 04/06/2019 County: Snohomish EPA ID: WA01123							
State	City	CompanyName	MatrixDescription	Matrix	Category	MethodName	MethodCode	AnalyteName	AnalyteID
WA	Stanwood	Warm Beach Campground Wastewater Lab	Non-Potable Water	N	General Chemistry	SM 2540 D-2011	20051212	Solids, Total Suspended	1960
WA	Stanwood	Warm Beach Campground Wastewater Lab	Non-Potable Water	N	General Chemistry	SM 4500-Cl G-2011	20081623	Chlorine (Residual), Total	1940
WA	Stanwood	Warm Beach Campground Wastewater Lab	Non-Potable Water	N	General Chemistry	SM 4500-H+ B-2011	20105220	pH	1900
WA	Stanwood	Warm Beach Campground Wastewater Lab	Non-Potable Water	N	General Chemistry	SM 5210 B-2011	20135266	Biochemical Oxygen Demand (BOD)	1530
WA	Stanwood	Warm Beach Campground Wastewater Lab	Non-Potable Water	N	Microbiology	SM 9222 B (mEndo)	20208428	Total coliforms-count	2500
WA	Stanwood	Warm Beach Campground Wastewater Lab	Non-Potable Water	N	Microbiology	SM 9222 D (mFC)-06	20210019	Fecal coliform-count	2530

## VI. Other Permit Conditions

### A. Reporting and record keeping

Ecology based Special Condition S3 and Reclaimed Water Condition R3 on its authority to specify appropriate reporting and recordkeeping requirements. Requirements in S3 are based on Ecology’s authority to prevent and control waste discharges (WAC 173-220-210). Requirements in R3 are to verify that the production, distribution and storage of reclaimed water complies the terms and conditions WAC 173-219 and the reclaimed water permit.

### 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 Warm Beach to:

- Take the actions detailed in proposed permit Special Condition S4.
- 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.

Chapter 173-219-240 states that “where design criteria have been established, the generator must not allow flows or waste loadings to exceed approved design criteria”. Ecology outlined the applicable design criteria of the reclaimed water side stream treatment in Section IV.A above.

The design criteria for the membrane filter are not included as an enforceable limit in the proposed permit because flow to the filter is restricted by upstream pumping capacity.

### **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 Warm Beach takes adequate safeguards so that it uses constructed facilities to their optimum potential in terms of pollutant capture and treatment.

In addition, Ecology requires the owner and operator of reclaimed water facilities to take all reasonable steps to properly operate and maintain their reclaimed water system in accordance with state regulations (WAC 173-219-240). They must ensure that facility operators use operation and maintenance (O&M) manuals that include detailed instructions for operating and maintaining all components of the reclaimed water production and distribution system under its control.

The facility must update and submit the O&M manual for the wastewater treatment system (Special Condition S5.G) and reclaimed water system (Special Condition R6.C) to Ecology for review and approval.

### **D. Reclaimed water distribution and use**

Reclaimed water condition R4 includes requirements governing the distribution and use of reclaimed water from the permitted facility. Ecology based these permit requirements on the following sections of the Reclaimed Water Rule:

- WAC 173-219-270 – Reclaimed water permit terms and conditions.
- WAC 173-219-290 – Use agreements.
- WAC 173-219-310 – Cross-connection control.
- WAC 173-219-360 – Storage and distribution system requirements.

This condition specifies the beneficial uses authorized by the permit and the areas in which reclaimed water from the permitted facility may be used.

The condition also specifies that Warm Beach may not allow the distribution or use of reclaimed water from the permitted facility unless it has signed enforceable use or distribution agreements with each user or distributor. The agreements must include specific conditions on the use and distribution of the water that are included in the proposed permit. Warm Beach owns the horse pasture land, currently the only beneficial use site of reclaimed water. Warm Beach is not required to maintain a use agreement since they own the use area property and operate the irrigation system. However, Warm Beach must adhere to the use area requirements in the permit.

They must include necessary instructions in the facility's Operations and Maintenance manual to ensure irrigation is done according to the use area requirements. Warm Beach must submit a permit application if they intend to distribute reclaimed water for a different use or at a different location than outlined in the permit.

Reclaimed water condition R4.C requires Warm Beach to develop and implement a cross-connection control program designed to protect the reclaimed water produced at the permitted facility from contamination with lower quality water. The condition also requires coordination with local water purveyors to ensure properties supplied with both reclaimed water and potable water have appropriate cross-connection controls in place to protect the potable water supply. While the drinking water purveyor is responsible for evaluating and approving the cross-connection controls installed to protect potable water, Warm Beach must ensure such approval has been granted before it may provide water to the use location.

Warm Beach submitted an extension request to Ecology on February 21, 2018. Warm Beach requested an extension to review the recently adopted rule and the impact it has on Warm Beach. Ecology accepted and expanded upon the District's request. The proposed permit includes a compliance schedule for the facility to submit a Cross-Connection Control Evaluation report, annual updates on the development of the program, and a final cross-connection control program implementation date (R4.C).

## **E. Pretreatment**

Warm Beach Christian Camps and Conference Center is a small, privately owned camping and recreation facility with no industrial dischargers to its wastewater treatment plant. Sources of wastewater to the treatment plant include only domestic sewage from residences and activity spaces on the property. The following information is a standard condition included in all permits and is derived from 40 CFR 403.5.

### **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:
  - a. Are prohibited due to dangerous waste rules.
  - b. Are explosive or flammable.
  - c. Have too high or low of a pH (too corrosive, acidic or basic).

- d. May cause a blockage such as grease, sand, rocks, or viscous materials.
- e. Are hot enough to cause a problem.
- f. Are of sufficient strength or volume to interfere with treatment.
- g. Contain too much petroleum-based oils, mineral oil, or cutting fluid.
- h. 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:

- a. Cooling water in significant volumes.
- b. Stormwater and other direct inflow sources.
- c. Wastewaters significantly affecting system hydraulic loading, which do not require treatment.

#### **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) and(iii)].

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

#### **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.

#### **F. 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.

#### **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.

### **VII. Permit Issuance Procedures**

#### **A. Permit modifications**

Ecology may modify this permit to impose numerical limits, if necessary to comply with water quality standards for surface water, with sediment quality standards, with reclaimed water performance standards or with water quality standards for groundwaters, based on new information from sources such as inspections, effluent monitoring, or groundwater studies.

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

#### **B. Proposed permit issuance**

This proposed permit meets all statutory requirements for Ecology to authorize a wastewater discharge to waters of the state and to authorize the beneficial use of reclaimed water. The permit includes limits and conditions necessary to protect public health, aquatic life, and the designated uses of waters of the state of Washington. The permit also implements applicable state laws and regulations governing the production, distribution, and use of reclaimed water. Ecology proposes to issue this permit for a term of five years.

## VIII. References for Text and Appendices

### Environmental Protection Agency (EPA).

1992. National Toxics Rule. Federal Register, V. 57, No. 246, Tuesday, December 22, 1992.
1991. *Technical Support Document for Water Quality-based Toxics Control*. EPA/505/2-90-001.
1988. *Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling*. USEPA Office of Water, Washington, D.C.
1985. *Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water*. EPA/600/6-85/002a.
1983. *Water Quality Standards Handbook*. USEPA Office of Water, Washington, D.C.

### Howarth, R. and R. Marino.

2006. Nitrogen as the Limiting Nutrient for Eutrophication in Coastal Marine Ecosystems: Evolving Views Over Three Decades. *Limnology and Oceanography* 51(1, part 2): 364-376.

### Newton, J. and K. Van Voorhis.

2002. [Seasonal Patterns and Controlling Factors of Primary Production in Puget Sound's Central Basin and Possession Sound](#). Washington State Department of Ecology, Olympia, Washington. Publication No. 02-03-059.  
(<https://fortress.wa.gov/ecy/publications/documents/0203059.pdf>)

### Tsivoglou, E.C., and J.R. Wallace.

1972. *Characterization of Stream Reaeration Capacity*. EPA-R3-72-012. (Cited in EPA 1985 op.cit.)

### Washington State Department of Ecology.

- January 2015. [Permit Writer's Manual](#). Publication Number 92-109  
(<https://fortress.wa.gov/ecy/publications/documents/92109.pdf>)
- September 2011. [Water Quality Program Guidance Manual – Supplemental Guidance on Implementing Tier II Antidegradation](#). Publication Number 11-10-073  
(<https://fortress.wa.gov/ecy/publications/documents/0610100.pdf>)
- October 2010 (revised). [Water Quality Program Guidance Manual – Procedures to Implement the State's Temperature Standards through NPDES Permits](#). Publication Number 06-10-100 <https://fortress.wa.gov/ecy/publications/documents/0610100.pdf>)
- [Laws and Regulations](#) (<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>)

### Water Pollution Control Federation.

1976. *Chlorination of Wastewater*.

**Wright, R.M., and A.J. McDonnell.**

1979. *In-stream Deoxygenation Rate Prediction*. Journal Environmental Engineering Division, ASCE. 105(E2). (Cited in EPA 1985 op.cit.)

## Appendix A - Public Involvement Information

Ecology proposes to issue a permit to Warm Beach Christian Camps and Conference Center. The permit includes wastewater discharge limits, reclaimed water 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 June 10, 2020 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 (a local public library, 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://fortress.wa.gov/ecy/publications/documents/0307023.pdf), which is available on our website at <https://fortress.wa.gov/ecy/publications/documents/0307023.pdf>.

You may obtain further information from Ecology by telephone at (425) 649-7000, or by writing to the address listed below.

Water Quality Permit Coordinator  
Department of Ecology  
Northwest Regional Office  
3190 160th Avenue SE  
Bellevue, Washington 98008-5452

The primary author of this permit and fact sheet is Maia Hoffman.

## 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.

**Table 21: Address and Location Information**

Street Addresses	Mailing Addresses
<p><b>Department of Ecology</b>                      Attn: Appeals Processing Desk                      300 Desmond Drive SE                      Lacey, WA 98503</p>	<p><b>Department of Ecology</b>                      Attn: Appeals Processing Desk                      PO Box 47608                      Olympia, WA 98504-7608</p>
<p><b>Pollution Control Hearings Board</b>                      1111 Israel RD SW                      STE 301                      Tumwater, WA 98501</p>	<p><b>Pollution Control Hearings Board</b>                      PO Box 40903                      Olympia, WA 98504-0903</p>

## 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 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 (BMPs)** -- 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 BOD<sub>5</sub> 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 173-240-130.

**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 507, 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 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 BOD<sub>5</sub>** -- 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 BOD<sub>5</sub> 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 BOD<sub>5</sub> 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.

The following terms apply to the discussions in this fact sheet related to reclaimed water.

**Beneficial use** -- the uses of reclaimed water for domestic, stock watering, industrial, commercial, agricultural, irrigation, hydroelectric power production, mining, fish and wildlife maintenance and enhancement, recreational, and thermal power production purposes, and for preservation of environmental and aesthetic values, and for all other uses compatible with the enjoyment of the waters of the state. Beneficial use of reclaimed water includes all uses authorized under chapter 90.46 RCW, and contained within WAC 173-219-390.

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

**Chlorine, free** -- The amount of chlorine available in a water sample as dissolved gas ( $\text{Cl}_2$ ), hypochlorous acid ( $\text{HOCl}$ ), or hypochlorite ion ( $\text{ClO}^-$ ).

**Chlorine, total** -- The sum of free chlorine and combined chloramines (compounds of organic or inorganic nitrogen and chlorine).

**Class A reclaimed water** -- A high-quality water resource derived from treated domestic wastewater that is suitable for use in areas with unlimited public access. The water must meet or exceed the minimum Class A performance standards in WAC 173-219-330 including, at a minimum, oxidation, coagulation, filtration, and disinfection.

**Class B reclaimed water** -- A high-quality water resource derived from treated domestic wastewater that is suitable for regulated use in areas with restricted public access.

The water must meet or exceed the minimum Class B performance standards in WAC 173-219-330 including, at a minimum, oxidation, and disinfection.

**Cross-connection Control** -- The practice of using approved devices and management strategies designed to eliminate or prevent the potential for contaminating high-quality waters with lower quality waters.

**Distributor** -- The person authorized through a use agreement with a reclaimed water generator to distribute or supply reclaimed water to users. A distributor may also be a generator or a user. Users that distribute reclaimed water to use areas through a gravity conveyance system for agricultural water uses are not distributors.

**Domestic wastewater** -- Wastewater predominantly from residential sources that includes greywater, toilet, or urinal sources. Also includes wastewater generated by commercial, institutional and light industrial entities including restaurants, office complexes, schools, and hospitals. It may include process wastewaters from industrial sources when allowed under federal pretreatment regulations.

**Greywater** -- Domestic type wastewater flows from bathtubs, showers, bathroom sinks, washing machines, dishwashers, and kitchen or utility sinks. It does not include wastewater from a toilet or urinal.

**Generator** -- Any person that generates any type of reclaimed water for a use regulated under RCW 90.46 and WAC 173-219. A generator may also be a distributor or a user.

**Nonpotable** -- Water that is not approved by state or local health authorities as being safe for human consumption.

**Potable water or drinking water** -- Water that is approved under WAC 246-290 or WAC 246-291 as being safe for human consumption.

**Reclaimed water** -- Water derived in any part from a wastewater with a domestic wastewater component that has been adequately and reliably treated to meet the requirements of WAC 173-219, so that it can be used for beneficial purposes. Reclaimed water is not considered a wastewater.

**Source water** -- Water entering the reclaimed water treatment facility or unit processes from which Class A or Class B reclaimed water is generated. Source water generally refers to the effluent from a domestic wastewater treatment facility that meets or exceeds secondary treatment standards defined in WAC 173-221.

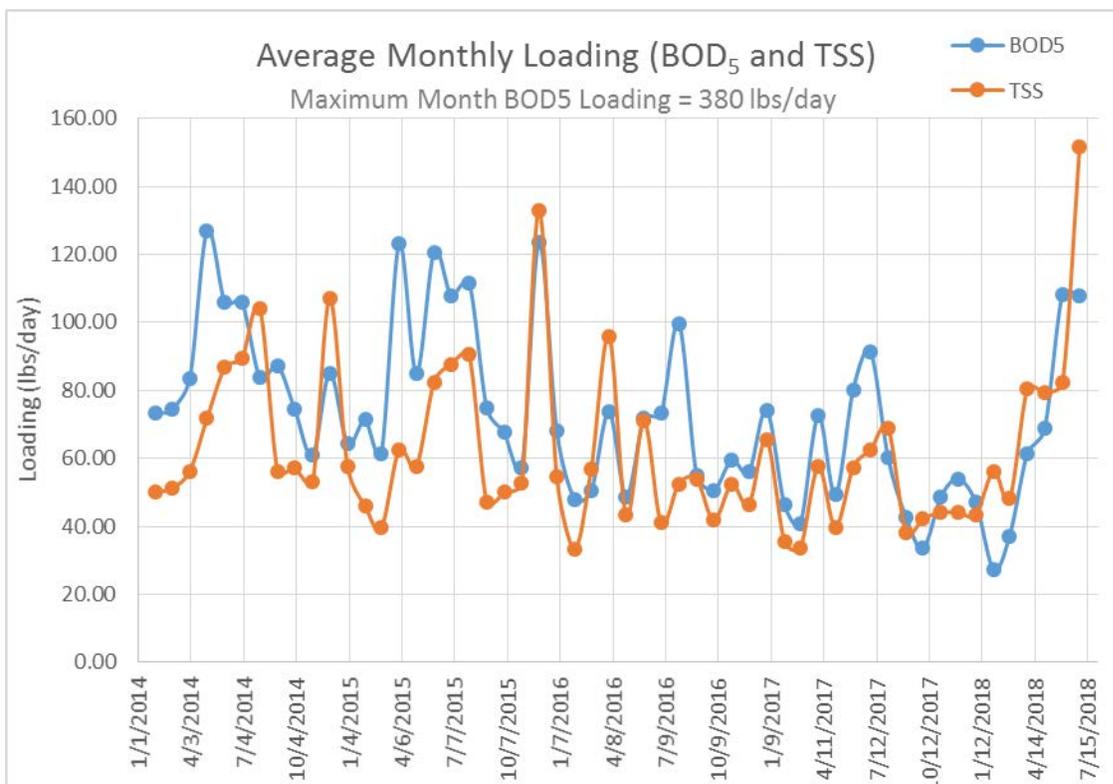
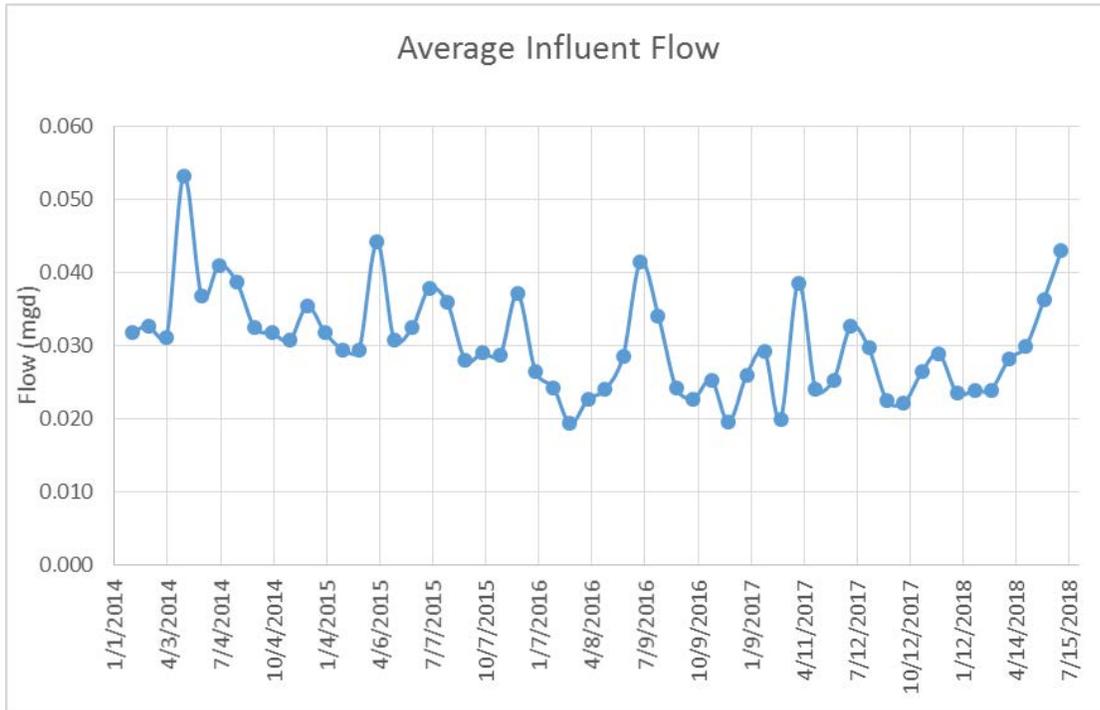
**Use** -- Application of reclaimed water in a manner and for a purpose, as designated in a permit or use agreement, and in compliance with all applicable requirements of the permit and WAC 173-219.

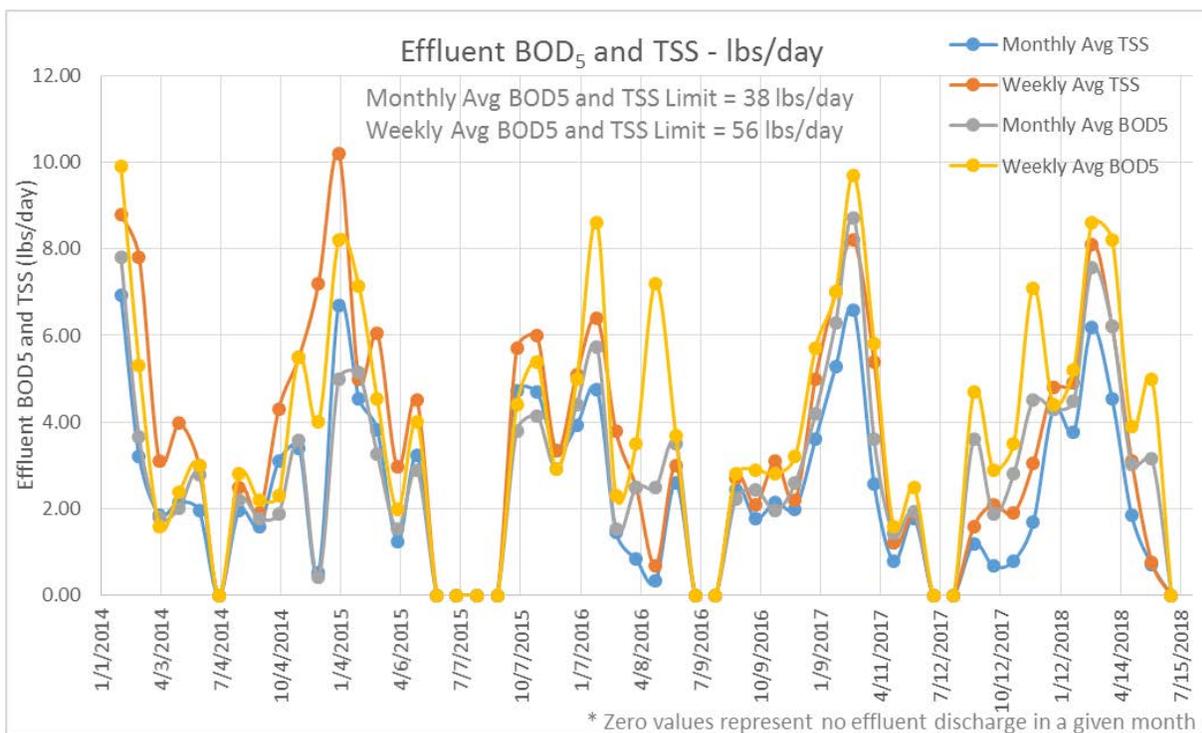
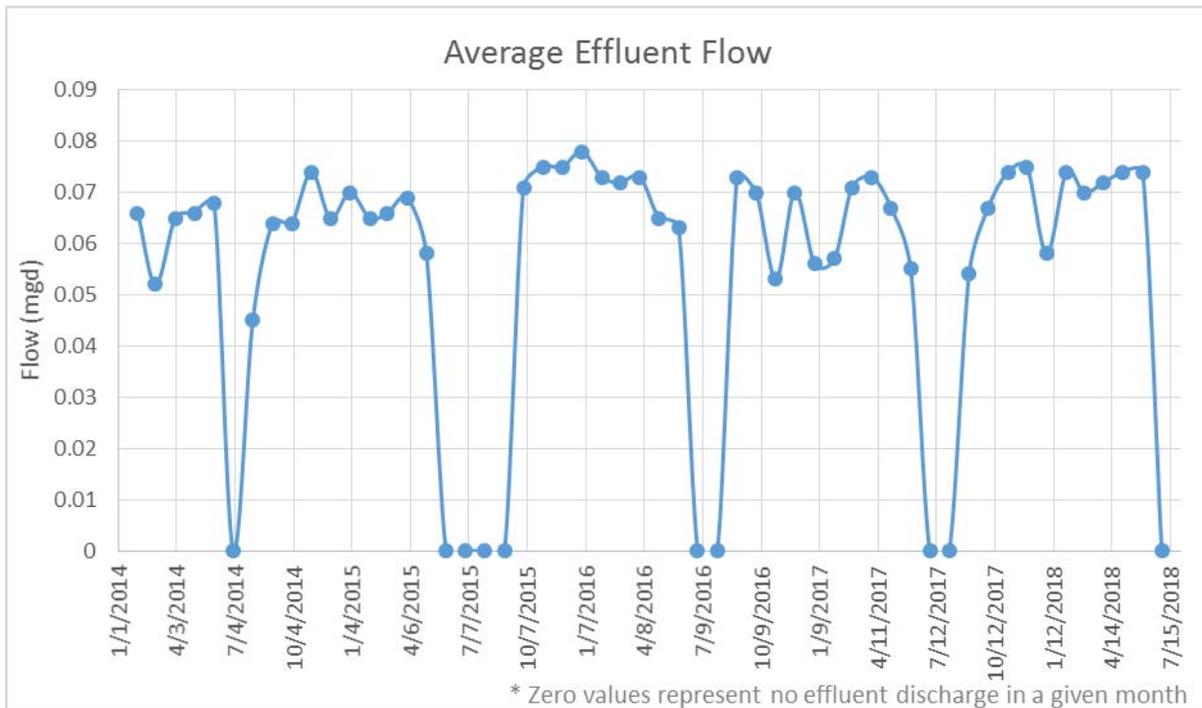
**Use agreement** -- An agreement or contract between the generator and the distributor or user, or between the distributor and user, that identifies terms and conditions for reclaimed water distribution and use to ensure compliance with the reclaimed water permit conditions.

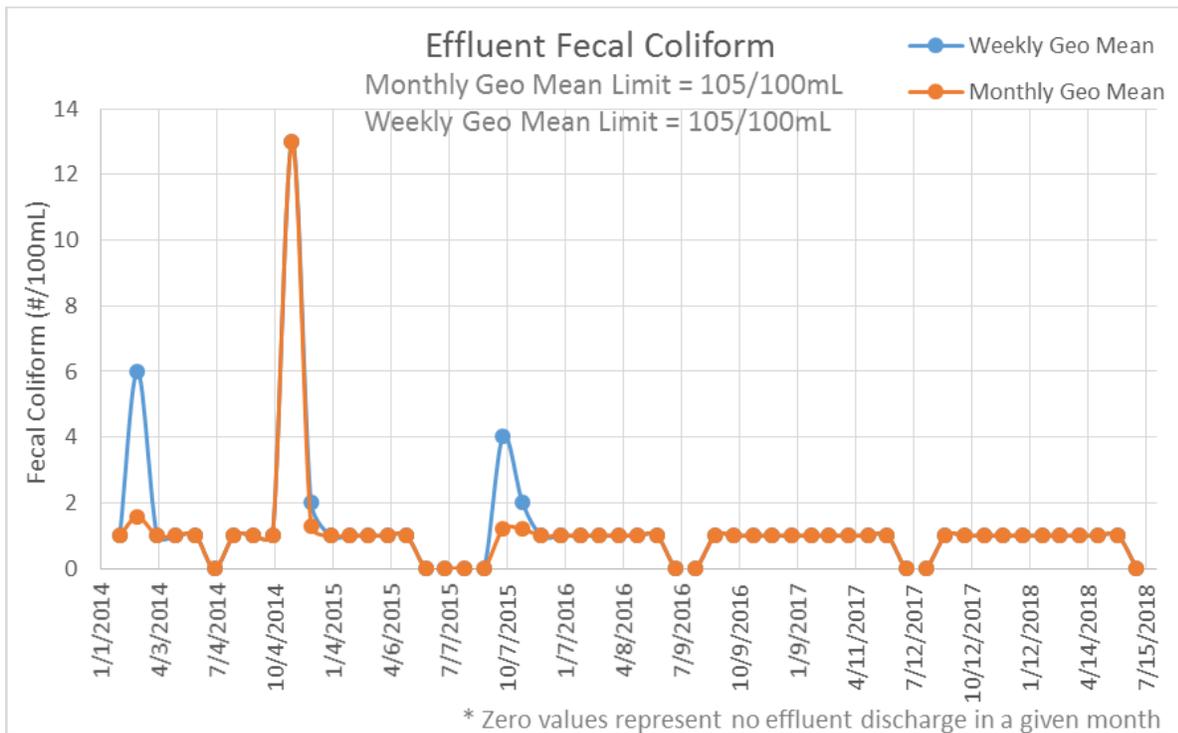
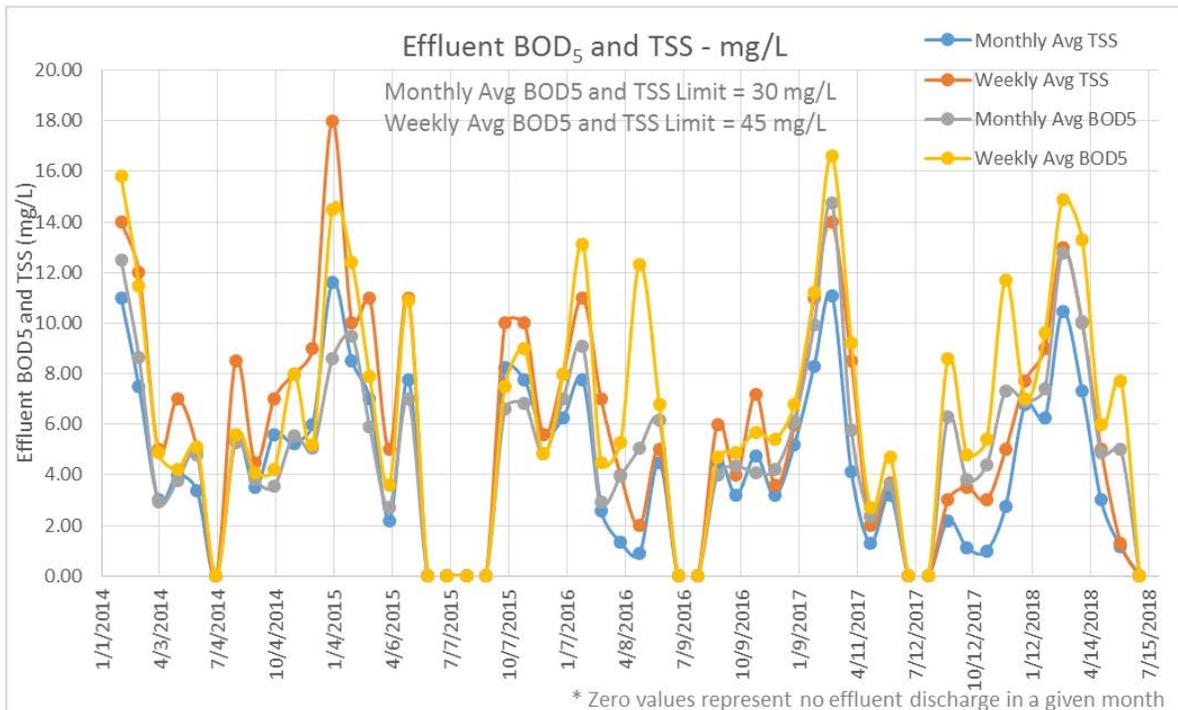
**Use area** -- Any facility, building, or land area, surface water, or groundwater identified in the use agreement as the location where reclaimed water is beneficially used.

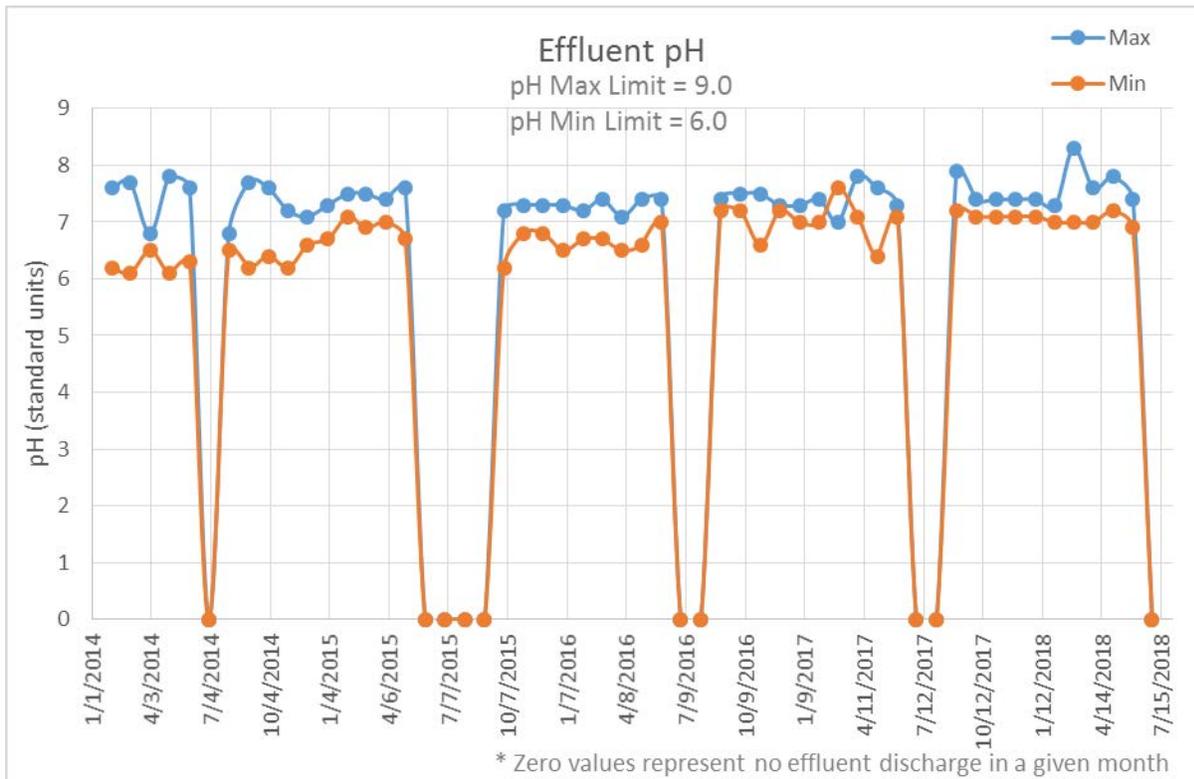
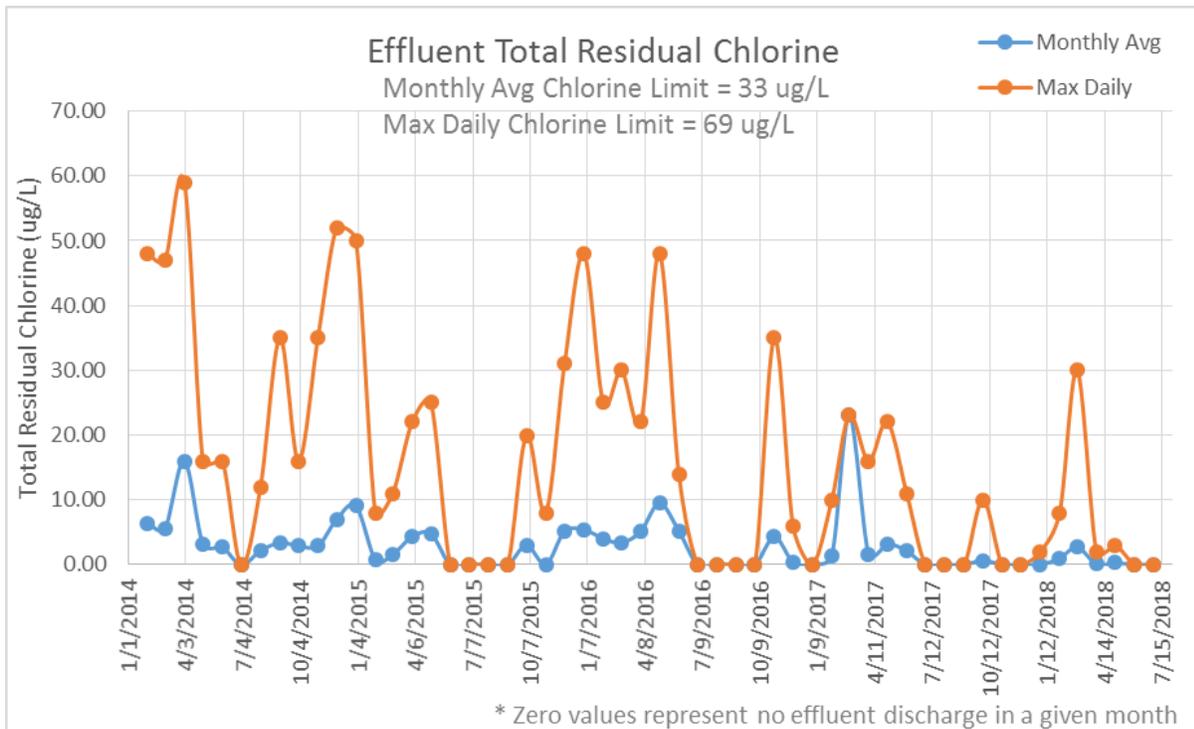
**User** -- Any person who uses reclaimed water under an agreement with a reclaimed water generator or distributor.

### Appendix D - Data and Technical Calculations









Several of the Excel® spreadsheet tools used to evaluate a discharger's ability to meet Washington State water quality standards can be found in the [PermitCalc workbook](#), located under the 'Permit Development Resources' tab, on Ecology's webpage at <https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance>.

### 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:

$$C_{mz} = Ca + \frac{(Ce - Ca)}{DF}$$

where: Ce = Effluent Concentration  
Ca = Ambient Concentration  
DF = Dilution Factor

### 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).

### Calculation of Fecal Coliform at Chronic Mixing Zone

INPUT	
Chronic Dilution Factor	7.5
Receiving Water Fecal Coliform, #/100 ml	0
Effluent Fecal Coliform - worst case, #/100 ml	105
Surface Water Criteria, #/100 ml	14
OUTPUT	
Fecal Coliform at Mixing Zone Boundary, #/100 ml	14
Difference between mixed and ambient, #/100 ml	14

**Conclusion: At design flow, the discharge has no reasonable potential to violate water quality standards for fecal coliform.**

### 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-

INPUT	
1. Receiving Water Temperature, deg C (90th percentile):	24.0
2. Receiving Water pH, (90th percentile):	7.7
3. Receiving Water Salinity, g/kg (10th percentile):	0.77
4. Pressure, atm (EPA criteria assumes 1 atm):	1.0
5. Unionized ammonia criteria (mg un-ionized NH <sub>3</sub> 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):	0.015
2. pKa8 at 25 deg C (Whitfield model "B"):	9.247
3. Percent of Total Ammonia Present as Unionized:	2.6%
4. Total Ammonia Criteria (mg/L as <u>NH<sub>3</sub></u> ):	
Acute:	8.98
Chronic:	1.35
RESULTS	
Total Ammonia Criteria (mg/L as <u>N</u> )	
Acute:	7.38
Chronic:	1.11

### 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. The Water Quality temperature guidance document may be found at: <http://www.ecy.wa.gov/biblio/0610100.html>

INPUT	May-Sep	Oct-Apr
1. Chronic Dilution Factor at Mixing Zone Boundary	7.5	7.5
2. Annual max 1DADMax Ambient Temperature (Background 90th percentile)	24.0 °C	24.0 °C
3. 1DADMax Effluent Temperature (95th percentile)	18.95 °C	3.95 °C
4. Aquatic Life Temperature WQ Criterion	16.0 °C	16.0 °C
OUTPUT		
5. Temperature at Chronic Mixing Zone Boundary:	23.33 °C	21.33 °C
6. Incremental Temperature Increase or decrease:	-0.67 °C	-2.67 °C
7. Incremental Temperature Increase $12/(T-2)$ if $T \leq \text{crit}$	---	---
8. Maximum Allowable Temperature at Mixing Zone Boundary:	24.30 °C	24.30 °C
<b>A. If ambient temp is warmer than WQ criterion</b>		
9. Does temp fall within this warmer temp range?	YES	YES
10. Temp increase allowed at mixing zone boundary, if required:	NO LIMIT	NO LIMIT
<b>B. If ambient temp is cooler than WQ criterion but within <math>12/(T_{\text{amb}}-2)</math> and within 0.3 °C of the criterion</b>		
11. Does temp fall within this incremental temp. range?	---	---
12. Temp increase allowed at mixing zone boundary, if required:	---	---
<b>C. If ambient temp is cooler than (WQ criterion-0.3) but within <math>12/(T_{\text{amb}}-2)</math> of the criterion</b>		
13. Does temp fall within this Incremental temp. range?	---	---
14. Temp increase allowed at mixing zone boundary, if required:	---	---
<b>D. If ambient temp is cooler than (WQ criterion - <math>12/(T_{\text{amb}}-2)</math>)</b>		
15. Does temp fall within this Incremental temp. range?	---	---
16. Temp increase allowed at mixing zone boundary, if required:	---	---
RESULTS		
17. Do any of the above cells show a temp increase?	NO	NO
18. Temperature Limit if Required?	NO LIMIT	NO LIMIT

**Calculation of BOD<sub>5</sub> Oxidation with Temperature Adjustment**

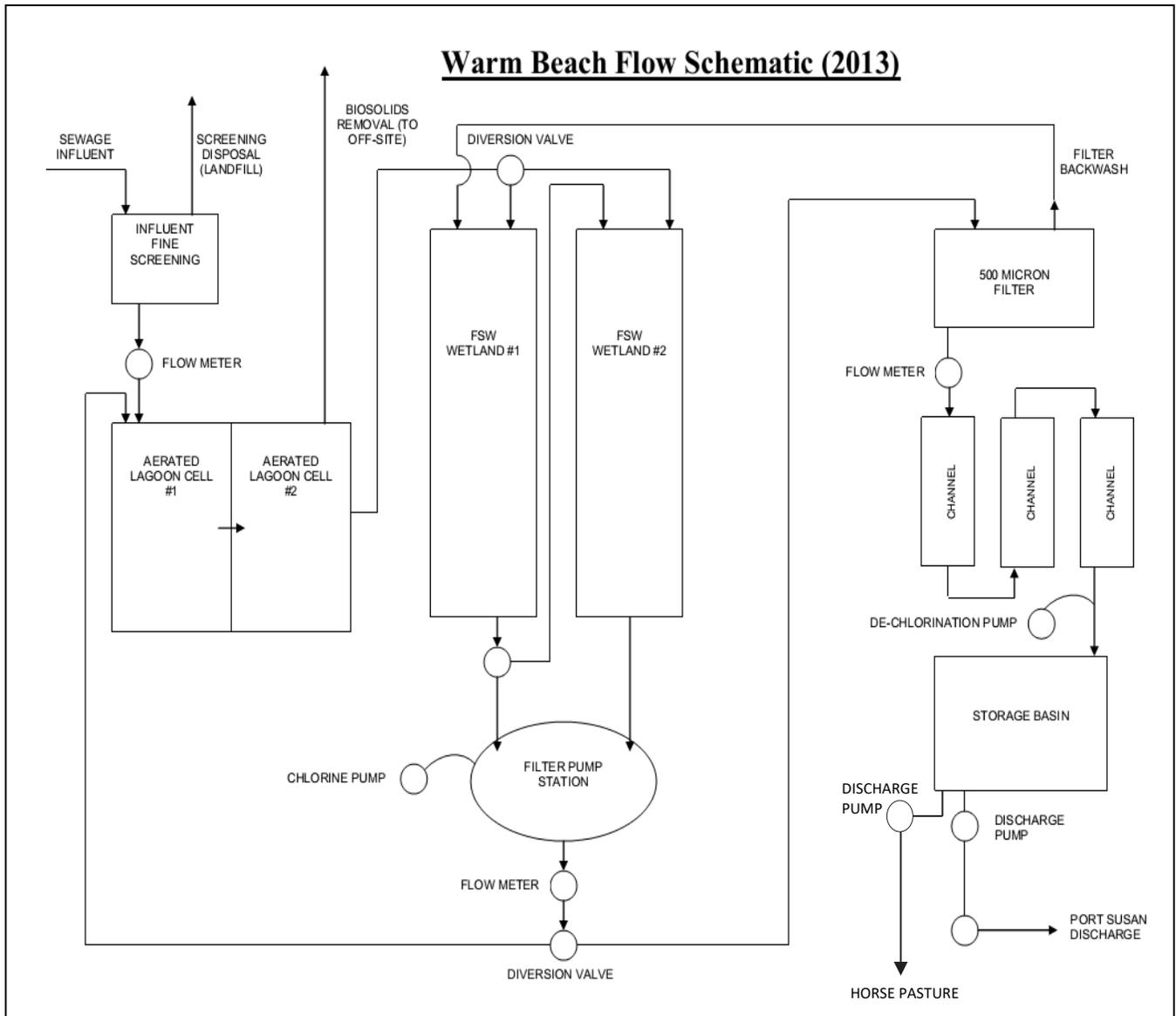
INPUT	
Effluent BOD <sub>5</sub> (mg/L)	45
Effluent Dissolved Oxygen (DO) (mg/L)	7.5
Receiving Water Temperature (deg C)	26
Receiving Water DO (mg/L)	6.8
DO WQ Standards (mg/L)	6
Chronic Mixing Dilution Factor	7.5
Time for effluent to travel from outfall to chronic mixing boundary (days)	0.016
Oxidation rate of BOD, base e at 20 deg C, k <sub>1</sub> (day <sup>-1</sup> )*	0.23
OUTPUT	
Effluent Ultimate BOD (mg/L)	65.85
Oxidation rate of BOD at ambient temperature, base e (day <sup>-1</sup> )	0.30
BOD oxidized between outfall and chronic mixing zone (mg/L)	0.32
RESULTS	
DO at chronic mixing zone	6.85
Difference between ambient DO and DO at chronic mixing boundary	-0.05
<b>There is no reasonable potential of not meeting the DO criteria under these conditions.</b>	

Pollutant, CAS No. & NPDES Application Ref. No.		AMMONIA, Criteria as Total NH3	CHLORINE (Total Residual) 7782505
<b>Effluent Data</b>	# of Samples (n)	3	960
	Coeff of Variation (Cv)	0.6	2.6
	Effluent Concentration, ug/L (Max. or 95th Percentile)	390	17.35
	Calculated 50th percentile Effluent Conc. (when n>10)		
<b>Receiving Water Data</b>	90th Percentile Conc., ug/L	0.14	0
	Geo Mean, ug/L		
<b>Water Quality Criteria</b>	Aquatic Life Criteria, Acute ug/L	7,385	13
	Chronic	1,109	7.5
	WQ Criteria for Protection of Human Health, ug/L	-	-
	Metal Criteria Acute Translator, decimal	-	-
	Chronic	-	-
Carcinogen?	N	N	

Aquatic Life Reasonable Potential			
Effluent percentile value		0.950	0.950
s	$s^2 = \ln(CV^2 + 1)$	0.555	1.431
Pn	$Pn = (1 - \text{confidence level})^{1/n}$	0.368	0.997
Multiplier		3.00	1.00
Max concentration (ug/L) at edge of...	Acute	221	3.274
	Chronic	156	2.313
Reasonable Potential? Limit Required?		NO	NO

## Appendix E - Warm Beach WWTP Diagrams

Figure 3: Warm Beach WWTP Process Flow Diagram





## **Appendix F - Response to Comments**

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