

Fact Sheet for NPDES Permit No. WA0021130

Granite Falls Wastewater Treatment Plant

Permit Effective Date: August 1, 2020

Purpose of this fact sheet

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

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

Ecology makes the draft permit and fact sheet available for public review and comment at least thirty (30) days before issuing the final permit. Copies of the fact sheet and draft permit for the Granite Falls WWTP, NPDES permit No. WA0021130, are available for public review and comment from April 17, 2020 until May 18, 2020. For more details on preparing and filing comments about these documents, please see **Appendix A - Public Involvement Information**.

City of Granite Falls 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 summarized substantive comments and provided responses to them. Ecology included the summary and responses to comments in this fact sheet as **Appendix G - Response to Comments**, and published it when issuing the final NPDES permit. Ecology generally does not revise the rest of the fact sheet. The full document becomes part of the legal history contained in the facility's permit file.

Summary

The City of Granite Falls owns, operates and maintains an oxidation ditch wastewater treatment plant that discharges to the Pilchuck River. Ecology issued the previous permit for this facility on April 15, 2015.

The proposed permit contains the same effluent limits for biochemical oxygen demand (5-day) (BOD₅), total suspended solids (TSS), fecal coliform bacteria (monthly geometric mean), and pH as the previous permit. The proposed permit changes the monitoring frequency for effluent soluble reactive phosphorus (SRP) from twice per year to three per week during the dry season (June through September). The rationale behind the increased monitoring frequency for SRP is to assure that Ecology has a large enough sample size to allow the computation of an average monthly limit in the next permit cycle. Ecology is currently finalizing the Pilchuck Temperature and Dissolved Oxygen Study, which establishes a waste load allocation (WLA) of 0.31 lbs SRP per day during the dry season. The proposed permit also changes the statistical basis of the fecal coliform limit from weekly geometric mean to maximum daily due to a reasonable potential for fecal coliform to violate the single-sample water quality criterion for the Pilchuck River.

Table of Contents

Fact Sheet for NPDES Permit No. WA0021130	1
I. Introduction.....	4
II. Background Information.....	5
A. Facility description	6
B. Description of the receiving water.....	9
C. Wastewater influent characterization	10
D. Wastewater effluent characterization	11
E. Summary of compliance with previous permit issued.....	12
F. State environmental policy act (SEPA) compliance	12
III. Proposed Permit Limits	13
A. Design criteria	13
B. Technology-based effluent limits.....	14
C. Surface water quality-based effluent limits.....	15
D. Designated uses and surface water quality criteria	23
E. Water quality impairments	25
F. Evaluation of surface water quality-based effluent limits for narrative criteria	25
G. Evaluation of surface water quality-based effluent limits for numeric criteria.....	26
H. Human health.....	31
I. Sediment quality	32
J. Whole effluent toxicity.....	32
K. Groundwater quality limits	33
L. Comparison of effluent limits with the previous permit issued on April 15, 2015..	33
IV. Monitoring Requirements	33
A. Wastewater monitoring	34
B. Lab accreditation.....	35
VI. Other Permit Conditions.....	36
A. Reporting and record keeping.....	36
B. Prevention of facility overloading	36
C. Operation and maintenance	36
D. Pretreatment.....	36
E. Solid wastes.....	38
F. Compliance schedule	38
G. General conditions	39
VII. Permit Issuance Procedures.....	39
A. Permit modifications.....	39
B. Proposed permit issuance.....	40
VIII. References for Text and Appendices	41
Appendix A — Public Involvement Information.....	43
Appendix B — Your Right to Appeal	44
Appendix C — Glossary.....	45
Appendix D — Technical Calculations.....	53

Appendix E – Granite Falls WWTP Process Flow Diagram	59
Appendix F – Granite Falls WWTP Data	60
Appendix G — Response to Comments	69

I. Introduction

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

- The following regulations apply to domestic wastewater NPDES permits:
- Procedures Ecology follows for issuing NPDES permits ([Chapter 173-220 WAC](#))
- Technical criteria for discharges from municipal wastewater treatment facilities ([Chapter 173-221 WAC](#))
- Water quality criteria for surface waters ([Chapter 173-201A WAC](#))
- Water quality criteria for groundwaters ([Chapter 173-200 WAC](#))
- Whole effluent toxicity testing and limits ([Chapter 173-205 WAC](#))
- Sediment management standards ([Chapter 173-204 WAC](#))
- Submission of plans and reports for construction of wastewater facilities ([Chapter 173-240 WAC](#))

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

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

II. Background Information

Table 1 - Facility Information

Applicant	City of Granite Falls
Facility Name and Address	Granite Falls Wastewater Treatment Plant 500 West Wallace Street Granite Falls, WA 98252
Contact at Facility	Lyle Bjornson, WWTP Supervisor Phone: 360-691-7432
Responsible Official	Matthew Hartman, Mayor 215 S. Granite Avenue PO Box 1440 Granite Falls, WA 98252 Phone: 360-691-6441
Type of Treatment	Activated Sludge (Oxidation Ditch)
Facility Location (NAD83/WGS84 reference datum)	Latitude: 48.079029 Longitude: -121.975724
Discharge Waterbody Name and Location (NAD83/WGS84 reference datum)	<u>Pilchuck River</u> Latitude: 48.076228 Longitude: -121.97831

Table 2 - Permit Status

Issuance Date of Previous Permit	April 15, 2015
Application for Permit Renewal Submittal Date	November 1, 2019
Date of Ecology Acceptance of Application	November 21, 2019

Table 3 - Inspection Status

Date of Last Non-sampling Inspection Date	September 29, 2017
---	--------------------

Figure 1 - Facility Location Map



(Illustration only, not to scale)

A. Facility description

History

The City of Granite Falls constructed the wastewater treatment plant in 1983 to provide secondary treatment for the city's domestic wastewater. Granite Falls added a composting facility in 1992 to allow more consistent control of sludge wasting. Plant improvements constructed in 2003 and 2004 included a bioselector, mixers in the oxidation ditch, splitter box, additional secondary clarifier, return activated sludge (RAS) and waste activated sludge (WAS) pumps, effluent reaeration/cooling tank, ultraviolet disinfection, and a mechanical fine screen to replace the comminutor unit.

In 2008, Granite Falls completed the Phase IIA treatment plant expansion, consisting of another secondary clarifier, a second UV bank, and an alkalinity addition system. The entire 18-foot section of the diffuser and all laterals were replaced in August 2009. The City completed an electrical system improvement project in 2014. It included a new generator, automatic transfer switch, motor control center sections, and a more powerful electrical service. This project did not alter the treatment plant process or capacity.

Collection system status

The collection system consists of approximately 36,000 linear feet of gravity sewers, 152 manholes, 11 clean outs, two pump stations, and 3,764 linear feet of force main. The collection system serves a residential population of approximately 3,340 people through about 1,200 sewer accounts or 1,340 equivalent residential units (ERUs).

Infiltration and inflow remains an ongoing concern. Granite Falls smoke tested its system in 1982, 1987, 1990, and 2004, and completed an Infiltration/Inflow (I&I) study in June 2005. In recent years, Granite Falls has repaired 25 leaking or damaged manholes and installed a “Smart Cover” monitoring system to detect high water levels and blockages in the collection system. These projects have significantly reduced wet weather flows into the treatment plant. In 2013 and 2015, the City completed a number of I&I reduction projects. Flows during the wet weather season have been reduced by 55,000 gallons/day and the 2019 I/I evaluation showed that I/I is not excessive.

The City continues to conduct weekly video camera pipe inspections and static leak isolation testing. Smoke tests were completed in 2016 in the entire collection system and no issues were detected.

The City is facing rapid population growth in recent years, and it is anticipated that significant development could occur and push against the 85 percent influent capacity threshold. In 2017, the City completed a Facility Capacity Evaluation and it was determined that the existing influent TSS loading limit should be increased from 823 pounds/day (lbs/day) to 1,109 lbs/day to adequately accommodate the population growth observed and minimize the risk of permit triggers or violations. The capacity evaluation was approved by Ecology on August 7, 2017. In 2018, the City completed a wastewater facility plan that addresses population growth, infiltration/inflow, treatment process deficiencies and biosolids management. This plan was approved by Ecology on November 30, 2018.

The City’s fats, oils, and grease (FOG) Program has been drafted; however, it has not yet been implemented. The purpose of the program is to reduce the volume of oil and grease dumped into the collection system. Although local restaurants are equipped with FOG traps, the plant receives significant volume of FOG on a regular basis.

Treatment processes

Wastewater influent flows through two parallel nonaerated grit channels, a Parshall flume for influent flow measurement, a perforated mechanical screen (0.25-inch opening), and a manually raked bar rack. Degritted and screened wastewater flows by gravity to a bioselector equipped with mechanical mixer to blend return activated sludge (RAS) and screened influent wastewater from the headworks. The primary purpose of the biological selector is to create a condition that favors the growth of floc-forming bacteria, suppress growth of filamentous bacteria that may cause sludge bulking and produce readily available carbon for the activated sludge.

Bioselector effluent flows by gravity to the oxidation ditch equipped with two brush aerators and two mechanical submersible mixers. Aerators are turned OFF for two hours and mixers are turned ON for two hours to provide good mixing while aerators are OFF.

Mixers and aerators are controlled automatically by a timer. Typical mixed liquor concentration in the oxidation ditch is 3,000 mg/L, which generally produces a sludge with good settling characteristics and effluent quality without exceeding the oxygen transfer capacity of the brush aerators. Operators waste solids as necessary to maintain a relatively constant solids concentration in the oxidation ditch.

Oxidation ditch effluent flows through a splitter box to uniformly distribute flow from the oxidation ditch to each secondary clarifier equipped with spiral sludge scraper, peripheral scum collection system, and return and waste activated sludge pumping systems. Effluent is cooled and aerated in the old chlorine contact chamber, which is outfitted with three floating aerators. One clarifier is capable of handling flows during summer months. During the wet weather season, the second clarifier is placed in service.

Secondary clarifier effluent is disinfected by low-pressure high-intensity UV system. The UV system consists of two banks with two modules each for a total of 24 lamps. Disinfected effluent is discharged to the Pilchuck River.

Appendix E includes a schematic process flow diagram of the Granite Falls WWTP.

Operator certification

Chapter 70.95B RCW requires an operator certified by Washington State to operate domestic wastewater treatment facilities. Chapter 173-219-250 WAC extends this requirement to operators of reclaimed water facilities. Guidance in Ecology's Permit Writer's Manual and WAC 173-230 classify the treatment system at the City of Granite Falls WWTP as a Class II 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 II operator. An operator certified for at least a Group I facility must be in charge of each scheduled shift at the facility.

Granite Falls WWTP is staffed with three licensed operators and one operator in training: Lyle Bjornson (Group 2), Chuck White (Group 2), Charles White, Jr. (Group 1), and Darren Jackson (OIT). WWTP is staffed 7 days a week as follows:

- Monday through Friday from 6:30 a.m. to 3:00 p.m.
- Weekends and holidays from 7:30 a.m. to 10:30 a.m.

Solid wastes/Residual Solids

The treatment facilities remove solids during the treatment of the wastewater at the headworks (grit and screenings), and at the secondary clarifiers, in addition to incidental solids (rags, scum, and other debris) removed as part of the routine maintenance of the equipment. Grit, rags, and screenings are drained and disposed of as solid waste at the local landfill.

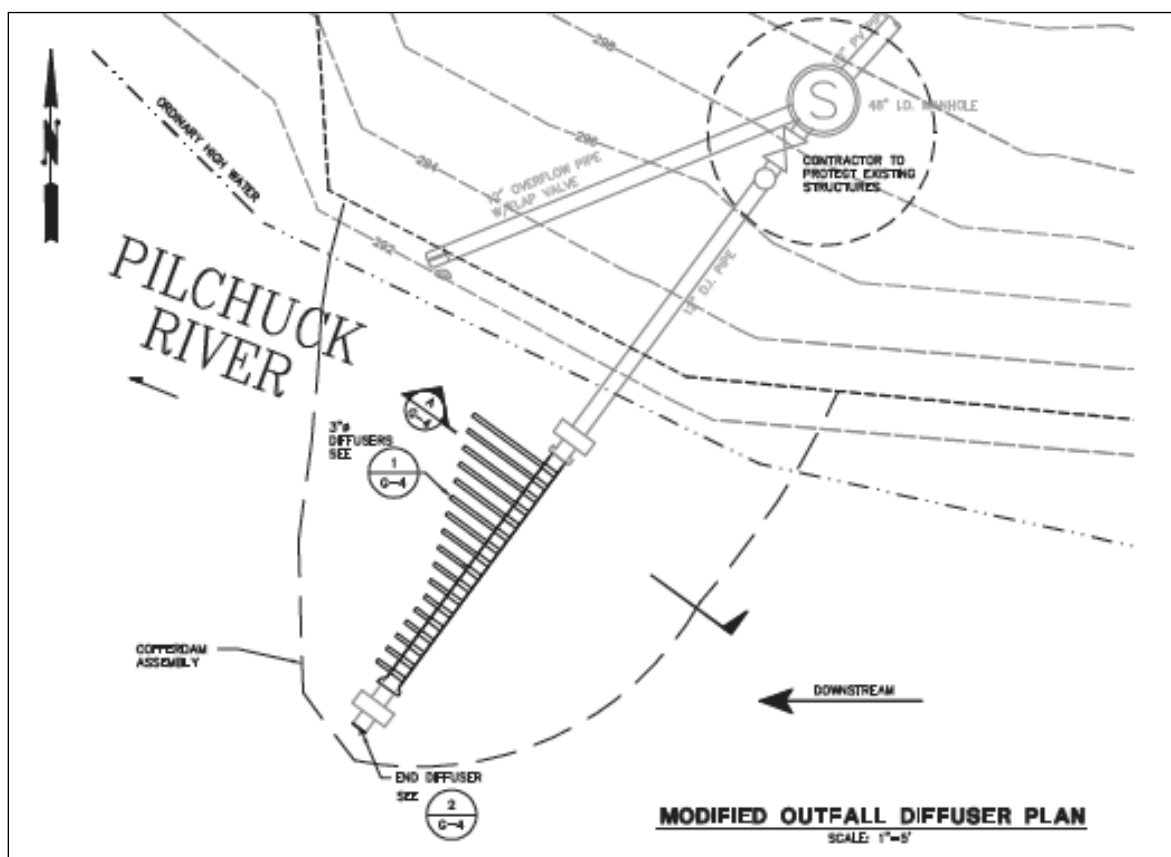
Waste activated sludge is pumped to a 20,000 gallon storage tank. Stored sludge is dewatered to approximately 10 to 12 percent solids concentration by three Somat screw presses arranged in series. The dewatered sludge is mixed with bark, woodchips, and sawdust and then composted on site using an aerated static pile process to produce Class A compost. The Class A compost is donated to local residents and farms.

The dewatering system operates approximately 7.5 hours/day, 4 days/week (Monday-Thursday) and occasionally on Friday and Saturday for 2 ~ 3 hours.

Discharge outfall

Secondary treated and disinfected effluent flows into the Pilchuck River through an outfall diffuser section buried approximately one foot below the bottom of the river bed. The entire 18-foot section of the diffuser and all laterals were replaced in August 2009. The diffuser consists of an 18-foot section of ductile iron pipe with eighteen (18) 3-inch diffusers spaced 12 inches apart. The diffusers are buried and extend approximately 6 inches up from the river bed with the discharge directed downstream. Figure 2 below shows the outfall diffuser plan.

Figure 2 - Granite Falls WWTP Outfall Layout



B. Description of the receiving water

Granite Falls WWTP effluent discharges to the Pilchuck River. The Pilchuck River originates approximately 15 miles southeast of Granite Falls on the western slopes of the Cascade Mountains. The river flows northwesterly toward Granite Falls, then flows southwesterly to join the Snohomish River southeast of the City of Snohomish.

No other point source outfalls are nearby. Non-point sources of pollutants in the immediate area include runoff from developed areas, agriculture, logging, and gravel mining.

The ambient background data used for this permit includes the following from Ecology monitoring station 07B120 – Pilchuck River @ Robe-Menzel Road (temperature, pH, DO, ammonia, fecal coliform, TSS and turbidity) and *Effluent and Receiving Water Study* written by Gray & Osborne, Inc., 2004 (hardness, copper and zinc).

Table 4 - Ambient Background Data

Parameter	Value Used
Temperature (highest annual 7-DADMax)	22.4°C
pH (Maximum / Minimum)	8.2 / 7.2 standard units
pH (90 th percentile)	8.1 standard units
Dissolved Oxygen (10 th percentile)	10.56 mg/L
Total Ammonia-N	0.01 mg/L
Fecal Coliform (Average)	37.7/100 mL
Total Suspended Solids (90 th percentile)	38.2 mg/L
Turbidity (Maximum)	16 NTU
Hardness (average in critical season)	36 mg/L as CaCO ₃
Copper (dissolved)	0.9 µg/L*
Zinc (dissolved)	0.0 µg/L (below detection level)
<p>*Note: Background value is the geometric mean of the sample results multiplied by 1.74. This estimates the 90th percentile of a lognormal distribution with a coefficient of variation (CV) of 0.6.</p>	

C. Wastewater influent characterization

The Permittee reported the concentration of influent pollutants in discharge monitoring reports. The tabulated data represents the quality of the wastewater influent from May 2015 through November 2019. The influent wastewater is characterized as follows:

Table 5 - Wastewater Influent Characterization

Parameter	Units	Average of Average Monthly Value	Maximum of Average Monthly Value
Flow	MGD	0.29	0.53
BOD ₅	mg/L	215	361
BOD ₅	lbs/day	502	911
TSS	mg/L	202	333
TSS	lbs/day	462	662

D. Wastewater effluent characterization

The Permittee 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 May 2015 through November 2019. The wastewater effluent is characterized as follows:

Table 6 - Wastewater Effluent Characterization

Parameter	Units	Average of Average Monthly Value	Maximum of Average Monthly Value
BOD ₅	mg/L	7.2	13.0
BOD ₅	lbs/day	17.4	48.7
TSS	mg/L	8.9	18.7
TSS	lbs/day	21.5	50.3

Parameter	Units	Average Value	Maximum Value
Ammonia	mg/L as N	1.27	5.39
Nitrate + Nitrite	mg/L as N	9.78	17.7
TKN	mg/L as N	3.75	7.72
Soluble Reactive Phosphorus	mg/ as P	2.44	4.85
Total Phosphorus	mg/L as P	2.48	4.78
Dissolved oxygen	mg/L	5.7	8
Temperature (summer)	° C	20.3	22.6
Temperature (winter)	° C	11.2	16.5
Hardness	mg/L as CaCO ₃	105.5	172
Copper (total)	µg/L	6.5	11.7
Zinc	µg/L	42.4	67.8

Parameter	Units	50th Percentile
Copper (total)	µg/L	6.8
Zinc	µg/L	43.0

Parameter	Units	Maximum Monthly Geometric Mean	Maximum Weekly Geometric Mean
Fecal Coliforms	#/100 mL	112.0	220.0

Parameter	Units	Minimum Value	Maximum Value
pH	standard units	6.0	7.8

E. Summary of compliance with previous permit issued

The previous permit placed effluent limits on biochemical oxygen demand (BOD₅), total suspended solids (TSS), fecal coliform bacteria, and pH.

Granite Falls WWTP has consistently complied with the effluent limits and permit conditions throughout the duration of the permit issued on April 15, 2015, with the exception of a failure to report a fecal coliform analysis on December 1, 2017 and late submittal of the NPDES application. Ecology assessed compliance based on its review of the facility's discharge monitoring reports (DMRs) and on inspections.

The following table summarizes the violations and permit triggers that occurred during the permit term. Permit triggers are not violations but rather when triggered require the permit holder to take an action defined in the permit or may function simply as a warning.

Table 7 - Violations/Permit Triggers

Begin	Parameter	Statistical Base	Units	Value	Limit	Violation
12/1/17	Fecal Coliform	-	#/100 mL	-	-	Analysis not Conducted
2/1/18	Flow	Average	MGD	0.525	0.472 (85% design flow) 0.555 (design flow)	Permit Trigger

Submittal Name	Due Date	Received Date	Violation
Permit Renewal Application	11/1/19	11/18/19	Late submittal

F. State environmental policy act (SEPA) compliance

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

III. Proposed Permit Limits

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

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

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

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

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 "*Phase 2A Expansion Plans and Specifications (2006)*" and "*Wastewater Capacity Evaluation (2017)*" prepared by Gray & Osborne, Inc. The table below includes design criteria from the referenced reports.

The aforementioned wastewater capacity evaluation determined that the existing influent TSS loading limit should be increased from 823 pounds/day (lbs/day) to 1,109 lbs/day to adequately accommodate the population growth observed and minimize the risk of permit triggers or violations. The capacity evaluation was approved by Ecology on August 7, 2017.

Table 8 - Design Criteria for Granite Falls WWTP

Parameter	Design Criteria
Maximum Month Design Flow (MMDf)	0.555 MGD
BOD ₅ Loading for Maximum Month	1,109 lbs/day
TSS Loading for Maximum Month	1,109 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 BOD₅, TSS, fecal coliform, and pH, as listed in [Chapter 173-221 WAC](#). Section III.F of this fact sheet describes the potential for water quality-based limits.

Table 9 - Technology-based Limits

Parameter	Average Monthly Limit	Average Weekly Limit
BOD ₅ (concentration)	30 mg/L	45 mg/L

BOD₅ (concentration): In addition, the BOD₅ effluent concentration must not exceed fifteen percent (15%) of the average influent concentration.

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

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

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

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

Technology-based mass limits are based on [WAC 173-220-130\(3\)\(b\)](#) and [WAC 173-221-030\(11\)\(b\)](#). Ecology calculated the monthly and weekly average mass limits for BOD₅ 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)

CF = Conversion factor of 8.34

Table 10 - Technology-based Mass Limits

Parameter	Concentration Limit (mg/L)	Mass Limit (lbs/day)
BOD ₅ Monthly Average	30	139
BOD ₅ Weekly Average	45	208
TSS Monthly Average	30	139
TSS Weekly Average	45	208

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\(1\)](#); 2016) limit the toxic, radioactive, or other deleterious material concentrations that the facility may discharge to levels below those which have the potential to:

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

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

Antidegradation

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

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

Tier I ensures existing and designated uses are maintained and protected and applies to all waters and all sources of pollutions. Tier II ensures that waters of a higher quality than the criteria assigned are not degraded unless such lowering of water quality is necessary and in the overriding public interest. Tier II applies only to a specific list of polluting activities. Tier III prevents the degradation of waters formally listed as "outstanding resource waters," and applies to all sources of pollution.

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

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

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

- Dischargers must maintain and protect existing and designated uses. Ecology must not allow any degradation that will interfere with, or become injurious to, existing or designated uses, except as provided for in [Chapter 173-201A WAC](#).

Facility Specific Requirements — Ecology determined that this facility must meet Tier II requirements. A Tier II analysis focuses on evaluating feasible alternatives that would eliminate or significantly reduce the level of degradation. The analysis also includes a review of the benefits and costs associated with the lowering of water quality. New discharges and facility expansions are prohibited from lowering water quality without providing overriding public benefits.

The “*2018 City of Granite Wastewater Facility Plan*” discusses minor and major treatment process improvements, and expansion to accommodate adequate wastewater treatment through the planning period (2018 – 2038). The preferred improvement alternative to address treatment deficiencies and population growth combines biological and chemical phosphorus removal technologies. Specifically, the selected alternative comprises of the addition of two oxidation ditches and polyaluminum chloride chemical feed system.

Only new or **expanded** actions are potentially eligible for a Tier II analysis. “New” means facilities that are just being built or actions first initiated. “Expanded” means:

1. A physical expansion of the facility (production or wastewater system expansions with a potential to allow an increase the volume of wastewater or the amount of pollution) or activity.
2. An increase (either monthly average or annual average) to an existing permitted concentration or permitted effluent mass limit (loading) to a water body greater than 10%. The City has experienced rapid population growth in recent years and this is expected to continue through 2038 with an estimated population of 8,482. Projected wastewater flows follow the population growth trend.
3. The act of re-rating the capacity of an existing plant greater than 10%.

Therefore, the proposed permit requires the City of Granite Falls to submit a Tier II Antidegradation Analysis of the planned treatment plant expansion for Ecology’s review.

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 Granite Falls 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’s [Permit Writer’s Manual](#) describes additional guidance on criteria/design conditions for determining dilution factors. The manual can be obtained from Ecology’s website at: <https://fortress.wa.gov/ecy/publications/documents/92109.pdf>.

Table 11 - Critical Conditions Used to Model the Discharge

Critical Condition	Value
The seven-day-average low river flow with a recurrence interval of ten years (7Q10)	30.3 cfs
River depth at the 7Q10 period	1.5 feet
River velocity	0.67 ft/sec
Manning roughness coefficient	0.033

Critical Condition	Value
Channel width	30 feet
Maximum average monthly effluent flow for chronic and human health non-carcinogen	0.284 – 0.865 MGD
Annual average flow for human health carcinogen	0.29 MGD
Maximum daily flow for acute mixing zone	0.325 – 1.357 MGD
Maximum monthly average effluent temperature	17.55 °C

Ecology obtained ambient data at critical conditions from the Granite Falls Wastewater Facilities Plan (2006), prepared by Gray & Osborne, Inc.

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.

Starting on January 1, 2021, the recreational water quality criteria for bacteria will change to *E. coli* for freshwater. In addition, all waterbodies will become designated for primary contact recreation. No change to the indicator will occur during this permit cycle as a site-specific correlation between fecal coliform and *E. coli* needs to be developed. Ecology will reevaluate bacteria limits for this discharge during the next permit development period.

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. 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 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 exceeds the maximum size restriction on width. Granite Falls' outfall, originally constructed in the 1980s and reconstructed in August 2009, consists of eighteen diffuser ports spread over a distance of eighteen feet. Eighteen feet is greater than 25 percent of the width of the Pilchuck River at low flow.

Exceptions to the numeric size criteria for mixing zones are allowed by WAC 173-201A-400(12) in cases where the discharge existed prior to November 24, 1992. Before such an exception may be allowed, it must clearly be demonstrated that:

- AKART appropriate to the discharge is being fully applied;
- All siting, technological, and managerial options which would result in full or significantly closer compliance that are economically achievable are being utilized; and
- Supporting information clearly indicates the mixing zone would not have a reasonable potential to cause a loss of sensitive or important habitat, substantially interfere with the existing or characteristic uses of the water body, result in damage to the ecosystem, or adversely affect public health as determined by Ecology.

Ecology concluded that this discharge meets the requirements for an exception to the rule that the mixing zone must occupy less than 25% of the river width. Ecology based this decision on the following:

- AKART is appropriately applied to the discharge. [Chapter 173-221 WAC](#) defines AKART (all known, available, and reasonable methods of treatment) for domestic wastewater facilities as effluent limits for the parameters of BOD, TSS, pH, and fecal coliform. Ecology has included these limits in permits for Granite Falls since 1983. Recent upgrades to the treatment plant have improved its effluent quality by eliminating the use of chlorine for disinfection, and by adding alkalinity to improve pH, nitrification and reduce metals toxicity.
- All siting, technological, and managerial options which would result in full or significantly closer compliance that are economically achievable are being utilized. Granite Falls has made improvements to the treatment plant, as described above. Additionally, the discharge now has no reasonable potential to exceed the metals water quality criteria using dilution factors calculated with the 25% and the 2.5% flow limits. When Granite Falls adds alkalinity (magnesium hydroxide), it increases the hardness in the effluent and therefore within the mixing zone. Because water quality criteria for metals are based on hardness, the metals concentrations in the mixed effluent and receiving water do not exceed the criteria. Therefore, Ecology applied the stricter dilution factors for metals in the proposed permit. As indicated earlier in this fact sheet, Granite Falls has reconstructed the outfall diffuser in the same location.

- Supporting information clearly indicates the mixing zone would not have a reasonable potential to cause a loss of sensitive or important habitat, substantially interfere with the existing or characteristic uses of the water body, result in damage to the ecosystem, or adversely affect public health as determined by Ecology. Ecology relies primarily on compliance with the water quality standards to assure that discharges do not interfere with beneficial uses including salmonid migration. There is no reasonable potential for water quality standards to be violated outside the area needed for mixing with 2.5% of the river flow at critical conditions for acute aquatic-life standards or 25% of flow for chronic standards. In addition, whole effluent toxicity testing has shown no toxicity to sensitive test organisms.

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 volume fraction 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](#). The tables included below summarize the criteria applicable to the receiving water's designated uses.

- Aquatic Life Uses are designated based on the presence of, or the intent to provide protection for the key uses. All indigenous fish and non-fish aquatic species must be protected in waters of the state in addition to the key species.

The Aquatic Life Uses for this receiving water are identified below.

Freshwater Aquatic Life Uses and Associated Criteria

Table 12 - Core Summer Salmonid Habitat (Applies June 16 – September 30)

Criteria	Limit
Temperature Criteria – Highest 7-DAD MAX	16°C (60.8°F)
Dissolved Oxygen Criteria	9.5 mg/L
Turbidity Criteria	<ul style="list-style-type: none"> 5 NTU over background when the background is 50 NTU or less; or A 10 percent increase in turbidity when the background turbidity is more than 50 NTU.
Total Dissolved Gas Criteria	Total dissolved gas must not exceed 110 percent of saturation at any point of sample collection.
pH Criteria	The pH must measure within the range of 6.5 to 8.5, with a human-caused variation within the above range of less than 0.2 units.

Table 13 - Salmon and Trout Spawning (Applies February 15 – June 15) (Applies seasonally as described in Ecology Publication 06 10-038)

Criteria	Limit
Temperature Criteria – Highest 7-DAD MAX	13°C (55.4°F)

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 100 colonies /100 mL.
Primary Contact Recreation (effective 1/1/2021)	E. coli organism levels must not exceed a geometric mean value of 100 CFU or MPN per 100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained within the averaging period exceeding 320 CFU or MPN per 100 mL.

- The *water supply uses* are domestic, agricultural, industrial, and stock watering.
- The *miscellaneous freshwater uses* are wildlife habitat, harvesting, commerce and navigation, boating, and aesthetics.

E. Water quality impairments

The Pilchuck River is listed on the current 303(d) and is impaired for pH, temperature, dissolved oxygen (DO) and bacteria. Ecology has recently drafted a Total Maximum Daily Load (TMDL) Analysis for the Pilchuck River and it highlights the implications for the Granite Falls WWTP. A water quality model of the Pilchuck River has predicted that temperature is naturally above and DO levels are naturally below the criterion assigned in the water quality standards (16°C and 9.5 mg/L, respectively) during critical warm conditions. The naturally elevated temperatures and naturally depressed DO levels severely limit the available capacity for human caused impacts to temperature and DO. Specifically, the analysis shows that human impacts currently elevate the river by more than 0.3°C and deplete DO by more than 0.2 mg/L.

The BOD loadings from the Granite Falls WWTP have a relatively smaller impact on DO in the Pilchuck River, compared to phosphorus loadings. However, the TMDL must still set limits to be protective of water quality standards.

The draft TMDL assigns the Granite Falls WWTP the following: a) tiered temperature WLAs based on effluent flows from May 1 through September 30; b) a daily soluble reactive phosphorus WLA of 0.31 lbs/day from June 1 through September 30; c) and BOD₅ load of 139 lbs/day from June 1 through September 30. The TMDL report is expected to be submitted to EPA by late 2020. Both WLAs will become effective in the next permit cycle. Further details on the timeline for the City of Granite Falls to comply with the established WLAs is presented in the Compliance Schedule section.

Ecology has also completed a TMDL Analysis for fecal coliform bacteria for tributaries to the Snohomish River, including the Pilchuck River (Ecology Publication Number 00-10-087, June 2001). The Granite Falls WWTP outfall is located in the Pilchuck River and the facility is the only municipal wastewater treatment point source discharging to the Snohomish River tributaries. The location of the treatment plant discharge is approximately six miles upstream of the uppermost Pilchuck River segment on the 303(d) list. This section of the Pilchuck River has been meeting water quality standards for fecal coliform bacteria and is therefore not on the 303(d) list.

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

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

The outfall consists of an 18-foot section of ductile iron pipe with eighteen (18) 3-inch diffusers spaced 12 inches apart, all on the same side of the pipe with the exception of one diffuser at the end of the pipe. The diffusers are buried and extend approximately 6 inches up from the river bed with the discharge directed downstream.

Chronic Mixing Zone — [WAC 173-201A-400\(7\)\(a\)](#) specifies that mixing zones must not extend in a downstream direction from the discharge ports for a distance greater than 300 feet plus the depth of water over the discharge ports or extend upstream for a distance of over 100 feet, not utilize greater than 25% of the flow, and not occupy greater than 25% of the width of the water body.

Granite Falls WWTP's outfall consists of eighteen diffuser ports spread over a distance of eighteen feet. Eighteen feet is greater than 25% of the width of the Pilchuck River at low flow. Ecology concluded that this discharge is eligible for an exception to the rule that the mixing zone width must be less than 25% of river width. Reasons for this exception are provided in the Mixing Zones section above.

The chronic dilution factor is more restrictive when calculated using 25% of the river flow than when using centerline dilution factor determined by the hydraulic mixing model. Therefore, Ecology calculated the dilution factors described below using the volumetric flow method.

Acute Mixing Zone — [WAC 173-201A-400\(8\)\(a\)](#) specifies that in rivers and streams a zone where acute toxics criteria may be exceeded must not extend beyond 10% of the distance towards the upstream and downstream boundaries of the chronic zone, not use greater than 2.5% of the flow and not occupy greater than 25% of the width of the water body.

The acute dilution factor is more restrictive when calculated using 2.5% of the river flow than when using centerline dilution factor determined by the hydraulic mixing model.

Therefore, Ecology calculated the dilution factors described below using the volumetric flow method.

Ecology determined the dilution factors (DF) that occur within these zones at the critical condition using the equation:

$$DF = \frac{(Q_{amb} + Q_e)}{Q_e}$$

where Q_{amb} is the receiving (ambient) water flow rate (2.5% or 25% of 7Q10) and Q_e is the effluent flow rate. The dilution factors are listed below.

Table 15 - Dilution Factors (DF)

Criteria	DF	Flows Used in Calculations	
		Ambient Flow	Effluent Flow
Aquatic Life – Acute	2.0	2.5% of 30.3 cfs 7Q10 flow	0.474 MGD (0.733 cfs) highest daily flow during July–October, 2015– 2019
Aquatic Life – Chronic	16.8	25% of 30.3 cfs 7Q10 flow	0.309 MGD (0.478 cfs) highest monthly average during July– October, 2015–2019
Human Health, Carcinogen	86.2	25% of 154 cfs harmonic mean flow	0.292 MGD (0.473 cfs) Average flow, 2015- 2019
Human Health, Non-carcinogen	21.8	25% of 39.8 cfs 30Q5 flow	0.309 MGD (0.452 cfs) highest monthly average during July– October, 2015–2019

Ecology determined the impacts of dissolved oxygen deficiency, pH, fecal coliform, ammonia, metals 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.

Dissolved Oxygen — BOD₅ and Ammonia Effects — Natural decomposition of organic material in wastewater effluent impacts dissolved oxygen in the receiving water at distances far outside of the regulated mixing zone. The BOD₅ 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.

The draft TMDL, referenced in the Water Quality Impairment section, is based off the BOD₅ loading limits in the current NPDES permit, applied seasonally from June to September. The TMDL sets a WLA of BOD₅ load of 139 lbs. This WLA is intended to be reflected in the permit as a monthly average, which matches the proposed technology-based effluent limit for BOD₅.

The draft TMDL does not set specific limits for nitrogenous BOD (NBOD), via ammonia or total kjeldahl nitrogen (TKN) loading, nor carbonaceous BOD (CBOD). The NBOD and CBOD are expected to be controlled through management of the overall BOD loading. Based on recent effluent data, TKN concentrations generally do not exceed 5 mg/L, which translates to an ultimate NBOD of approximately 23 mg/L. The model suggests this level of NBOD has a very small impact on DO in the Pilchuck River.

Based on historical operating data, BOD₅ concentrations generally do not exceed 15 mg/L, which translates to an ultimate BOD of about 48 mg/L based on a decomposition rate of 0.075 per day, which is typical for activated sludge treatment. At 2038 dry season design effluent flow, a BOD₅ of 139 lbs/day translates to a concentration of 36.5 mg/L BOD₅, or an ultimate BOD of 116.5 mg/L. This suggests that if the current treatment is expanded, it should be able to continue to meet this BOD₅ WLA in 2038.

pH – Ecology limits pH to a range of 6.0 to 9.0 for most discharges. The discharge of effluent outside this range generally indicates spills or treatment plant upset. Ecology does not have sufficient data to model the effect of effluent pH on the receiving water using the calculations from EPA, 1988. However, modeling of freshwater discharges is usually unnecessary unless the effluent pH is above 8 and the receiving water is poorly buffered or the volume of the discharge is very large. Therefore, the proposed permit includes technology-based effluent limits for pH.

Data Collection Required: Ecology does not have sufficient information on the alkalinity of the receiving water to determine compliance with water quality criteria for pH. The proposed permit also requires the Granite Falls WWTP to monitor effluent and receiving water temperature and report the results to Ecology.

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 16.8.

Under 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 400 organisms/100 mL (maximum daily limit). When Ecology computed the fecal coliform limit using the technology-based limit of 400 organisms/100 mL and the surface water criteria 50 organisms/100 mL (geometric mean), the model predicted reasonable potential to violate water quality standards. However, when Ecology computed the fecal coliform limit using the surface water criterion 100 organisms/100 mL (single sample), there was no reasonable potential to violate water quality standards (See **Appendix D**). Therefore, the proposed permit includes a water quality-based effluent limit of 400 organisms/100 mL as a maximum daily limit.

During this permit term, the water quality fecal coliform bacteria criterion will change from fecal coliform to *E. Coli*. 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 (December 31, 2020) of the existing fecal coliform recreational standard. Because the proposed permit limits are protective of the current water quality criteria and the transition is a change in bacterial indicator not more or less stringent than the current standards, the effluent limits will remain unchanged throughout the duration of the permit term. Dual indicator monitoring will be a part of this permit so that a site-specific correlation can be developed during the permit cycle. Ecology will use this data to assess the reasonable potential to exceed the applicable water quality criterion in the next iteration of this permit.

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: ammonia, copper, and zinc. 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 and pH in the receiving freshwater. To evaluate ammonia toxicity, Ecology used the available receiving water information for ambient station 07B120 – Pilchuck River @ Robe-Menzel Road, and Ecology spreadsheet tools.

Valid ambient background data were available for ammonia, copper, and zinc. Ecology used all applicable data to evaluate reasonable potential for this discharge to cause a violation of water quality standards.

Ecology determined that ammonia, copper, and zinc 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.

The reasonable potential calculations for copper and zinc are based on an effluent total hardness of 105.5 mg/L as CaCO₃. Maintaining this hardness in the effluent requires the use of an alkalinity addition system at the treatment plant.

Temperature — The state temperature standards [[WAC 173-201A](#), [WAC 173-201A-200](#), [WAC 173-201A-600](#), and [WAC 173-201A-602](#)] 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\(1\)\(c\)](#)], and [WAC 173-201A-602, 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\(1\)\(c\)\(i\)-\(ii\)](#)]. 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 99th 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

Annual summer maximum, supplementary spawning criterion, and incremental warming criteria: Ecology calculated the reasonable potential for the discharge to exceed the annual summer maximum, the supplementary spawning criterion, and the incremental warming criteria.

The discharge is only allowed to warm the water by a defined increment when the background (ambient) temperature is cooler or warmer than the assigned threshold criterion. Ecology allows warming increments only when they do not cause temperatures to exceed either the annual maximum or supplemental spawning criteria.

The incremental increase for this discharge is within the allowable amount. Therefore, the proposed permit does not include a temperature limit.

The water quality model (draft TMDL) predicts that temperatures naturally increase above the numeric criteria under the warmest conditions (May 1 – September 30) and sets temperature WLAs based on effluent flows. These WLAs will be required and further detailed in the next permit cycle.

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 effluent contains chemicals of concern for human health, based on data or information reported in priority pollutant testing that indicate regulated chemicals occur in the discharge. The pollutants of concern for human health are copper and zinc.

Ecology evaluated the discharge's potential to violate the water quality standards as required by [40 CFR 122.44\(d\)](#) by following the procedures published in the [Technical Support Document for Water Quality-Based Toxics Control \(EPA/505/2-90-001\)](#) and Ecology's *Permit Writer's Manual* to make a reasonable potential determination. The evaluation showed that the discharge has no reasonable potential to cause a violation of water quality standards, and an effluent limit is not needed.

I. Sediment quality

The aquatic sediment standards ([Chapter 173-204 WAC](#)) protect aquatic biota and human health. Under these standards Ecology may require a facility to evaluate the potential for its discharge to cause a violation of sediment standards ([WAC 173-204-400](#)). You can [obtain additional information about sediments](#) at the Aquatic Lands Cleanup Unit website 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.

- *Acute toxicity tests measure mortality as the significant response* to the toxicity of the effluent. Dischargers who monitor their wastewater with acute toxicity tests find early indications of any potential lethal effect of the effluent on organisms in the receiving water.
- *Chronic toxicity tests measure various sublethal toxic responses*, such as reduced growth or reproduction. Chronic toxicity tests often involve either a complete life cycle test on an organism with an extremely short life cycle, or a partial life cycle test during a critical stage of a test organism's life. Some chronic toxicity tests also measure organism survival.

WET testing conducted during the previous two permit terms (2008/2009 and 2013/2014) showed no reasonable potential for effluent discharges to cause receiving water acute or chronic toxicity. The proposed permit will not include an acute or chronic WET limit. In addition, Ecology has determined that the Permittee has not made any changes to the facility which would trigger an additional effluent characterization pursuant to [WAC 173-205-060](#). 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 further WET testing. Ecology may require additional WET testing in the future if it receives information indicating that toxicity may be present in this effluent.

If this facility makes process or material changes which, in Ecology's opinion, increase the potential for effluent toxicity, then Ecology may (in a regulatory order, by permit modification, or in the permit renewal) require the facility to conduct additional effluent characterization.

Ecology may also review this requirement after the completion of improvements and expansion projects described in the “2018 City of Granite Falls Wastewater Facilities Plan”.

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](#)).

Granite Falls 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 April 15, 2015

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 ₅	Technology	30 mg/L 139 lbs/day	45 mg/L 208 lbs/day	No change	No change
TSS	Technology	30 mg/L 139 lbs/day	45 mg/L 208 lbs/day	No change	No change

Parameter	Basis of Limit	Monthly Geometric Mean Limit	Weekly Geometric Mean Limit	Monthly Geometric Mean Limit	Maximum Daily
Fecal Coliform Bacteria	Technology/WQ	200/100 mL	400/100 mL	No change	400/100 mL

Parameter	Basis of Limit	Limit	Limit
pH	Technology	6.0 – 9.0	No change

IV. Monitoring Requirements

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

If a facility uses a contract laboratory to monitor wastewater, it must ensure that the laboratory uses the methods and meets or exceeds the method detection levels required by the permit. The permit describes when facilities may use alternative methods. It also describes what to do in certain situations when the laboratory encounters matrix effects.

When a facility uses an alternative method as allowed by the permit, it must report the test method, detection level (DL), and quantitation level (QL) on the discharge monitoring report or in the required report.

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 a 0.555 MGD oxidation ditch wastewater treatment facility.

Ecology has included some additional monitoring of nutrients in the proposed permit to establish a baseline for this discharger. It will use this data in the future as it develops TMDLs for dissolved oxygen and establishes WLAs for nutrients. Specifically, Ecology has increased the monitoring frequency of soluble reactive phosphorus from 2/year to 3/week during the dry season (June through September). The draft TMDL establishes a WLA (maximum daily limit) for SRP for discharges occurring during this critical season and SRP data from this period is required to calculate the average monthly limit. According to federal NPDES regulations, all permit limits must be expressed as both average monthly and maximum daily limits.

The proposed permit also includes 1/week effluent alkalinity monitoring throughout the permit cycle. Currently, Ecology does not have any alkalinity data to model the effect of effluent pH on the Pilchuck River. This information necessary to determine whether the effluent pH has a reasonable potential to cause a violation of the water quality standards. Alkalinity analyses must be performed by an accredited laboratory per requirements of the [Chapter 173-50 WAC](#).

Additional Effluent Temperature Monitoring:

In the Draft TMDL report, Ecology discusses one key factor that challenge the ability of evaluating whether the Granite Falls WWTP can comply with the proposed temperature wasteload allocations, as follows:

- The facility monitors effluent temperature immediately after UV disinfection and not at or near the point of discharge to the Pilchuck River.

In 2012, continuous temperature monitoring at the overflow junction near the outfall to the Pilchuck River showed consistently cooler temperatures compared to measurements at the facility. Based on current effluent temperatures and 2038 effluent flows, it appears the facility would likely meet the T_{NPDES} limits, without any additional cooling measures. Although limited by the factors mentioned above, a preliminary relationship between the two monitoring points was developed based on the 2012 data and applied to recent temperature monitoring results at the facility to test the feasibility of the TMDL limits. The cooling factor was only applied when the effluent temperatures were above 18°C.

Therefore, the proposed permit requires temperature monitoring at the facility and towards the end of the outfall pipe to confirm this relationship and determine a future point of compliance. Specifically, Ecology requires continuous temperature monitoring during the dry season (May 1 – September 30) for the entire duration of this permit cycle. If a strong correlation can be established between the two monitoring points and the substantial cooling pattern is confirmed, then it would be appropriate for the permit to increase the daily maximum limit, using the relationship between the two points, and apply it to the current temperature monitoring point.

E. Coli Monitoring:

On January 1, 2021, the new water contact recreation use criteria will become effective. The new criteria will require changing bacterial indicators for protecting primary contact recreation activities. For fresh waters, the new bacterial indicator will be E. Coli. In order to make an efficient transition from the current fecal coliform-based criteria to the new criteria bacterial indicator (E. Coli), the proposed permit requires quarterly E. Coli monitoring during the last two years of this permit cycle. The purpose of the dual monitoring (fecal coliform and E. Coli) is twofold: a) to develop a site-specific correlation between the two indicators and b) to assure that the City can reliably meet the new criteria if there is ever a change made to the TMDL.

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. 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 17 - Accredited Parameters

Parameter Name	Category	Method Name	Matrix Description
Hardness, Total	General Chemistry	SM 2340 C-2011	Non-Potable Water
Solids, Total Suspended	General Chemistry	SM 2540 D-2011	Non-Potable Water
pH	General Chemistry	SM 4500-H+ B-2011	Non-Potable Water
Biochemical Oxygen Demand (BOD)	General Chemistry	SM 5210 B-2011	Non-Potable Water
Fecal coliform-count	Microbiology	SM 9222 D (m-FC)-06	Non-Potable Water

VI. Other Permit Conditions

A. Reporting and record keeping

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

B. Prevention of facility overloading

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

If a municipality intends to apply for Ecology-administered funding for the design or construction of a facility project, the plan must meet the standard of a “Facility Plan”, as defined in [WAC 173-98-030](#). A complete “Facility Plan” includes all elements of an “Engineering Report” along with State Environmental Review Process (SERP) documentation to demonstrate compliance with [40 CFR 35.3140](#) and [40 CFR 35.3145](#), and a cost effectiveness analysis as required by [WAC 173-98-730](#). The municipality should contact Ecology’s regional office as early as practical before planning a project that may include Ecology-administered funding.

C. Operation and maintenance

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

D. Pretreatment

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 \(f\)\(1\)\(i\)\(iii\)](#)].

Industrial dischargers must obtain a permit from Ecology before discharging waste to the Granite Falls 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.

Industrial user survey update

This provision requires the POTW to submit an updated list of existing and proposed SIUs and PSIUs. This provides Ecology with notice of any new or proposed industrial users in the POTW's service area without a more rigorous “complete” industrial user survey. This level of effort is often sufficient for small municipalities which have not seen any adverse effects potentially attributable to industries, have loadings commensurate with domestic flows, and have a small proportion of industrial flow.

E. Solid wastes

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

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

F. Compliance schedule

The proposed permit includes a compliance schedule for the City of Granite Falls to expand and upgrade its WWTP to meet the wasteload allocations established in the draft TMDL for the Pilchuck River. A water quality model of the Pilchuck River has predicted that temperature is naturally above and dissolved oxygen (DO) levels are naturally below the criterion assigned in the water quality standards (16°C and 9.5 mg/L, respectively) during critical warm conditions. The naturally elevated temperatures and naturally depressed DO levels severely limit the available capacity for human caused impacts to temperature and DO.

The draft TMDL has also determined that the BOD loading from the Granite Falls WWTP has a relatively smaller impact on DO in the Pilchuck River, compared to phosphorus loading. However, the TMDL must still set limits to be protective of water quality standards.

In summary, the draft TMDL assigns the Granite Falls WWTP the following: a) tiered temperature WLAs based on effluent flows from May 1 through September 30; b) a daily soluble reactive phosphorus WLA of 0.31 lbs/day from June 1 through September 30; c) and BOD5 load of 139 lbs/day from June 1 through September 30.

Therefore, the proposed permit requires the City to submit design documents (Plans and Construction Specifications) for Alternative 1A, which is the recommended alternative to assist the City to reliably meet the WLAs requirements aforementioned. On March 11, 2020, the City of Granite Falls communicated to Ecology its decision to pursue Alternative 1A described in the *“2018 City of Granite Falls Wastewater Facilities Plan”*.

Tier II Antidegradation Analysis

The *“2018 City of Granite Falls Wastewater Facilities Plan”* discusses minor and major treatment process improvements, and expansion to accommodate adequate wastewater treatment through the planning period (2018 – 2038). Therefore, the Granite Falls WWTP expansion must undergo a Tier II analysis. Further details on this requirement are presented in the *“Surface Water Quality-based Limits”* section of this fact sheet.

Dual Bacterial Indicators Monitoring

On January 1, 2021, Ecology will adopt a new water contact recreation use criteria, which will require changing bacterial indicators for protecting water contact recreation activities. To facilitate an effective transition from fecal coliform based criteria to E. Coli, Ecology requires dual monitoring (fecal coliform and E. Coli) to assure that the Granite Falls WWTP can efficiently meet the new criteria. The transition period is also intended to provide time for the City to purchase new equipment, incorporate new laboratory methods, conduct training and become accredited for the new bacterial indicator and methods.

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 waters, with sediment quality standards, or with water quality standards for groundwaters, based on new information from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

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

B. Proposed permit issuance

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

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.

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.

- July 2018. [Permit Writer's Manual](https://fortress.wa.gov/ecy/publications/documents/92109.pdf). 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](https://fortress.wa.gov/ecy/publications/summarypages/1110073.html). Publication Number 11-10-073
(<https://fortress.wa.gov/ecy/publications/summarypages/1110073.html>)
- October 2010 (revised). [Water Quality Program Guidance Manual – Procedures to Implement the State's Temperature Standards through NPDES Permits](http://leg.wa.gov/LawsAndAgencyRules/Pages/default.aspx). Publication Number 06-10-100 (<https://fortress.wa.gov/ecy/publications/summarypages/0610100.html>)
- [Laws and Regulations](http://leg.wa.gov/LawsAndAgencyRules/Pages/default.aspx) (<http://leg.wa.gov/LawsAndAgencyRules/Pages/default.aspx>)
- [Permit and Wastewater Related Information](https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance) (<https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance>)
- December 2019. Updated Implications for the City of Granite Falls Wastewater Treatment Plant (WWTP) from the draft TMDL.

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.)

Gray & Osborne, Inc.

2018. *City of Granite Falls Wastewater Facilities Plan*. G & O No. 17560
2017. *City of Granite Falls WWTP Capacity Evaluation*.
2006. *City of Granite Falls, Amendment to Wastewater Facilities Plan*. G & O No. 06603.

2006. *City of Granite Falls Wastewater Facilities Plan*. G & O No. 04739.

2004. *City of Granite Falls Wastewater Treatment Plant Effluent and Receiving Water Study*.
G & O No. 03606.

Appendix A — Public Involvement Information

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

Ecology placed a Public Notice of Draft on April 17, 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:

- Told where copies of the draft permit and fact sheet were available for public evaluation (a local public library, the closest regional or field office, posted on our website).
- Offered to provide the documents in an alternate format to accommodate special needs.
- Asked people to tell us how well the proposed permit would protect the receiving water.
- Invited people to suggest fairer conditions, limits, and requirements for the permit.
- Invited comments on Ecology's determination of compliance with antidegradation rules.
- Urged people to submit their comments, in writing, before the end of the comment period.
- Told how to request a public hearing about the proposed NPDES permit.
- Explained 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, 425-649-7201, or by writing to the address listed below.

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

The primary author of this permit and fact sheet is Lazaro Eleuterio.

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 B1 - Address and Location Information

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

Appendix C — Glossary

1-DMax or 1-day maximum temperature – The highest water temperature reached on any given day. This measure can be obtained using calibrated maximum/minimum thermometers or continuous monitoring probes having sampling intervals of thirty minutes or less.

7-DADMax or 7-day average of the daily maximum temperatures – The arithmetic average of seven consecutive measures of daily maximum temperatures. The 7-DADMax for any individual day is calculated by averaging that day's daily maximum temperature with the daily maximum temperatures of the three days prior and the three days after that date.

Acute toxicity – The lethal effect of a compound on an organism that occurs in a short time period, usually 48 to 96 hours.

AKART – The acronym for “all known, available, and reasonable methods of prevention, control and treatment.” AKART is a technology-based approach to limiting pollutants from wastewater discharges, which requires an engineering judgment and an economic judgment. AKART must be applied to all wastes and contaminants prior to entry into waters of the state in accordance with [RCW 90.48.010](#) and [RCW 90.48.520](#), [WAC 173-200-030\(2\)\(c\)\(ii\)](#), and [WAC 173-216-110\(1\)\(a\)](#).

Alternate point of compliance – An alternative location in the groundwater from the point of compliance where compliance with the groundwater standards is measured. It may be established in the groundwater at locations some distance from the discharge source, up to, but not exceeding the property boundary and is determined on a site specific basis following an AKART analysis. An “early warning value” must be used when an alternate point is established. An alternate point of compliance must be determined and approved in accordance with [WAC 173-200-060\(2\)](#).

Ambient water quality – The existing environmental condition of the water in a receiving water body.

Ammonia – Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Annual average design flow (AADF) – average of the daily flow volumes anticipated to occur over a calendar year.

Average monthly (intermittent) discharge limit – The average of the measured values obtained over a calendar month's time taking into account zero discharge days.

Average monthly discharge limit – The average of the measured values obtained over a calendar month's time.

Background water quality – The concentrations of chemical, physical, biological or radiological constituents or other characteristics in or of groundwater at a particular point in time upgradient of an activity that has not been affected by that activity, [[WAC 173-200-020\(3\)](#)].

Background water quality for any parameter is statistically defined as the 95% upper tolerance interval with a 95% confidence based on at least eight hydraulically upgradient water quality samples. The eight samples are collected over a period of at least one year, with no more than one sample collected during any month in a single calendar year.

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

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

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

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

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

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

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

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

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

Composite sample – A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite" (collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots).

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Method detection level (MDL) – See Detection Limit.

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

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

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

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

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

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

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

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

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

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

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

ALSO GIVEN AS:

The smallest detectable concentration of analyte greater than the Detection Limit (DL) where the accuracy (precision & bias) achieves the objectives of the intended purpose. (Report of the Federal Advisory Committee on Detection and Quantitation Approaches and Uses in Clean Water Act Programs Submitted to the US Environmental Protection Agency December 2007).

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

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

Sample Maximum – No sample may exceed this value.

Significant industrial user (SIU) –

- 1) All industrial users subject to Categorical Pretreatment Standards under [40 CFR 403.6](#) and [40 CFR Chapter I, Subchapter N](#) and;

2) Any other industrial user that: discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling, and boiler blow-down wastewater); contributes a process wastestream that makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority* on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement [in accordance with [40 CFR 403.8\(f\)\(6\)](#)].

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Appendix D — 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](https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance) 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 Water Quality-Based Effluent Limits:

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

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

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

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

where: DF_a = Acute Dilution Factor
 DF_c = Chronic Dilution Factor

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

$$LTA_a = WLA_a \times e^{[0.5\sigma^2 - z\sigma]}$$

where: $\sigma^2 = \ln[CV^2 + 1]$
 $z = 2.326$
 CV = coefficient of variation = std. dev/mean

$$LTA_c = WLA_c \times e^{[0.5\sigma^2 - z\sigma]}$$

where: $\sigma^2 = \ln[(CV^2 \div 4) + 1]$
 $z = 2.326$

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

MDL = Maximum Daily Limit

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

where: $\sigma^2 = \ln[CV^2 + 1]$
 $z = 2.326$ (99th percentile occurrence)
 LTA = Limiting long term average

AML = Average Monthly Limit

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

where: $\sigma^2 = \ln[(CV^2 \div n) + 1]$
 n = number of samples/month
 $z = 1.645$ (95th % occurrence probability)
 LTA = Limiting long term average

Dilution Factors Calculation

Dilution Factor Calculations and Receiving Water Critical Conditions

Step 1: Enter Waterbody Type

Water Body Type	Freshwater
-----------------	------------

Facility Name	Granite Falls WWTP
Receiving Water	Pilchuck River

Step 2: Enter Dilution Factors -OR- Calculate DFs by entering Facility/Receiving Water Flow Data

Do you want to enter dilution factors -or- flow data?	Flow Data
---	-----------

	Annual Average	Max Monthly Average	Daily Max
Facility Flow, MGD	0.292	0.309	0.474
Facility Flow, cfs (calculated)	0.45	0.48	0.73

	Condition	Receiving Water Flow, cfs	Allowable % of river flow	Max Dilution Factor Allowed
<u>Aquatic Life - Acute</u>	7Q10	30.3	0.025	2.0
<u>Aquatic Life - Chronic</u>	7Q10	30.3	0.25	16.8
<u>HH-Non-Carcinogen</u>	30Q5	39.8	0.25	21.8
<u>HH-Carcinogen</u>	Harmonic Mean	154	0.25	86.2
<u>Whole river at 7Q10</u>	7Q10	30.3	1	64.4

Reasonable Potential Calculation

Reasonable Potential Calculation

Facility	Granite Falls WWTP
Water Body Type	Freshwater
Rec. Water Hardness	Acute=70.2, Chronic=40.1 mg/L

Dilution Factors:		
Aquatic Life	Acute	Chronic
Human Health Carcinogenic	2.0	16.8
Human Health Non-Carcinogenic		86.2
		21.8

Pollutant, CAS No. & NPDES Application Ref. No.		AMMONIA, Criteria as Total NH3	COPPER - 744058 6M Hardness dependent	ZINC- 744066 13M hardness dependent								
Effluent Data	# of Samples (n)	16	16	16								
	Coeff of Variation (Cv)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Effluent Concentration, ug/L (Max. or 95th Percentile)	5,390	11.7	67.8								
	Calculated 50th percentile Effluent Conc. (when n>10)		6.8	43								
Receiving Water Data	90th Percentile Conc., ug/L	10	0.9	0								
	Geo Mean, ug/L		0	0								
Water Quality Criteria	Aquatic Life Criteria, ug/L	4,641	12.1898	84.78727								
	Chronic	622	5.20179	48.20884								
	WQ Criteria for Protection of Human Health, ug/L	-	1300	1000								
	Metal Criteria	-	0.66123	0.771607								
	Translator, decimal	-	0.66123	0.771607								
	Carcinogen?	N	N	N								

Aquatic Life Reasonable Potential

Effluent percentile value		0.950	0.950	0.950
s	$s^2 = \ln(CV^2 + 1)$	0.555	0.555	0.555
Pn	$Pn = (1 - \text{confidence level})^{1/n}$	0.829	0.829	0.829
Multiplier		1.47	1.47	1.47
Max concentration (ug/L) at edge of...	Acute	3,900	6.048	37.803
	Chronic	479	1.521	4.562
Reasonable Potential? Limit Required?		NO	NO	NO

Human Health Reasonable Potential

s	$s^2 = \ln(CV^2 + 1)$	0.55451	0.554513
Pn	$Pn = (1 - \text{confidence level})^{1/n}$	0.829	0.829
Multiplier		0.5901	0.590104
Dilution Factor		21.8149	21.8149
Max Conc. at edge of Chronic Zone, ug/L		0.31171	1.97113
Reasonable Potential? Limit Required?		NO	NO

Freshwater Un-ionized Ammonia Criteria Calculation

Based on Chapter 173-201A WAC, amended November 20, 2006

		mixed @ Acute Boundary	mixed @ Chronic Boundary	mixed @ Whole River
INPUT				
1. Receiving Water Temperature (deg C):	22.4	22.5	22.4	22.4
2. Receiving Water pH:	8.1	#DIV/0!	#DIV/0!	#DIV/0!
3. Is salmonid habitat an existing or designated use?	Yes	Yes	Yes	Yes
4. Are non-salmonid early life stages present or absent?	Present	Present	Present	Present
OUTPUT				
Using mixed temp and pH at mixing zone boundaries?	no			
Ratio	13.500	#DIV/0!	#DIV/0!	#DIV/0!
FT	1.400	1.400	1.400	1.400
FPH	1.000	#DIV/0!	#DIV/0!	#DIV/0!
pKa	9.327	9.324	9.327	9.327
Unionized Fraction	0.056	#DIV/0!	#DIV/0!	#DIV/0!
Unionized ammonia NH ₃ criteria (mg/L as NH ₃)				
Acute:	0.316	#DIV/0!	#DIV/0!	#DIV/0!
Chronic:	0.042	#DIV/0!	#DIV/0!	#DIV/0!
RESULTS				
Total ammonia nitrogen criteria (mg/L as N):				
Acute:	4.641	#DIV/0!		#DIV/0!
Chronic:	0.622		#DIV/0!	#DIV/0!

Calculation of Fecal Coliform at Chronic Mixing Zone

INPUT	
Chronic Dilution Factor	16.8
Receiving Water Fecal Coliform, #/100 mL	38
Effluent Fecal Coliform - worst case, #/100 mL	400
Surface Water Criteria, #/100 mL	100
OUTPUT	
Fecal Coliform at Mixing Zone Boundary, #/100 mL	59
Difference between mixed and ambient, #/100 mL	22

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

Calculation of Dissolved Oxygen at Chronic Mixing Zone

INPUT	
Chronic Dilution Factor	16.8
Receiving Water DO Concentration, mg/L	10.6
Effluent DO Concentration, mg/L	5.7
Effluent Immediate DO Demand (IDOD), mg/L	8
Surface Water Criteria, mg/L	9.5
OUTPUT	
DO at Mixing Zone Boundary, mg/L	9.80
DO decrease caused by effluent at chronic boundary, mg/L	0.76

Conclusion: At design flow, the discharge has no reasonable potential to violate water quality standards for dissolved oxygen.

References: EPA/600/6-85/002b and EPA/430/9-82-011



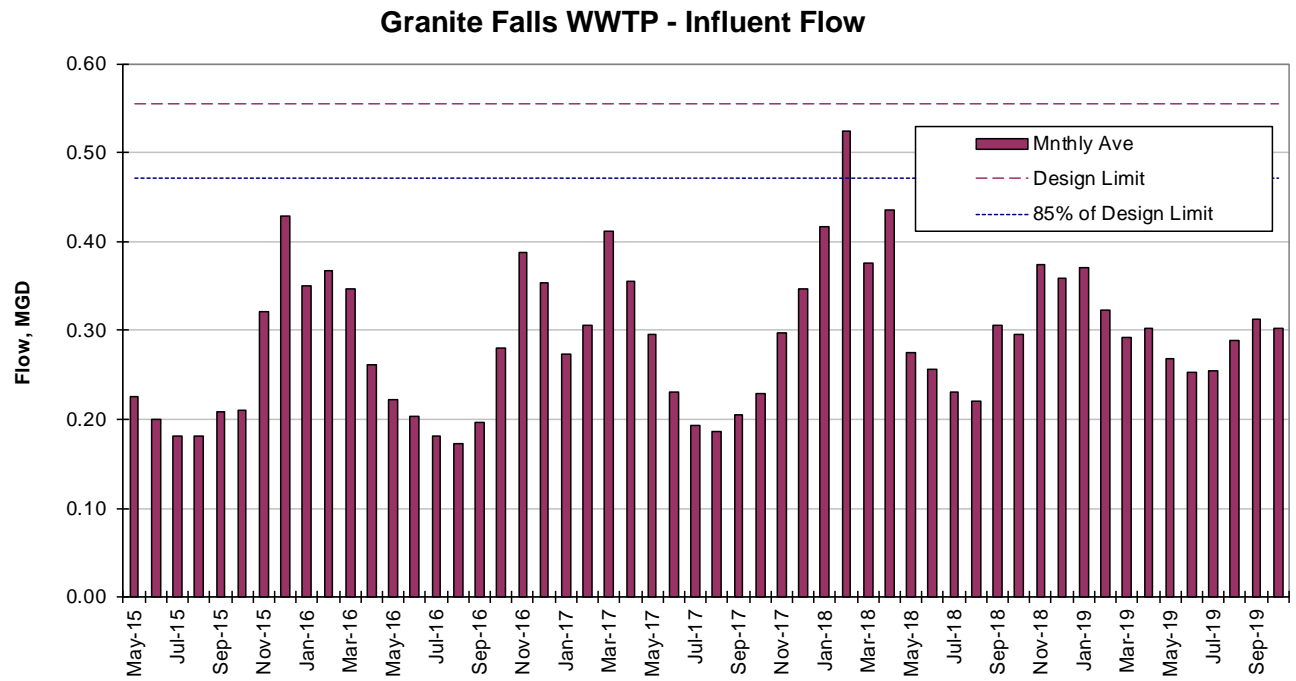
Appendix F – Granite Falls WWTP Data

Granite Falls WWTP – Influent Data

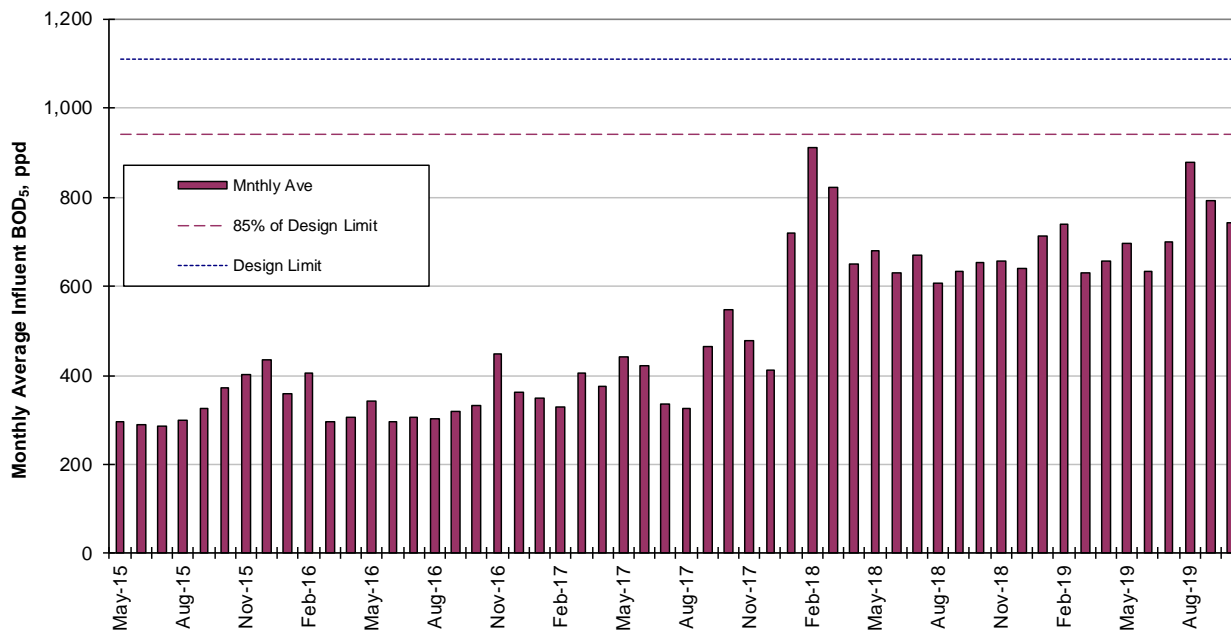
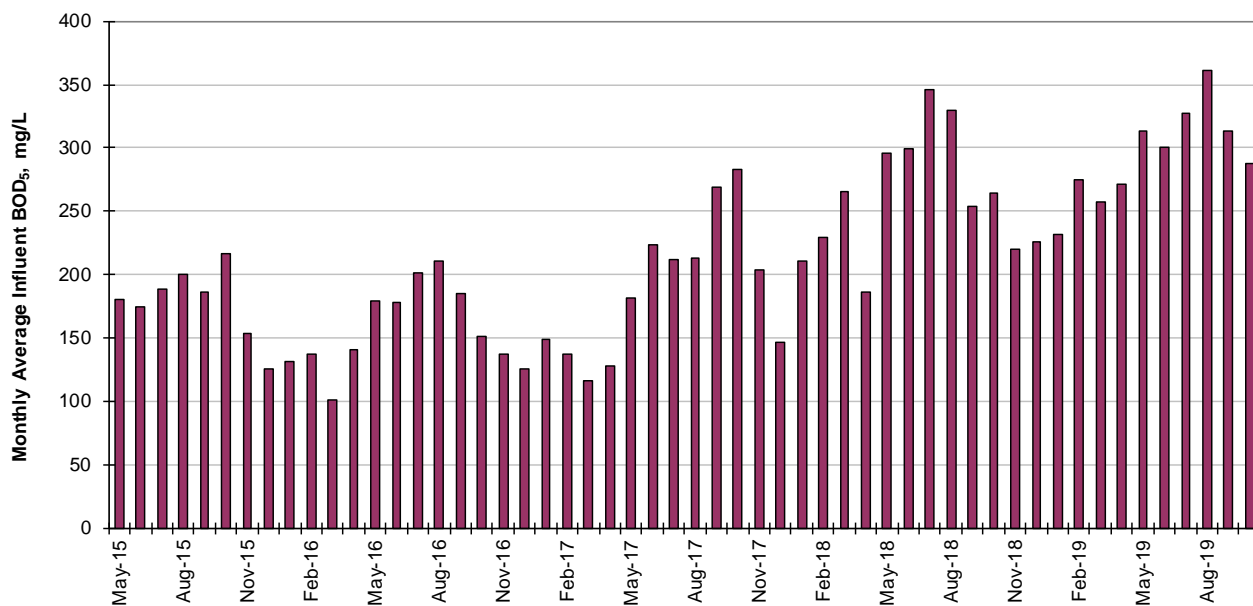
Influent										
Date	BOD, mg/L	BOD, mg/L	BOD, ppd	BOD, ppd	TSS, mg/L	TSS, mg/L	TSS, ppd	TSS, ppd	Flow, MGD	Flow, MGD
	Mnthly Ave	Mnthly Max	Mnthly Ave	Mnthly Max	Mnthly Ave	Mnthly Max	Mnthly Ave	Mnthly Max	Mnthly Ave	Mnthly Max
May-15	180	233	297	447	157	188	309	428	0.23	0.31
Jun-15	175	212	290	400	173	240	287	364	0.20	0.25
Jul-15	189	212	286	340	191	223	288	321	0.18	0.21
Aug-15	200	228	298	359	333	469	496	685	0.18	0.24
Sep-15	186	210	325	363	225	382	399	740	0.21	0.34
Oct-15	216	274	373	444	197	278	342	501	0.21	0.26
Nov-15	153	211	402	643	151	198	393	643	0.32	0.54
Dec-15	126	204	434	614	134	263	447	596	0.43	0.70
Jan-16	132	169	360	423	132	158	362	418	0.35	0.53
Feb-16	138	178	406	511	139	198	411	568	0.37	0.61
Mar-16	101	135	297	386	135	168	397	545	0.35	0.44
Apr-16	140	191	308	449	176	239	387	555	0.26	0.36
May-16	179	197	343	376	205	266	392	510	0.22	0.25
Jun-16	178	238	297	377	211	287	354	503	0.20	0.25
Jul-16	201	286	307	432	219	366	337	553	0.18	0.22
Aug-16	211	282	301	400	224	280	322	406	0.17	0.22
Sep-16	185	208	320	381	229	274	400	482	0.20	0.25
Oct-16	151	208	333	355	193	298	424	565	0.28	0.47
Nov-16	137	247	447	709	150	348	480	998	0.39	0.57
Dec-16	125	199	364	612	139	186	400	495	0.35	0.50
Jan-17	149	171	350	389	160	217	372	480	0.27	0.37
Feb-17	138	160	328	414	143	223	336	452	0.31	0.44
Mar-17	117	153	404	602	156	210	545	827	0.41	0.65
Apr-17	128	164	376	439	172	233	509	801	0.36	0.44
May-17	181	317	443	701	221	320	549	782	0.30	0.46
Jun-17	224	267	423	478	280	342	529	611	0.23	0.27
Jul-17	212	265	335	424	260	367	408	554	0.19	0.23
Aug-17	213	252	324	383	261	324	396	481	0.19	0.23
Sep-17	269	372	465	717	224	262	387	500	0.21	0.28
Oct-17	284	335	547	615	244	330	471	606	0.23	0.30
Nov-17	204	309	477	608	211	367	502	722	0.30	0.47
Dec-17	146	191	413	728	196	296	534	686	0.35	0.56
Jan-18	211	235	721	857	170	265	569	692	0.42	0.53
Feb-18	229	388	911	1,414	153	241	607	878	0.53	0.91
Mar-18	265	389	821	1,210	204	249	636	916	0.38	0.50
Apr-18	186	293	652	860	150	212	525	603	0.44	0.69
May-18	296	368	681	865	238	303	546	697	0.28	0.34
Jun-18	299	461	629	969	227	282	479	593	0.26	0.32
Jul-18	346	450	669	878	246	306	477	605	0.23	0.26
Aug-18	330	444	606	844	250	312	456	593	0.22	0.25
Sep-18	254	358	634	866	223	291	556	662	0.31	0.44
Oct-18	264	390	654	898	231	457	567	1,082	0.30	0.35
Nov-18	220	347	656	915	160	194	479	545	0.37	0.47
Dec-18	226	270	640	741	160	199	455	546	0.36	0.49
Jan-19	232	277	713	873	160	199	489	564	0.37	0.48
Feb-19	274	318	739	908	185	229	498	615	0.32	0.43
Mar-19	258	302	630	714	179	240	435	528	0.29	0.38
Apr-19	271	309	656	740	204	243	493	550	0.30	0.40
May-19	313	375	698	873	240	360	538	880	0.27	0.38
Jun-19	301	368	632	792	246	302	517	617	0.25	0.32
Jul-19	327	437	700	878	250	311	539	742	0.25	0.31
Aug-19	361	547	878	1,305	264	337	640	784	0.29	0.34
Sep-19	313	385	793	995	262	338	662	843	0.31	0.37
Nov-19	287	362	744	1,004	249	298	644	722	0.30	0.37
AVE:	215	284	502	665	202	277	462	623	0.29	0.40
MIN:	101	135	286	340	132	158	287	321	0.17	0.21
MAX:	361	547	911	1,414	333	469	662	1,082	0.53	0.91

Granite Falls WWTP – Effluent Data

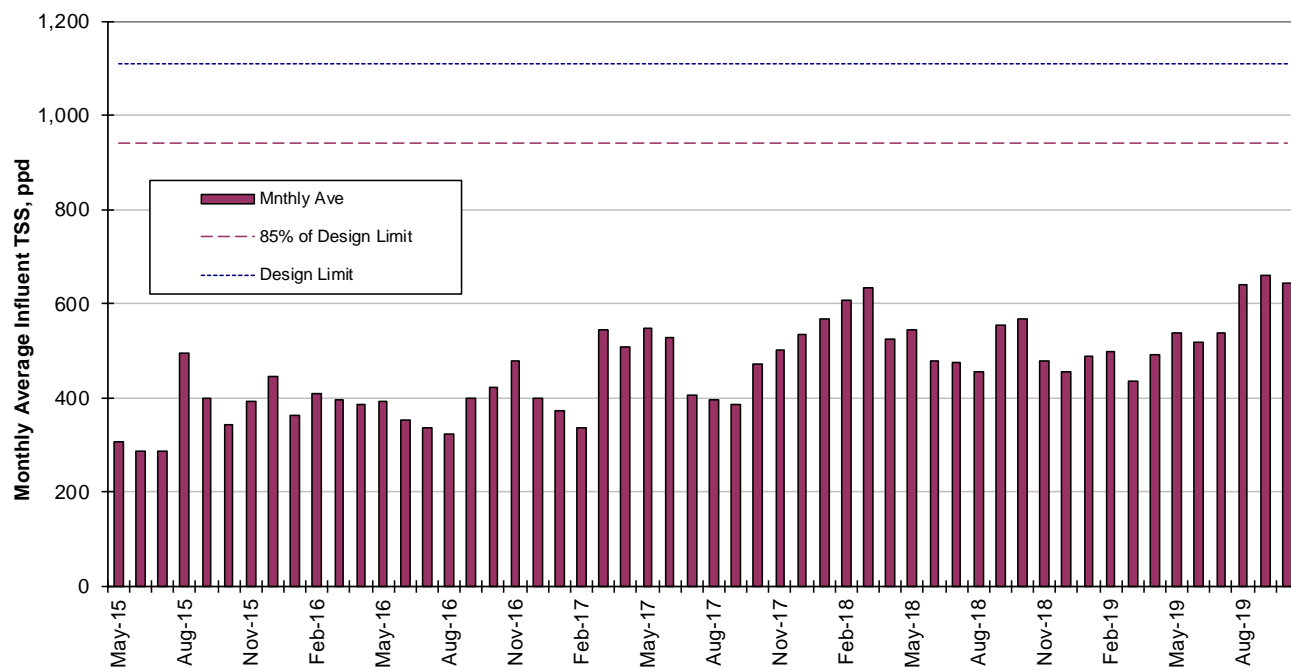
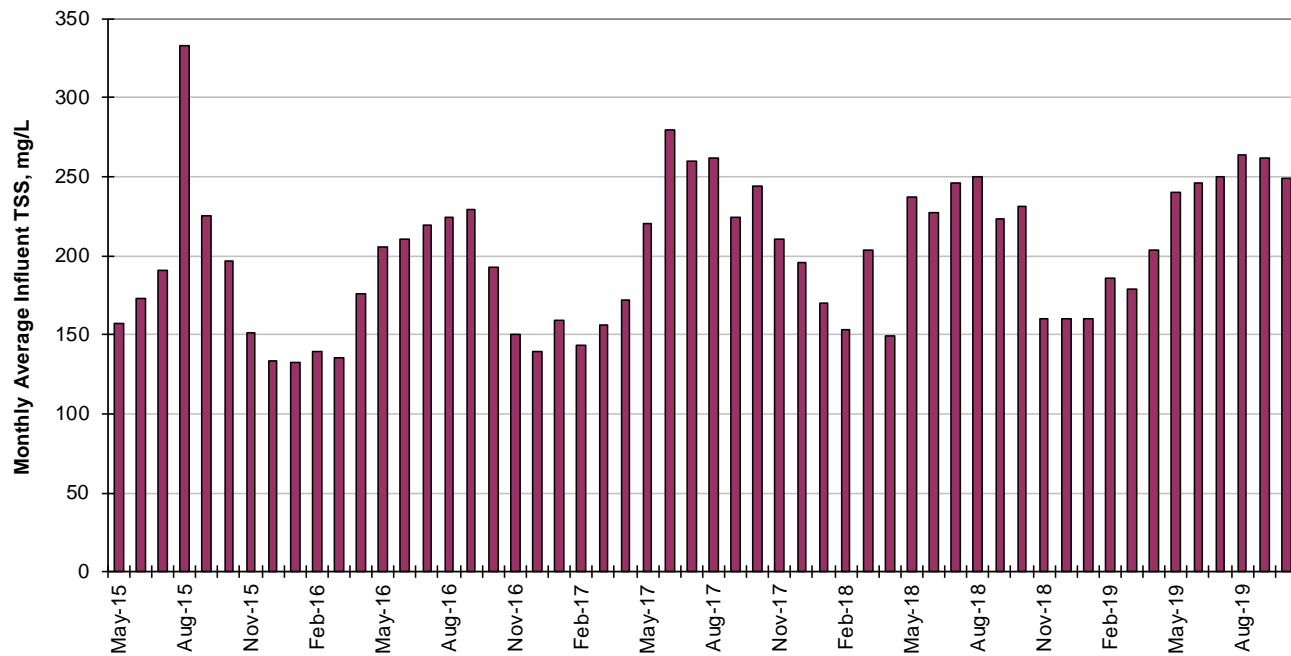
Effluent																			
Date	Flow, MGD	Flow, MGD	BOD, mg/L	BOD, mg/L	BOD, ppd	BOD, ppd	BOD, % Removal	TSS, mg/L	TSS, mg/L	TSS, ppd	TSS, ppd	TSS, % Removal	PH	PH	Fecal Coliform, #/100 ml	Fecal Coliform, #/100 ml	Temperature		
	Mnthly Ave	Mnthly Max	Mnthly Ave	Wkly Ave	Mnthly Ave	Wkly Ave	Ave	Mnthly Ave	Wkly Ave	Mnthly Ave	Wkly Ave	Ave	Min	Max	GEM	GM7	Max		
May-15	0.23	0.31	4.4	5.6	8.5	9.9	98	7.5	8.7	14.5	17.5	95	6.0	6.9	14.0	38.6	19		
Jun-15	0.20	0.25	9.3	11.5	15.4	18.0	95	18.7	24.4	30.9	37.5	89	6.0	6.6	57.1	108.0	22		
Jul-15	0.18	0.21	8.0	11.3	12.2	17.2	95	15.8	19.7	24.0	30.0	92	6.0	6.8	68.9	185.3	23		
Aug-15	0.18	0.24	5.7	6.6	8.5	9.6	97	14.1	23.2	21.0	35.2	96	6.4	7.3	25.0	140.8	22		
Sep-15	0.21	0.34	5.4	7.5	9.4	14.7	96	11.3	18.0	19.9	36.3	95	6.4	7.1	22.1	40.0	20		
Oct-15	0.21	0.26	4.5	5.0	7.9	8.6	98	5.7	7.5	10.0	13.1	97	6.3	7.0	27.8	56.3	19		
Nov-15	0.32	0.54	7.4	8.2	19.9	30.1	95	11.4	17.7	33.0	67.9	93	6.2	6.8	14.5	28.1	17		
Dec-15	0.43	0.70	7.8	9.9	27.0	38.5	94	14.7	23.2	50.3	94.5	89	6.2	6.9	3.4	7.4	13		
Jan-16	0.35	0.53	9.1	10.7	24.9	27.4	93	13.9	15.2	38.3	47.0	90	6.0	7.0	10.3	23.3	11		
Feb-16	0.37	0.61	4.9	6.1	14.8	19.2	96	5.1	6.5	15.0	18.5	96	6.3	6.8	3.5	11.6	11		
Mar-16	0.35	0.44	4.6	6.0	13.5	17.3	95	8.1	11.7	23.7	35.5	94	6.2	7.3	13.3	31.0	13		
Apr-16	0.26	0.36	7.2	8.6	15.8	18.7	94	9.3	12.2	20.3	23.7	95	6.0	7.1	36.7	113.6	15		
May-16	0.22	0.25	10.2	14.4	19.3	26.7	94	12.0	21.5	22.6	39.8	94	6.4	7.8	76.6	220.0	17		
Jun-16	0.20	0.25	6.2	8.3	10.4	13.1	97	6.3	8.4	10.6	13.9	97	6.4	7.2	17.4	25.4	19		
Jul-16	0.18	0.22	5.7	6.7	8.8	10.8	97	5.1	6.7	7.9	10.8	98	6.4	7.3	11.7	17.9	21		
Aug-16	0.17	0.22	4.4	6.3	6.2	8.8	98	8.6	12.7	12.2	18.8	96	6.6	7.2	14.5	43.8	21		
Sep-16	0.20	0.25	4.4	5.7	7.8	11.0	97	9.8	16.9	16.9	28.5	96	6.4	7.2	16.7	44.0	18		
Oct-16	0.28	0.47	4.6	6.1	10.7	16.5	97	7.8	10.8	18.2	28.9	96	6.3	6.9	17.2	102.4	17		
Nov-16	0.39	0.57	5.7	8.7	18.9	29.2	96	9.7	19.4	32.5	65.5	93	6.2	7.0	12.2	46.7	15		
Dec-16	0.35	0.50	4.9	5.7	14.4	15.5	96	8.0	8.9	23.9	28.2	94	6.4	7.0	4.3	11.1	12		
Jan-17	0.27	0.37	8.4	10.9	19.8	27.8	94	12.7	17.2	30.2	43.6	92	6.4	7.0	12.4	62.2	10		
Feb-17	0.31	0.44	6.1	7.4	14.6	17.9	96	10.2	12.4	24.0	29.0	93	6.0	6.9	3.5	14.0	10		
Mar-17	0.41	0.65	6.2	7.3	5.3	5.6	96	7.2	10.3	25.2	41.6	95	6.2	7.3	4.2	30.0	12		
Apr-17	0.36	0.44	5.5	7.2	16.0	19.0	96	8.3	10.4	24.3	28.2	95	6.3	7.2	2.5	3.3	14		
May-17	0.30	0.46	6.7	12.0	16.5	30.2	96	9.1	16.7	22.7	42.1	96	6.3	7.5	16.3	47.4	18		
Jun-17	0.23	0.27	10.6	16.0	20.1	31.1	95	14.3	22.0	27.3	43.0	95	6.2	7.3	92.5	156.0	21		
Jul-17	0.19	0.23	7.8	9.6	12.3	15.0	96	9.6	12.7	15.0	19.8	96	6.6	7.5	45.7	118.0	22		
Aug-17	0.19	0.23	4.4	5.7	6.7	8.4	98	3.9	5.4	6.0	7.9	99	6.9	7.8	19.0	65.0	23		
Sep-17	0.21	0.28	4.1	6.2	7.3	12.8	99	3.9	7.7	7.2	16.2	98	6.5	7.7	38.1	135.0	22		
Oct-17	0.23	0.30	5.4	5.9	10.4	12.2	98	5.3	8.7	10.2	16.1	98	6.8	7.7	45.5	143.0	18.4		
Nov-17	0.30	0.47	5.6	6.6	14.4	21.2	97	5.0	6.3	12.8	17.9	97	6.8	7.8	96.0	168.0	15.4		
Dec-17	0.35	0.56	6.6	9.4	19.3	29.8	95	6.6	9.0	19.7	30.7	96	6.7	7.5	82.3	220.0	13.6		
Jan-18	0.42	0.53	11.0	15.7	37.3	51.5	95	10.9	20.9	36.8	68.6	94	6.7	7.6	60.7	188.0	12.3		
Feb-18	0.53	0.91	10.6	17.0	48.7	103.0	95	8.4	10.7	36.6	64.0	94	6.6	7.6	112.0	202.0	11.7		
Mar-18	0.38	0.50	7.3	8.6	22.7	28.7	97	6.4	7.0	19.8	23.6	97	6.6	7.5	28.3	220.0	12.2		
Apr-18	0.44	0.69	13.0	33.7	47.7	125.2	93	12.5	29.0	47.6	152.0	91	6.8	7.6	74.2	193.0	14.9		
May-18	0.28	0.34	7.5	11.1	17.7	28.4	98	8.6	12.9	20.4	31.4	96	6.6	7.6	14.8	60.0	18.3		
Jun-18	0.26	0.32	6.1	7.0	13.0	15.7	98	8.6	11.7	18.3	24.3	96	6.7	7.2	28.8	83.0	19.9		
Jul-18	0.23	0.26	9.4	17.7	18.2	35.2	97	13.5	27.4	26.4	54.6	95	6.7	7.3	65.0	183.0	22.1		
Aug-18	0.22	0.25	6.9	10.5	12.7	19.5	98	9.5	16.7	17.6	21.1	96	6.9	7.6	89.4	129.0	22.6		
Sep-18	0.31	0.44	5.5	6.7	14.2	17.9	98	5.3	7.7	13.9	19.9	97	6.8	7.4	55.0	72.0	20.5		
Oct-18	0.30	0.35	6.0	7.9	15.0	21.9	98	10.0	16.3	25.0	45.1	95	6.7	7.8	35.0	68.0	19		
Nov-18	0.37	0.47	7.4	8.3	22.5	28.1	97	8.8	17.6	26.9	50.2	94	6.5	7.1	63.8	109.0	16.5		
Dec-18	0.36	0.49	9.2	11.2	26.4	34.6	96	11.3	17.5	32.9	54.3	93	6.7	7.1	17.9	73.3	14		
Jan-19	0.37	0.48	6.0	7.0	18.6	20.0	97	4.5	5.7	13.7	17.1	97	6.6	7.5	9.9	18.7	12.8		
Feb-19	0.32	0.43	6.7	7.8	18.0	20.1	98	5.3	6.4	14.0	16.4	97	6.6	7.1	5.5	30.0	12.5		
Mar-19	0.29	0.38	8.8	9.9	21.6	24.4	97	7.2	9.0	17.6	21.0	96	6.7	7.3	16.0	16.0	13.8		
Apr-19	0.30	0.40	9.9	14.2	23.3	33.0	96	9.2	16.2	21.6	38.0	96	6.5	7.3	14.3	115.0	14.9		
May-19	0.27	0.38	9.7	12.1	21.8	27.5	97	9.2	11.4	20.5	26.5	96	6.7	7.5	46.1	66.0	18.5		
Jun-19	0.25	0.32	9.1	10.8	19.0	22.3	97	6.0	7.4	12.6	15.2	98	6.6	7.7	68.7	98.0	22.2		
Jul-19	0.25	0.31	10.2	13.3	22.1	30.9	97	8.5	17.7	18.8	41.0	97	6.8	7.5	64.0	127.0	21		
Aug-19	0.29	0.34	10.2	20.0	24.7	46.5	97	7.9	11.3	19.0	26.3	97	6.7	7.6	68.0	159.0	22		
Sep-19	0.31	0.37	7.1	10.8	17.7	25.9	98	6.9	11.5	17.3	27.7	97	6.7	7.6	91.0	132.0	22		
Nov-19	0.30	0.37	7.0	8.0	18.1	22.0	98	5.5	6.5	14.4	17.9	98	6.9	7.4	104.0	177.0	16.1		
AVE:	0.29	0.40	7.2	9.9	17.4	25.4	96	8.9	13.5	21.5	34.9	95	6.5	7.3	38.1	92.2	17.1		
MIN:	0.17	0.21	4.1	5.0	5.3	5.6	93	3.9	5.4	6.0	7.9	89	6.0	6.6	2.5	3.3	9.8		
MAX:	0.53	0.91	13.0	33.7	48.7	125.2	99	18.7	29.0	50.3	152.0	99	6.9	7.8	112.0	220.0	22.6		



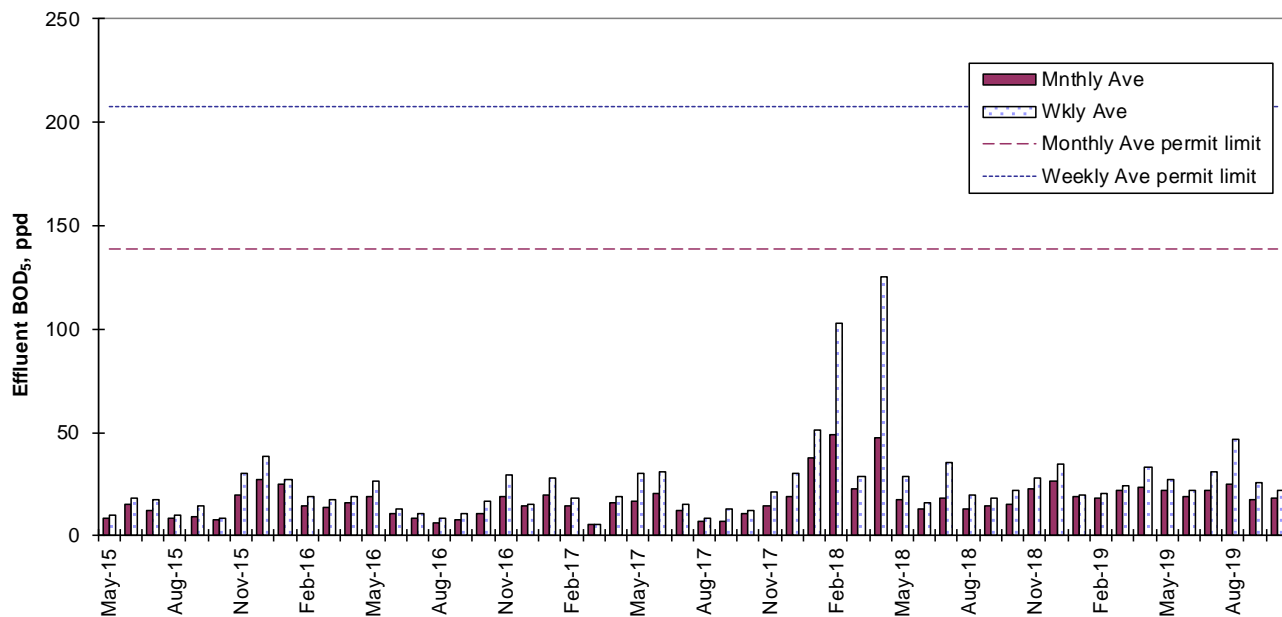
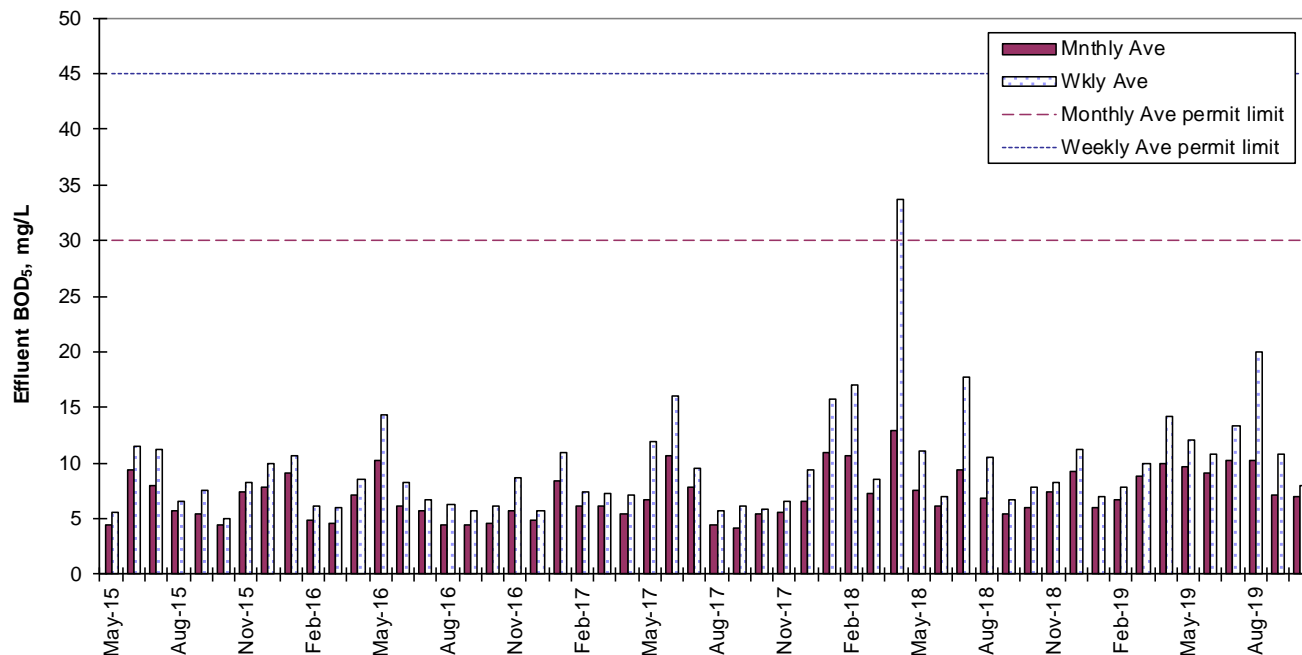
Granite Falls WWTP - Influent BOD₅



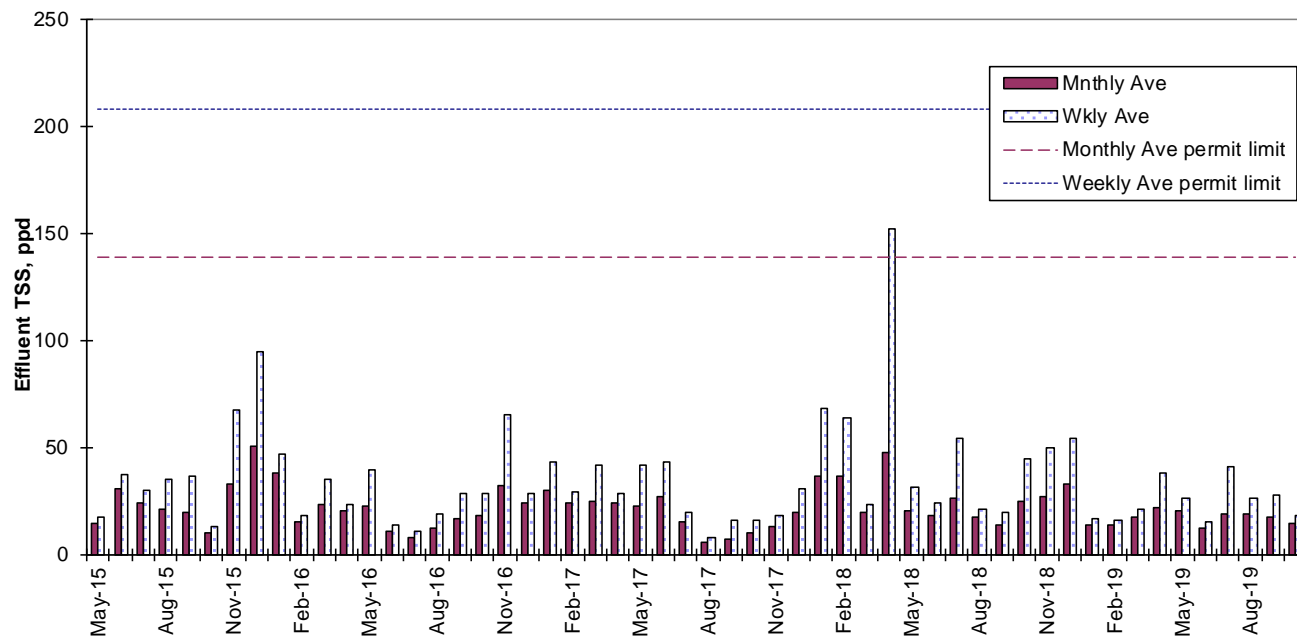
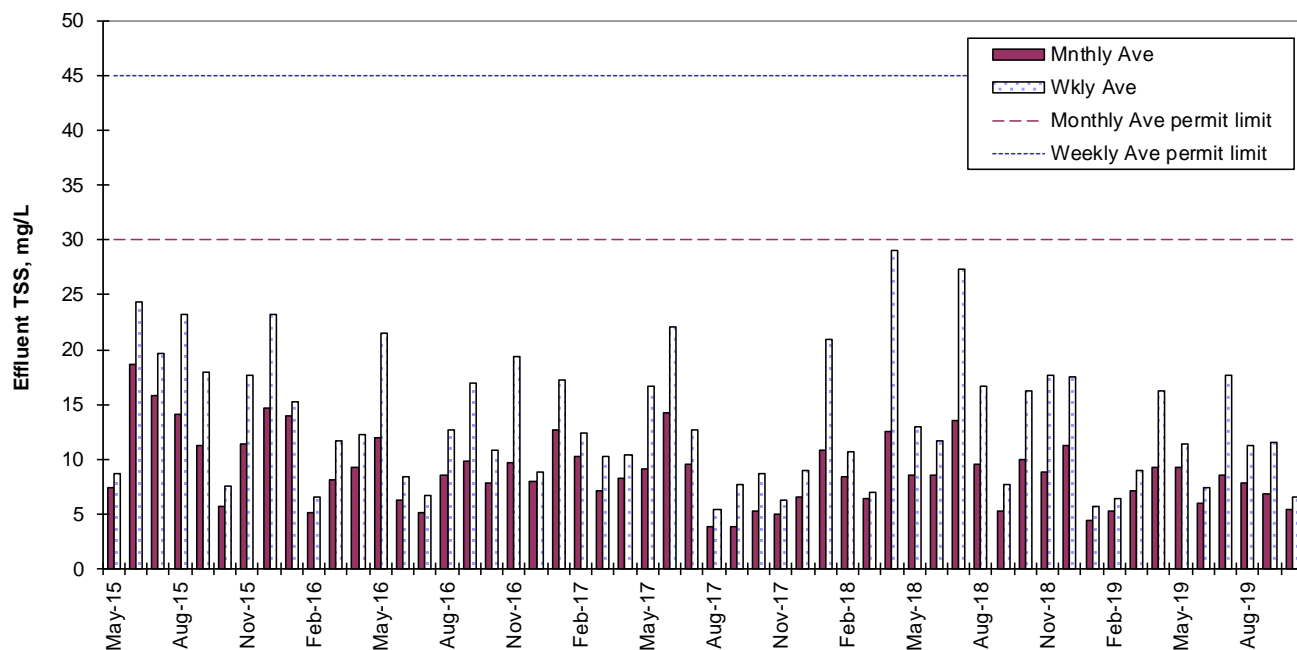
Granite Falls WWTP - Influent TSS



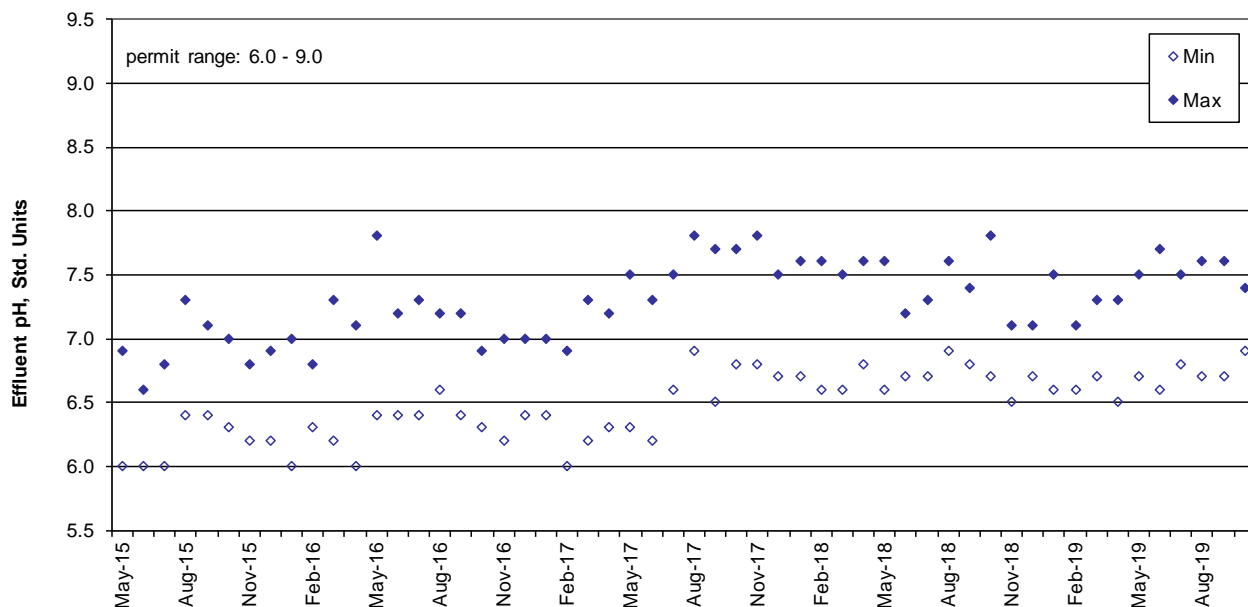
Granite Falls WWTP - Effluent BOD₅



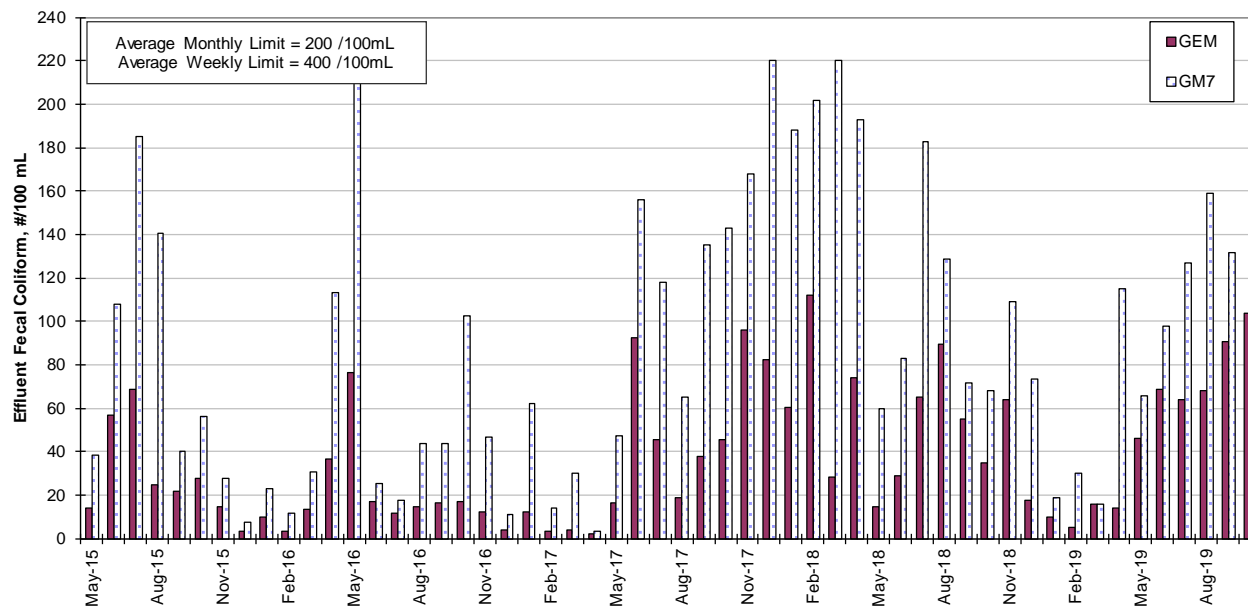
Granite Falls WWTP - Effluent TSS



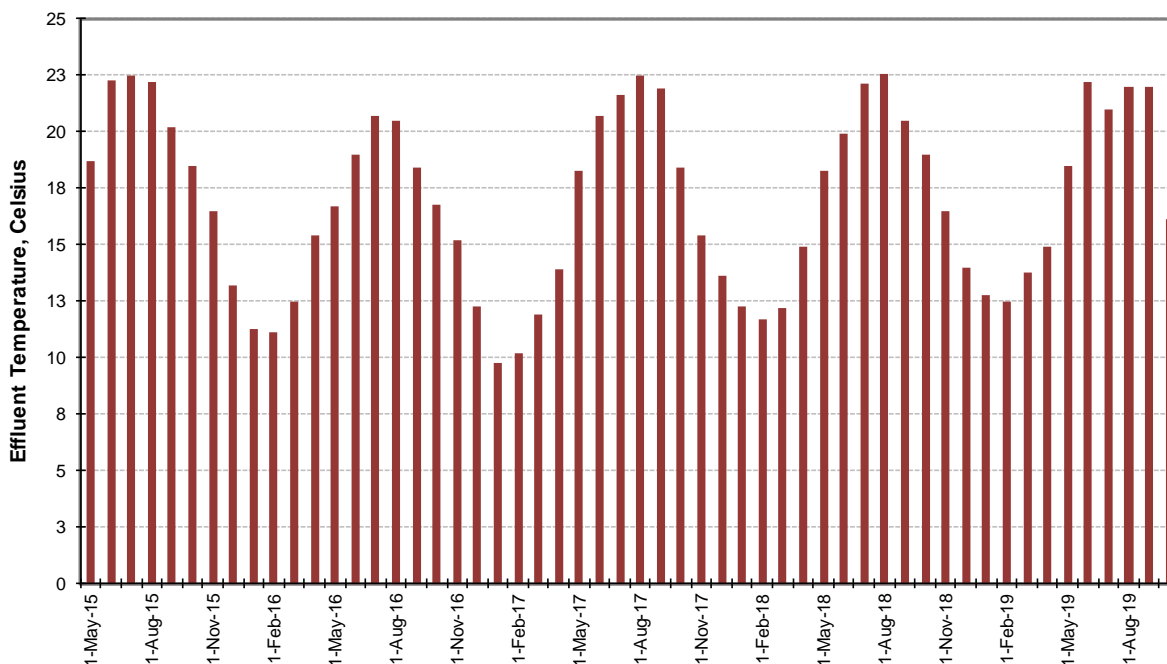
Granite Falls WWTP - Effluent pH



Granite Falls WWTP - Effluent Fecal Coliform



Granite Falls WWTP - Effluent Temperature



Granite Falls WWTP – Additional Effluent Data

ADDITIONAL EFFLUENT MONITORING DATA								
Parameter	Ammonia	Nitrate + Nitrite	TKN	Total Phosphorus	Phosphorus (Soluble Reactive)	Copper (Total)	Zinc (Total)	DO
Units	mg/L as N	mg/L as N	mg/L as N	mg/L as P	mg/L as P	ug/L	ug/L	mg/L
1-Feb-11	0.63	7.09	3.5	1.53	1.36	3.1	31.1	
1-Jul-11	0.55	1.99	1.06	2.85	2.54	3.3	49.7	
1-Jan-12	0.48	6.13	2.56	0.58	0.26	2.9	49.7	
1-Jul-12	0.21	14.1	3.32	2.87	2.64	1.8	44.8	
1-Jan-13	0.52	5.88	1.77	1.51	2.03	5.12	11.9	
1-Jul-13	0.52	7.52	4.25	0.83	4.7	6.81	17	
1-Jan-14	5.39	6.34	7.72	2.02	1.75	6.7	29.4	
1-Jul-14	1.52	17.7	5.08	4.78	4.85	11.7	67.8	
1-Jul-15	0.7	14.8	3.95	4.38	4.1	8.99	57.8	
1-Jan-16	1.19	13.6	2.84	2.3	2.09	4.38	39.1	
1-Jul-16	0.53	13.5	2.56	4.33	4.05	9.01	53.5	
1-Jan-17	0.22	9.2	3.12	1.76	1.32	5.42	35.4	
1-Jul-17	1.35	11.5	4.8	3.97	3.69	8.23	60.5	
1-Jan-18	0.52	11.6	3.06	1.61	1.27	10.6	35.3	
1-Jul-18	1.62	5.49	3.4	2.12	0.328	7.99	54.6	
1-Jan-19	4.36	10.1	6.94	2.29	2.04	7.32	41.2	
1-Feb-19								4.4
1-May-19								8
1-Aug-19								4.7
Min	0.21	1.99	1.06	0.58	0.26	1.8	11.9	4.4
Max	5.39	17.7	7.72	4.78	4.85	11.7	67.8	8
Average	1.27	9.78	3.75	2.48	2.44	6.46	42.43	5.7
Median	0.59	9.65	3.36	2.205	2.065	6.755	43	4.7
90th Percentile	4.669	15.67	7.174	4.5	4.745	10.93	62.69	
50th Percentile						6.8	43.0	

Appendix G — Response to Comments

City of Granite Falls Entity Review Comments:

DRAFT FACT SHEET:

Comment # 1: Page 5 – Change Matt Hartman phone number to City Hall to be 360-691-6441.

Ecology's Response: *Per City's request, phone number has been changed.*

Comment # 2: Page 8, First Paragraph – “...3,000 mg/L, which causes solids to settle within the oxidation ditch and operators are required to waste more solids to maintain good operation of the oxidation ditch.”

We recommend: “...3,000 mg/L which generally produces a sludge with good settling characteristics and effluent quality without exceeding the oxygen transfer capacity of the brush aerators. Operators waste solids as necessary to maintain a relatively constant solids concentration in the oxidation ditch.”

Ecology's Response: *Per City's request, paragraph has been modified.*

Comment # 3: Page 8, Second Paragraph – “Only one clarifier is capable of handling flows during summer months. During the wet weather season, the second clarifier is placed in service.”

We recommend: “~~Only~~ One clarifier is capable of handling flows during summer months. During the wet weather season, the second clarifier is placed in service.”

Ecology's Response: *Per City's request, paragraph has been modified.*

Comment # 4: Page 8 – In the Operator Certification section, in the last bulleted item of the second paragraph, after the word “Weekends” insert the words “and Holidays.”

Ecology's Response: *Per City's request, the second paragraph of the Operation Certification section has been modified.*

Comment # 5: Page 9, First Paragraph – Revise the paragraph to read as follows: “Waste activated sludge is pumped to a 20,000-gallon storage tank ~~and then pumped to three SOMAT dewatering system~~. Stored sludge is dewatered to approximately ~~2 to 3~~ 10 to 12 percent solids concentration by three Somat screw presses arranged in series. The dewatered sludge is mixed with bark, woodchips, and sawdust and then composted on site using an aerated static pile process to produce Class A compost. The Class A compost is donated to local residents and farms. The dewatering system operates approximately 7.5 hours/day, 4 days/week (Monday-Thursday and occasionally on Friday and Saturday for 2-3 hours. ~~Class A biosolids is donated to local residents and farms.~~”

Ecology's Response: *Per City's request, paragraph has been modified.*

Comment # 6: Page 9, Discharge Outfall – Revise the third sentence to read as follows: “The diffuser consists of an 18-foot section of ductile iron pipe with eighteen (18) 3-inch diffuser ports spaced ~~24~~ 12 inches apart, ~~all on the same side of the pipe with the exception of one diffuser at the end of the pipe.~~ All ports pointing downstream with the exception of one port at the terminal end of the diffuser manifold that is perpendicular to the flow of the river.”

Ecology's Response: *Per City's request, paragraph has been modified.*

Comment # 7: Page 10, First Paragraph – *“The City of Snohomish obtains its water supply from the Pilchuck River through a diversion upstream from Granite Falls. This withdrawal averages about 0.5 million gallons per day (MGD).”*

The Snohomish Water Treatment Plant has been abandoned.

Ecology's Response: *Per City's request, paragraph has been modified.*

Comment # 8: Page 12, Section E, Second Paragraph – The determination that the City's treatment plant has not consistently complied with the effluent permit limits and permit conditions appears to be overly harsh. The City failed to report the results of one fecal coliform sampling event on the DMR. This should have been detected when running the verification check on the Web DMR. When the City was notified of the violation, the bench sheet showing the analysis and a corrected DMR were sent to Ecology the same day. The City achieved 100 percent compliance with testing all limits and conditions of the permit. It is suggested that the sentence be revised as follows:

“The City of Granite Falls has consistently complied with the effluent limits and permit conditions throughout the duration of the permit issued April 15, 2015, with the exception of a single violation for failure to report a fecal coliform analysis on December 1, 2017.”

Ecology's Response: *Per City's comment, second paragraph of Section E has been modified.*

Comment # 9: Page 17, Facility-Specific Requirements – Ecology states that “This facility must meet Tier 1 requirements.” However, in the following paragraph titled “Facility Specific Requirements” the draft permit states that Ecology determined that this facility (Granite Falls WWTP) must meet Tier II requirements. The Granite Falls WWTP should only be required to complete a Tier II analysis if there is a physical expansion of the existing facility intended to increase the hydraulic capacity of the existing plant or to treat an increased concentration or load of the facility exceeding 10 percent of the existing capacity.

Page 17, Items 2 and 3 –

2) An increase (either monthly average or annual average) to an existing permitted concentration or permitted effluent mass limit (loading) to a water body greater than 10%. The “2017 Wastewater Capacity Evaluation Report” determines that the influent TSS loading limit should be increased from 823 lbs/day to 1,109 lbs/day, which is approximately a 26 percent increase. The City has experienced rapid population growth in recent years and this is expected to continue through 2038 with an estimated population of 8,482. Projected wastewater flows follow the population growth trend.

3) The act of re-rating the capacity of an existing plant greater than 10%.

Therefore, the proposed permit requires the City of Granite Falls to submit a Tier II Antidegradation Analysis for Ecology's review.”

Ecology's Water Quality Program Guidance – Supplemental Guidance on Implementing Tier II Antidegradation (Pub. 11-10-073) states on page 3:

“All three of the following conditions must be met before an activity would be required to go through a Tier II analysis:

- 1) It must be an action associated with specified authorizations by Ecology.*
- 2) It must be a new or expanded action.*
- 3) The action must have the potential to cause measurable degradation to existing water quality at the edge of a chronic mixing zone.”*

Rerating the TSS influent loading does not trigger Item 3. If the Antidegradation is being required only because of the TSS influent limit being increased, this seems unjustified.

Per Table 8-1 in the Facilities Plan, no increase in effluent loading of BOD or TSS is anticipated with an expanded WWTP.

Ecology’s Response: *Tier I and Tier II requirements both apply. One requirement does not exclude the other.*

Based upon the information discussed in the 2018 GSP, Ecology has determined that a Tier II Antidegradation Analysis is necessary to determine whether the WWTP expansion and increased flows and loads will not deteriorate water quality. This may be a simple demonstration of no measurable changes, but should include parameters beyond BOD and TSS, including metals and pH. We have removed the reference to the 2017 capacity analysis.

Comment # 10: Page 25, Section E, Water Quality Impairments – The second sentence states that Ecology has recently drafted a TMDL analysis for the Pilchuck River and it highlights implications for the City of Granite Falls WWTP. This draft TMDL is referenced in several sections within the fact sheet but has not been provided to the City of Granite Falls for review nor has it been released for public review.

Ecology’s Response: *Ecology will give the City the opportunity to review and comment on the final draft of the TMDL Study.*

Comment # 11: In the reference documents on page 41, a Washington State Department of Ecology document is listed (*December 2019 Updated Implications for the City of Granite Falls Wastewater Treatment Plant (WWTP) from the draft TMDL*). Ecology has not provided the draft TMDL or the Updated Implications documents to the City of Granite Falls for review and comment. The City should be afforded the opportunity to review and comment on these documents before they are used to establish future permit conditions for the City of Granite Falls.

Ecology’s Response: *Ecology will give the City the opportunity to review and comment on the final draft of the TMDL Study.*

Comment # 12: Page 29 – In regard to monitoring effluent for E. coli, it seems that monitoring of the receiving water upstream of the outfall is needed to establish a baseline for determining future discharge limits for E. Coli.

Ecology’s Response: *The primary purpose of E. Coli monitoring is to develop a site-specific correlation between fecal coliform and E. Coli. Ecology will reevaluate bacteria limits for this discharge during the next permit development period. At this time, no ambient monitoring is envisioned.*

Comment # 13: Page 34 – The paragraph states that the facility uses grab sampling in the late afternoon and does not always catch the maximum effluent temperature. That is incorrect as the City of Granite Falls installed a continuous temperature device in 2015 and has reported the maximum daily temperature ever since.

Ecology's Response: *Per City's request, paragraph has been modified.*

Comment # 14: Page 35 – Why is temperature monitoring at the facility required if the point of compliance is the last manhole before the diffuser?

Ecology's Response: *The point of compliance is still at the facility. The end of the outfall pipe is not the point of compliance.*

The proposed permit requires temperature monitoring downstream of the UV system and near the river to establish a correlation between temperatures measure at the facility and closer to the Pilchuck River. Preliminary findings of the TMDL Study demonstrate that effluent temperature closer to the river is lower than effluent temperature measured at the facility. In 2012, continuous temperature monitoring at the overflow junction near the outfall to the Pilchuck River showed consistently cooler temperatures compared to measurements at the facility. Based on current effluent temperatures and 2038 effluent flows, it appears the facility would likely meet the TMDL allocation for temperature, without any additional cooling measures. Although limited by the factors mentioned above, a preliminary relationship between the two monitoring points was developed based on the 2012 data and applied to recent temperature monitoring results at the facility to test the feasibility of the TMDL limits. The cooling factor was only applied when the effluent temperatures were above 18°C.

Additional temperature monitoring between the facility and outfall is necessary to confirm this relationship and establish a future point of compliance. Ecology recommends performing continuous monitoring during dry season (May 1st to September 30th) to compare effluent temperatures at the current facility monitoring point with a point as near to the end of the outfall as possible. If a strong correlation can be established between the two monitoring points and the substantial cooling pattern is confirmed, then it would be appropriate for the permit to increase the daily maximum limit, using the relationship between the two points, and apply it to the current temperature monitoring point.

Comment # 15: Page 39, Tier II Antidegradation – BOD and TSS effluent loads to the river are not increasing. SRP loading is to be reduced. Why is a Tier II analysis required?

Ecology's Response: *Please, see response to comment # 9.*

Comment # 16: Page 58, Appendix E, City of Granite Falls Schematic Process Flow Diagram – Update/correct the schematic in accordance with the attachment provided.

Ecology's Response: *Per City's request, process flow diagram has been updated.*

DRAFT NPDES PERMIT:

Comment # 17: Page 10, Table 6, Soluble Reactive Phosphorus – June – September. Is this June 1 to September 30 or June 30 to September 1? Please clarify.

Ecology's Response: Ecology has clarified this requirement on Table 6 of the NPDES permit. Soluble reactive phosphorus must be monitored from June 1st to September 30.

Comment # 18: Page 10, Table 5, Final Wastewater Effluent – The City of Granite Falls does not use chlorine for disinfection. Revise to: “Final wastewater effluent means wastewater exiting the last treatment process or operation. Typically, this is after or at the exit from the chlorine contact chamber or other disinfection process. If taken after, the permittee must dechlorinate and reseed the sample.”

Ecology's Response: Per City's request, paragraph has been modified.

Comment # 19: Page 10, Table 6, Effluent Characterization – Soluble Reactive Phosphorus sampling at three times per week (24-hour composite sampling) seems excessive. We would prefer to change this to two times per week to align with the TSS and BOD 24-hour composite sampling.

Ecology's Response: Per City's request, Ecology has changed the monitoring frequency for soluble reactive phosphorus from 3/week to 2/week.

Comment # 20: In 2015, the sampling frequency for Total Phosphorus, Total Ammonia, Nitrate plus Nitrite Nitrogen, Total Kjeldahl Nitrogen (TKN), Total Copper, and Total Zinc was changed from quarterly to biannual because of the consistency of data from 2010 to 2015. We do not see the reasoning to change it from biannual back to quarterly at this point.

Ecology's Response: Even though the City of Granite Falls is not part of the Salish Sea Model at this time, Ecology's Nutrient Removal Project will in the future transition its focus to watersheds that discharge into Puget Sound and contribute to low oxygen levels. A recommended and proven methodology to properly assess the nutrient loadings to Pilchuck River is monitoring. The larger the statistical sample size, the better is the characterization of the effluent from the Granite Falls WWTP.

With regards to copper and zinc, the rationale is similar. Ecology's has observed that a number of WWTPs discharging to freshwater have the potential to deteriorate water quality with heavy metals. Therefore, a slightly increase in monitoring frequency for these pollutants is necessary to assure that water quality has been protected. A slight increase in monitoring frequency will also help Ecology to determine whether there is seasonal variation. In the future, Ecology may focus the monitoring only on the season that presents high metals concentration.

Comment # 21: Page 12, Footnote 7 – Ecology requires quarterly sampling for E. coli beginning January 1, 2024, and to submit the result by April 15, 2024. It is unclear if this is intended to be for the results for the first quarter. If it is for the first quarter, then when are the results due for the remaining quarters? Why not follow the requirements for quarterly DMRs defined in Section S3.A of the permit?

Ecology's Response: The City must monitor its effluent for E. Coli four times a year, in 2024 and 2025. For the first quarter (January – March), the results must be submitted by April 15, 2014 and so on. The WebDMR will properly inform the City when the quarterly submittals are due.

The E. Coli quarterly monitoring/submittals follow the same rationale of the other quarterly monitoring/submittals described in Section S3.A. The only difference is that it starts in January 2024.

Comment # 22: Page 12, Footnote 12 – Ecology requires continuous monitoring of effluent temperature but has not identified how frequently the temperature should be recorded. A 5-minute recording interval is suggested by Gray & Osborne.

Ecology's Response: *Please, see the footnotes Table 5 on page 10. If measuring temperature continuously, the Permittee must determine and report a daily maximum from half-hour measurements in a 24-hour period.*

Comment # 23: Page 12, Footnote 12 – Ecology requires quarterly sampling for phosphorus and defines the fourth quarter to be October through December, yet then requires results to be submitted by October 15, 2020. To meet this schedule, the City would need to collect the fourth quarter sample within the first week of October. It is suspected that Ecology may have made a typographical error and intended a submittal date of January 15, 2021. Why not follow the requirements for quarterly DMRs defined in Section S3.A of the permit?

Ecology's Response: *Footnote 12 explains that for the quarter beginning on 07/01/2020, the results must be submitted by October 15, 2020. This monitoring frequency follows the requirements established in Section S3.A. Please, see table below for reference.*

QUARTER	SUBMITTAL DATE
1 ST Quarter (January – March)	April 15
2 nd Quarter (April – June)	July 15
3 rd Quarter (July – September)	October 15
4 th Quarter (October – December)	January 15

Comment # 24: Page 15, Items 11 and 12 – Should they be numbered 10a and 10b?

Ecology's Response: *Per City's request, numbering on page 15 has been edited.*

Comment # 25: Page 27, Table 9, Compliance Schedule –

Determination Letter – The City needs to send a letter to Ecology stating the infiltration system will not work based upon the hydrogeological study last summer/fall.

Plans and Specifications for WWTP Upgrades Design – May 31, 2022.

Tier II Antidegradation – See comments relating to Fact Sheet page 17. Is a Tier II Analysis required? If yes then should it not be completed before the design?

Ecology's Response: *Ecology has edited the language of the Compliance Schedule per City's request. Additionally, Ecology has changed the submittal date of the Antidegradation Analysis from May 31, 2023 to December 2021, which is before the submittal of design documents. Ecology concurs that the Antidegradation Analysis must be submitted prior to design. In general, the Tier II analysis should be conducted as a companion to an engineering report.*

Comment # 26: Page 28, Receiving Water Study, Paragraph 2d – Should City staff conduct river sampling for alkalinity? If so, please provide specific dates for Critical Period 2c. Does Ecology have a preference of upstream or downstream?

Ecology's Response: *Yes, the City is required to monitor the river for alkalinity. Ambient and effluent alkalinity data are required to compute pH limits. Ecology has provided two (2) specific deadlines related to the alkalinity monitoring: 1) Quality Assurance Plan is due on December 31, 2023 and 2) Sampling Results must be submitted by December 31, 2024. It is the City's decision to determine the appropriate schedule for sampling. Ecology would suggest quarterly monitoring for one year and totalizing, at minimum, 25 alkalinity results. Water samples should be collected upstream of the discharge point.*

During the public comment period, no comments were received.