Fact Sheet

The U.S. Environmental Protection Agency (EPA)

Proposes to Reissue a National Pollutant Discharge Elimination System (NPDES) Permit to Discharge Pollutants Pursuant to the Provisions of the Clean Water Act (CWA) to:

United States Department of the Navy

Naval Magazine Indian Island

Public Comment Start Date: February 24th, 2022

Public Comment Expiration Date: March 25th, 2022

Technical Contact: James Earl
(503) 326-2653
800-424-4372, ext. (within Alaska, Idaho, Oregon and Washington)
earl.james@epa.gov

EPA Proposes to Reissue the NPDES Permit

EPA proposes to reissue the NPDES permit for the facility referenced above. The draft permit places conditions on the discharge of pollutants from the wastewater treatment plant to waters of the United States. In order to ensure protection of water quality and human health, the permit places limits on the types and amounts of pollutants that can be discharged from the facility.

This Fact Sheet (FS) includes:

- information on public comment, public hearing, and appeal procedures
- a listing of proposed effluent limitations and other conditions for the facility
- a map and description of the discharge location
- technical material supporting the conditions in the permit

CWA § 401 Certification

EPA is requesting that State of Washington (Washington Department of Ecology) provide a CWA Certification of the permit for this facility under CWA § 401. Comments regarding the Washington Department of Ecology intent to certify the permit should be directed to:

Washington Department of Ecology
Angela Zeigenfuse
300 Desmond Drive SE
Lacey, WA 98504-7600

Public Comment

Because of the COVID-19 virus, access to the Region 10 EPA building is limited. Therefore, we request that all comments on EPA's draft permits or requests for a public hearing be submitted via email to James Earl (earl.james@epa.gov). If you are unable to submit comments via email, please call (503) 326-2653.

Persons wishing to comment on or request a Public Hearing for the draft permit for this facility may do so in writing by the expiration date of the Public Comment period. A request for a Public Hearing must state the nature of the issues to be raised as well as the requester's name, address and telephone number. All comments and requests for Public Hearings must be in writing and should be submitted to the EPA as described in the Public Comments Section of the attached Public Notice.

After the Public Notice expires, and all comments have been considered, EPA's regional Director for the Water Division will make a final decision regarding permit issuance. If no substantive comments are received, the tentative conditions in the draft permit will become final, and the permit will become effective upon issuance. If substantive comments are received, EPA will address the comments and issue the permit. The permit will become effective no less than 30 days after the issuance date, unless an appeal is submitted to the Environmental Appeals Board within 30 days pursuant to 40 CFR 124.19.

Documents are Available for Review

The draft permit, this Fact Sheet and the Public Notice can also be found by visiting the Region 10 website at https://www.epa.gov/npdes-permits/about-region-10s-npdes-permit-program. Because of the COVID-19 virus and limited building access, we cannot make hard copies available.

The draft Administrative Record for this action contains any documents listed in the References section. The Administrative Record or documents from it are available electronically upon request by contacting James Earl.

For technical questions regarding the Fact Sheet, contact James Earl at (503) 326-2653 or earl.james@epa.gov. Services can be made available to persons with disabilities by contacting Audrey Washington at (206) 553-0523.

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Acronyms

1Q10	1 day, 10 year low flow
7Q10	7 day, 10 year low flow
30B3	Biologically-based design flow intended to ensure an excursion frequency of less than once every three years, for a 30-day average flow.
30Q10	30 day, 10 year low flow
ACR	Acute-to-Chronic Ratio
AKART	All known, available and reasonable methods of prevention, control and treatment
AML	Average Monthly Limit
AWL	Average Weekly Limit
BA	Biological Assessment
BAT	Best Available Technology economically achievable
BCT	Best Conventional pollutant control Technology
BE	Biological Evaluation
BO or BiOp	Biological Opinion
BOD_5	Biochemical oxygen demand, five-day
BOD_{5u}	Biochemical oxygen demand, ultimate
BMP	Best Management Practices
BPT	Best Practicable
°C	Degrees Celsius
C BOD_5	Carbonaceous Biochemical Oxygen Demand
CFR	Code of Federal Regulations
CFS	Cubic Feet per Second
COD	Chemical Oxygen Demand
CSO	Combined Sewer Overflow
CV	Coefficient of Variation
CWA	Clean Water Act
DMR	Discharge Monitoring Report
DO	Dissolved oxygen
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FR	Federal Register
Gpd	Gallons per day
HUC	Hydrologic Unit Code

IC	Inhibition Concentration
ICIS	Integrated Compliance Information System
I/I	Infiltration and Inflow
LA	Load Allocation
lbs/day	Pounds per day
LC	Lethal Concentration
LC_{50}	Concentration at which 50% of test organisms die in a specified time period
LD_{50}	Dose at which 50% of test organisms die in a specified time period
LOEC	Lowest Observed Effect Concentration
LTA	Long Term Average
LTCP	Long Term Control Plan
mg/L	Milligrams per liter
mL	Milliliters
ML	Minimum Level
µg/L	Micrograms per liter
mgd	Million gallons per day
MDL	Maximum Daily Limit or Method Detection Limit
MF	Membrane Filtration
MPN	Most Probable Number
N	Nitrogen
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NOEC	No Observable Effect Concentration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and maintenance
POTW	Publicly owned treatment works
PSES	Pretreatment Standards for Existing Sources
PSNS	Pretreatment Standards for New Sources
QAP	Quality assurance plan
RP	Reasonable Potential
RPM	Reasonable Potential Multiplier
RWC	Receiving Water Concentration
SIC	Standard Industrial Classification
SPCC	Spill Prevention and Control and Countermeasure
SS	Suspended Solids
SSO	Sanitary Sewer Overflow

s.u.	Standard Units
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TRC	Total Residual Chlorine
TRE	Toxicity Reduction Evaluation
TSD	Technical Support Document for Water Quality-based Toxics Control (EPA/505/2-90-001)
TSS	Total suspended solids
TU_a	Toxic Units, Acute
TU_c	Toxic Units, Chronic
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
UV	Ultraviolet
WADOE	Washington Department of Ecology
WD	Water Division
WET	Whole Effluent Toxicity
WLA	Wasteload allocation
WQBEL	Water quality-based effluent limit
WQS	Water Quality Standards
WWTP	Wastewater treatment plant

I. BACKGROUND INFORMATION

A. GENERAL INFORMATION

This fact sheet provides information on the draft NPDES permit for the following entity:

Table 1. General Facility Information

NPDES Permit #:	WA0021997
Applicant:	United States Department of the Navy Naval Magazine Indian Island
Type of Ownership	Federal
Physical Address:	100 Island Rd. Port Hadlock, WA 98339
Mailing Address:	100 Island Rd. Port Hadlock, WA 98339
Facility Contact:	Bill Kalina Environmental Manager william.kalina@navy.mil (360) 396-5353
Operator Name:	Mr. Ken Gumm Mr. Matt Gilmore
Facility Location:	48.053464°N 122.738067°W
Receiving Water	Port Townsend Bay
Facility Outfall	48.053799°N 122.740711°W

B. PERMIT HISTORY

The most recent NPDES permit for the Naval Magazine Indian Island was issued and became effective on April 17th, 1985 and expired on April 16th, 1990. The permit had a minor modification that was issued on February 25th, 1987 and become effective March 27th, 1987. An NPDES application for permit issuance was submitted by the permittee. EPA determined that the application was timely and complete. Therefore, pursuant to 40 Code of Federal Regulations (CFR) 122.6, the permit has been administratively continued and remains fully effective and enforceable.

II. FACILITY INFORMATION

A. TREATMENT PLANT DESCRIPTION

1. Service Area

The United States Department of the Navy owns and operates the Naval Magazine Indian Island Wastewater Treatment Plant (WWTP) located in Port Hadlock,WA. The collection system has no combined sewers. The facility serves a resident population of 170. There are no major industries discharging to the facility.

Naval Magazine Indian Island WWTP treats wastewater from the following sources:

• Domestic sewage from the operational areas,

• Ship sanitary wastewater collection and holding system (CHT)

• Seawater flushed through the ship's sanitary waste water system to clean the system

2. Treatment Process

The design flow of the facility is 0.043 million gallons per day (MGD). The reported actual flows from June 2016 to April 2021 for the facility range from 0.003 to 0.03 MGD with an average flow over this time period of 0.012 MGD. The average dry weather flow is 0.011 to 0.013 MGD. The treatment process consists of activated sludge, and disinfection using UV light. Naval Magazine Indian Island WWTP meets secondary treatment as follows:

• Removal of solids,

• Removal of oxygen-demanding organic material

• Destruction of disease causing organisms

When the facility is operated at or below design-loading criteria, it is capable of consistently removing 95% of the raw wastewater-suspended solids and biochemical oxygen demand (BOD) as well as destroying pathogenic organisms. The WWTP was upgraded in 2003 to include the construction of two new aeration lagoons, and headworks. In 2012, a new effluent UV disinfection system was installed, which came online in early 2013. A schematic of the wastewater treatment process and a map showing the location of the treatment facility and discharge are included in Appendix A**.** Because the design flow is less than 1 mgd, the facility is considered a minor facility.

B. OUTFALL DESCRIPTION

Treated effluent discharges year-round to Port Townsend Bay in Puget Sound. Discharge can be intermittent during the dry months of the year. The outfall is constructed of a 4-inch pipeline that flows by gravity terminating at a Y diffuser. The diffuser is located approximately 275 feet from the shoreline and was originally installed 11.6 feet below mean low lower water (MLLW).

C. EFFLUENT CHARACTERIZATION

To characterize the effluent, EPA evaluated the facility's application form, discharge monitoring report (DMR) data, and additional data provided by Naval Magazine Indian Island. The effluent quality is summarized in Table 2. DMR data are provided in Appendix B.

Table 2 Effluent Characterization

Parameter	Minimum	Maximum
BOD, 5-day, 20 deg. C	1.1 mg/L	16.3 mg/L

Weekly Average	0.0 lb/day	2.3 lb/day
BOD, 5-day, 20 deg. C Monthly Average	1.0 mg/L 0.0 lb/day	11.6 mg/L 1.7 lb/day
Total Suspended Solids Weekly Average	1.6 mg/L 0.3 lb/day	86.0 mg/L 3.4 lb/day
Total Suspended Solids Monthly Average	0.6 mg/L 0.0 lb/day	45.0 mg/L 1.96 lb/day
Fecal coliform bacteria Daily Maximum	1 #100 ml	10 #100 ml
Fecal coliform bacteria Monthly Average	1 #100 ml	4 #100 ml
Effluent temperature Daily Maximum	8.0 C	22.0 C
Effluent pH	6.5	8.6
Source: DMR data from 6/30/2016 to 4/30/2021 submitted electronically by permittee.		

D. COMPLIANCE HISTORY

Overall, the facility has had a good compliance record. There were no permit limit exceedances noted in the DMR data from June 2016 to April 2021.

Additional compliance information for this facility, including compliance with other environmental statutes, is available on Enforcement and Compliance History Online (ECHO). The ECHO web address for this facility is: https://echo.epa.gov/detailed-facility-report?fid=110042088674#pane3110042088674

EPA conducted an inspection of the facility on September 22, 2016. The inspection encompassed the wastewater treatment process, records review, operation and maintenance, and the collection system. Overall, the results of the inspection were favorable with no significant findings.

E. RECEIVING WATER

In drafting permit conditions, EPA must analyze the effect of the facility's discharge on the receiving water. The details of that analysis are provided in the**Error! Reference source not found.** (WQBEL) section below. This section summarizes characteristics of the receiving water that impact that analysis.

This facility discharges to Port Townsend Bay near the City of Port Hadlock, WA. Port Townsend Bay is in Washington State Waters. Since the Washington Department of Ecology does not have NPDES permitting authority for federal facilities, EPA is the permitting authority.

Other nearby point source outfalls include the New Day Fisheries Inc., Port Townsend Paper, and two boatyards permitted under Washington's Boatyard General Permit. Significant nearby non-point sources of pollutants include boat mooring, farming, and untreated non-regulated storm water.

1. Water Quality Standards (WQS)

CWA § 301(b)(1)(C) requires the development of limitations in permits necessary to meet WQS. 40 CFR 122.4(d) requires that the conditions in NPDES permits ensure compliance with the WQS of all affected States. A State's WQS are composed of use classifications, numeric and/or narrative water quality criteria and an anti-degradation policy. The use classification system designates the beneficial uses that each water body is expected to achieve, such as drinking water supply, contact recreation, and aquatic life. The numeric and narrative water quality criteria are the criteria deemed necessary to support the beneficial use classification of each water body. The anti-degradation policy represents a three-tiered approach to maintain and protect various levels of water quality and uses.

The facility is located on the US Naval Reservation Indian Island (i.e., a federal facility). The facility discharges into Washington State Waters, thus Washington State WQS apply.

2. Designated Beneficial Uses

The Washington WQS describes the receiving waters as: *Mukilteo and all North Puget Sound west of longitude 122[degrees]39'W (Whidbey, Fidalgo, Guemes and Lummi islands and State Highway 20 Bridge at Deception Pass), except as otherwise noted.*

The receiving water has the following Use Designations:

• Aquatic Life Use: Extraordinary quality

• Recreational Use: Primary contact recreation

• Harvest Use: All

• Miscellaneous Uses: domestic, industrial, agriculture, wildlife habitat, stock, harvesting, commerce and navigation, boating, and aesthetics.

The Extraordinary Aquatic Life Use designation has a General Description in WAC 173-201A-610, as follows: *Extraordinary quality. Water quality of this use class shall markedly and uniformly exceed the requirements for all uses including, but not limited to, salmonid migration and rearing; other fish migration, rearing, and spawning; clam, oyster, and mussel rearing and spawning; crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing and spawning.*

a. Water Quality

The water quality for the receiving water is summarized in Table 3.

Table 3. Receiving Water Quality Data

Parameter	Units	Percentile	Value
Temperature[1]	°C	95^{th}	7.8
DO[1]	mg/L	5^{th} – 95^{th}	8.5/9.0
pH[2]	Standard units	5^{th} – 95^{th}	7.4/8.0
Fecal coliform[3]	CFU/100ml	90th	2.5
1. DO and temperature obtained from WA DOE monitoring station PTH005 Port Townsend Harbor - Walan Point https://apps.ecology.wa.gov/eim/search/Default.aspx 2. pH obtained from WA DOE monitoring station ADM 001 Admiralty Inlet-Bush Point https://apps.ecology.wa.gov/eim/search/Default.aspx 3. Source: WA State DOH Station 34 Port Townsend https://fortress.wa.gov/doh/oswpviewer/index.html			

b. *Water Quality Limited Waters*

Any waterbody for which the water quality does not, and/or is not expected to meet, applicable WQS is defined as a "water quality limited segment." Section 303(d) of the CWA requires states to develop a Total Maximum Daily Load (TMDL) management plan for water bodies determined to be water quality limited segments. A TMDL is a detailed analysis of the water body to determine its assimilative capacity. The assimilative capacity is the loading of a pollutant that a water body can assimilate without causing or contributing to a violation of WQS. Once the assimilative capacity of the water body has been determined, the TMDL will allocate that capacity among point and non-point pollutant sources, taking into account natural background levels and a margin of safety. Allocations for non-point sources are known as "load allocations" (LAs). The allocations for point sources, known as "waste load allocations" (WLAs), are implemented through effluent limitations in NPDES permits. Effluent limitations for point sources must be consistent with applicable TMDL allocations.

The WWTP discharges in Ecology's Water Resource Inventory Area 17 (WRIA 7) Quilcene - Snow. Based on Ecology's mapping tool accessed July 2021 https://apps.ecology.wa.gov/waterqualityatlas/wqa/map , Ecology has not documented any water quality impairments in the receiving water in the vicinity of the outfall. However, it is well acknowledged that nitrogen is a limiting nutrient for Puget Sound which, in turn, affects the dissolved oxygen levels within Puget Sound. Ecology is working on the Puget Sound Nutrient Reduction Project to improve water quality and address dissolved oxygen impairments in Puget Sound. As part of the larger project, on December 1, 2021, Ecology issued the Puget Sound Nutrient General Permit for discharges of nitrogen from domestic wastewater treatment plants (POTWs) into Puget Sound.

III. EFFLUENT LIMITATIONS AND MONITORING

Table 4 below presents the existing effluent limits and monitoring requirements in the current permit. Table 5, below, presents the effluent limits and monitoring requirements proposed in the draft permit.

Table 4. Existing Permit - Effluent Limits and Monitoring Requirements

Parameter	Units	Effluent Limitations			Monitoring Requirements		
		Average Monthly	Average Weekly	Maximum Daily	Sample Location	Sample Frequency	Sample Type
Parameters with Effluent Limits							
Biochemical Oxygen Demand (BOD_5)	mg/L	30	45	--	Influent and Effluent	1/week	24-hour composite
	lbs/day	9	14	--			Calculation
Biochemical Oxygen Demand (BOD5) Percent Removal	%	85% (minimum)	--	--	--	1/month	Calculation
Total Suspended Solids (TSS)	mg/L	30	45	--	Influent and Effluent	1/week	24-hour composite
	lbs/day	9	14	--			Calculation
TSS Percent Removal	%	85 (minimum)	--	--	--	1/month	Calculation
Fecal coliform	CFU/ 100 ml	200	400	--	Effluent	Weekly	Grab
Report Parameters							
Flow	MGD	Report	--	Report	Effluent	Continuous	Recording
pH	std units	Report			Effluent	Weekly	Grab

The following effluent limitations are proposed in the draft permit:

Table 5. Draft Permit - Effluent Limits and Monitoring Requirements

Parameter	Units	Effluent Limitations			Monitoring Requirements		
		Average Monthly	Average Weekly	Maximum Daily	Sample Location	Sample Frequency	Sample Type
Parameters with Effluent Limits							
Biochemical Oxygen Demand (BOD_5)	mg/L	30	45	--	Influent and Effluent	1/week	24-hour composite
	lbs/day	9.0	14.0	--			Calculation[1]
Biochemical Oxygen Demand (BOD5) Percent Removal	%	85% (minimum)	--	--	--	1/month	Calculation[2]

Total Suspended Solids (TSS)	mg/L	30	45	--	Influent and Effluent	1/week	24-hour composite
	lbs/day	9.0	14.0	--			Calculation[1]
TSS Percent Removal	%	85 (minimum)	--	--	--	1/month	Calculation[2]
Total Inorganic Nitrogen (Interim limit)	mg/L	Report	--	--	Effluent	2/month[c]	Calculation[f]
	lbs/day	Report			Effluent	2/month[c]	Calculation[g]
Total Inorganic Nitrogen (Final limit)	mg/L	3.0	--	--	Effluent	2/month[c]	Calculation[f]
	lbs/day	1.1			Effluent	2/month[c]	Calculation[g]
Fecal coliform	CFU/ 100 ml	14	--	43 (instant. max) [4]	Effluent	5/month	Grab
Enterococci[3]	CFU/ 100 ml	30	--	110 (instant. max) [4]	Effluent	5/month	Grab
pH	std units	Between 6.0 – 9.0			Effluent	5/week [5]	Grab
Report Parameters							
Flow	MGD	Report	--	Report	Influent and Effluent	Continuous	Recording
$CBOD_5$[a]	mg/L	Report	--	Report	Influent and Effluent	2/month[c]	24-hour composite[d]
Total Ammonia	mg/L as N	Report	--	Report	Influent and Effluent	2/month[c]	24-hour composite[d]
Nitrate plus Nitrite Nitrogen	mg/L as N	Report	--	Report	Influent and Effluent	2/month[c]	24-hour composite[d]
Total Kjeldahl Nitrogen (TKN)	mg/L as N	Report	--	Report	Influent and Effluent	1/month[b]	24-hour composite[d]
Total Organic Carbon	mg/L	Report	--	Report	Effluent	1/quarter[d]	24-hour composite[d]
Average Monthly Total Inorganic Nitrogen	lbs					1/month[b]	Calculation[h]
Annual Total Inorganic Nitrogen, year to date	lbs					1/month[b]	Calculation[i]

Temperature	°C	Report	--	Report	Effluent	Daily	Grab

Notes:

1. Loading (in lbs/day) is calculated by multiplying the concentration (in mg/L) by the corresponding flow (in mgd) for the day of sampling and a conversion factor of 8.34. For more information on calculating, averaging, and reporting loads and concentrations see the *NPDES Self-Monitoring System User Guide* (EPA 833-B-85-100, March 1985).

2. Percent Removal. The monthly average percent removal must be calculated from the arithmetic mean of the influent values and the arithmetic mean of the effluent values for that month using the following equation:

(average monthly influent concentration – average monthly effluent concentration) ÷ average monthly influent concentration x 100. Influent and effluent samples must be taken over approximately the same time period.

3. The average monthly Enterococci bacteria counts must not exceed a geometric mean of 30/100 ml based on a minimum of five samples taken every 3 - 7 days within a calendar month. See Part VI of this permit for a definition of geometric mean. The Department of Ecology provides directions to calculate the monthly and weekly geometric mean in publication No. 04-10-020, Information Manual for Treatment Plant Operators available at: https://fortress.wa.gov/ecy/publications/documents/0410020.pdf.

4. Reporting is required within 24 hours of a maximum daily limit or instantaneous maximum limit violation. See Paragraph I.B.4 and Part III.G of this permit.

5. Samples must be taken on different days.

a. Take effluent samples for the CBOD5 analysis before or after the disinfection process. If taken after, dechlorinate and reseed the sample.

b. 1/month means one (1) time during each month.

c. 2/month means two (2) times during each month and on a rotational basis throughout the days of the week, except weekends and holidays.

d. Quarterly sampling periods are January through March, April through June, July through September, and October through December. The Permittee must begin quarterly monitoring for the quarter beginning on 1/1/22 4/1/22 7/1/22 10/1/22 and submit results by 4/15/22, 7/15/22, 10/15/22, 1/15/22 (subject to change based on effective date of permit, these dates are for draft illustration only.

e. 24-hour composite means a series of individual samples collected over a 24-hour period into a single container, and analyzed as one sample.

f. Report daily flows on days when collecting total ammonia and nitrate plus nitrite samples.

g. TIN (mg/L) as N = Total Ammonia (mg/L as N) + Nitrate plus Nitrite (mg/L as N)

h. Calculate mass concurrently with the respective concentration of a sample, using the following formula: Concentration (in mg/L) X daily flow (in MGD) X Conversion Factor (8.34) =lbs/day

i. Calculate the monthly average total inorganic nitrogen load (lbs as N) using the following equation:

$$\text{Monthly average TIN load (lbs as N)} = \left(\left(\sum \text{Calculated TIN loads} \left(\frac{\text{lbs}}{\text{day}} as\ N\right)\right) / number\ of\ samples\right) \text{ x number of days in the calendar month}$$

j. Calculate the annual total inorganic nitrogen, year to date using the following calculation:

$$\text{Annual TIN load (lbs as N)} = \sum \text{Monthly average TIN loads, to date}$$

Table 6. Summary of Proposed Updates to Permit Limits and Monitoring Requirements

Parameter	Current Permit	Draft Permit	Reason
		Effluent Limit Changes	
Total inorganic nitrogen (TIN)	None	3.0 mg/L/1.1 lbs/day	Compliance with WAC 173-201A-400 AKART, minimization of pollutants of concern.
Fecal coliform	200/400 CFU/100 ml	14/43 CFU/100 ml	Compliance with current Washington State Water Quality Standards for Shellfish Harvesting WAC 173-201A-210(2)(b)
Enterococci	None	30/110 CFU/100 ml	Compliance with current Washington State Water Quality Standards for Primary Contact Recreation WAC 173-201A-210(3)(b) Table 210.
		Monitoring Changes	
$CBOD_5$ Total Ammonia Nitrate+Nitrite Nitrogen TKN Total Organic Carbon	None	See Table 5 for proposed monitoring frequencies.	To evaluate nutrient discharge loading.
Influent Flow	None	Continuous	To evaluate hydraulic and organic loading
Effluent Temperature	None	Daily Grab	To evaluate potential for temperature effects on receiving water.

A. BASIS FOR EFFLUENT LIMITS

In general, the CWA requires that the effluent limits for a particular pollutant be the more stringent of either technology-based effluent limits (TBELs) or water quality-based effluent limits (WQBELs). TBELs are set according to the level of treatment that is achievable using available technology. A WQBEL is designed to ensure that the

WQSs applicable to a waterbody are being met and may be more stringent than TBELs.

1. Pollutants of Concern

Pollutants of concern are those that either have TBELs or may need WQBELs. EPA identifies pollutants of concern for the discharge based on those which:

- Have a TBEL
- Have an assigned wasteload allocation (WLA) from a TMDL
- Had an effluent limit in the previous permit
- Are present in the effluent monitoring. Monitoring data are reported in the application and DMR and any special studies
- Are expected to be in the discharge based on the nature of the discharge

The wastewater treatment process for this facility includes both primary and secondary treatment, as well as disinfection with UV light. Pollutants expected in the discharge from a facility with this type of treatment include but are not limited to: ammonia, five-day biochemical oxygen demand (BOD_5), enterococci bacteria, fecal coliform bacteria, effluent pH, effluent temperature, nitrogen and total suspended solids (TSS).

Based on this analysis, pollutants of concern are as follows:

- Ammonia
- BOD_5
- Enterococci bacteria
- Fecal coliform bacteria
- Effluent pH
- Effluent temperature
- Total Inorganic Nitrogen
- TSS

2. Technology-Based Effluent Limits (TBELs)

a. Federal Secondary Treatment Effluent Limits

The CWA requires POTWs to meet performance-based requirements based on available wastewater treatment technology. CWA § 301 established a required performance level, referred to as “secondary treatment,” which POTWs were required to meet by July 1, 1977. EPA has developed and promulgated “secondary treatment” effluent limitations, which are found in 40 CFR 133.102. These TBELs apply to certain municipal WWTPs and identify the minimum level of effluent quality attainable by application of secondary treatment in terms of BOD_5, TSS, and pH. The federally promulgated secondary treatment effluent limits are listed in Table 7. For additional information and background refer to Part 5.1 *Technology Based Effluent Limits for POTWs* in the Permit Writers Manual.

Table 7. Secondary Treatment Effluent Limits

Parameter	30-day average	7-day average
BOD_5	30 mg/L	45 mg/L
TSS	30 mg/L	45 mg/L
Removal for BOD_5 and TSS (concentration)	85% (minimum)	--
pH	within the limits of 6.0 - 9.0 s.u.	
Source: 40 CFR 133.102		

Naval Magazine Indian Island is a federally owned industrial treatment facility, not a POTW. Where effluent guidelines have not been promulgated by EPA, the Act and NPDES regulations at 40 CFR § 125.3 require the permit writer to establish technology based effluent limits on a case-by-case basis based on Best Professional Judgment (BPJ). Since the Naval Magazine Indian Island treatment process is nearly identical to a POTW, EPA has applied the POTW secondary treatment effluent limits to this permit, based on BPJ.

b. *Mass-Based Limits*

The federal regulation at 40 CFR 122.45(f) requires that effluent limits be expressed in terms of mass, except under certain conditions. The regulation at 40 CFR 122.45(b) requires that effluent limitations for POTWs be calculated based on the design flow of the facility. The mass based limits are expressed in pounds per day and are calculated as follows:

Mass based limit = concentration limit (mg/L) × design flow (mgd) × 8.34[1]

Since the design flow for this facility is 0.043 mgd, the technology-based mass limits for BOD_5 and TSS are calculated as follows:

Average Monthly Limit = 30 mg/L × 0.043 mgd × 8.34 = 10.8 lbs/day

Average Weekly Limit = 45 mg/L × 0.043 mgd × 8.34 = 16.1 lbs/day

However, due to prohibitions on backsliding, the proposed permit will maintain the previous Average Monthly mass limits of 9.0 and Average Weekly mass limits of 14.0 lbs/day. The facility has a history of consistent compliance with current mass limits.

c. *Summary Discussion of TBELs*

BOD_5

The permit contains the secondary treatment standards set forth in 40 CFR 125.3 based upon BPJ.For BOD_5. Thus, the facility is required to meet an Average Monthly Limit of 30 mg/l, and an Average Weekly Limit of 45 mg/l. During the last permit cycle, the facility's 95th percentile Average Monthly Limit monitoring was 7.2 mg/l, and the 95th percentile Average Weekly Limit monitoring was 10.5 mg/l, which are both well under the permitted limits. The facility consistently has an average BOD removal of approximately 98%. However, due to prohibitions on backsliding, the proposed permit will maintain

[1] 8.34 is a conversion factor with units (lb ×L)/(mg × gallon×10^6)

the previous Average Monthly mass limits of 9.0 lbs/day and Average Weekly mass limits of 14.0 lbs/day. The facility has a history of consistent compliance with current mass limits.

TSS

As explained above, the permit contains the secondary treatment standards set forth in 40 CFR 125.3 based upon BPJ for TSS. Thus, the facility is required to meet an Average Monthly Limit of 30 mg/l, and an Average Weekly Limit of 45 mg/l. During the last permit cycle, the facility's 95th percentile Average Monthly Limit monitoring was 6.5 mg/l, and the 95th percentile Average Weekly Limit monitoring was 12.7 mg/l, which are both well under the permitted limits. The facility consistently has an average TSS removal of approximately 97%. The TBELs for TSS are proposed to be retained for the next permit cycle. However, due to prohibitions on backsliding, the proposed permit will maintain the previous Average Monthly mass limits of 9.0 lbs/day and Average Weekly mass limits of 14.0 lbs/day. The facility has a history of consistent compliance with current mass limits.

pH

The technology-based limits for pH are the secondary treatment standards of 6.0 to 9.0 set forth in 40 CFR 125.3 based upon BPJ.

TIN

Both the Washington Department of Ecology and EPA have recognized that there are nutrient related DO reductions in Puget Sound. Ecology has identified nitrogen as a primary human source contributor to reduced DO levels. Total inorganic nitrogen (TIN) has been selected as the indicator pollutant instead of total nitrogen because TIN is the primary bioavailable component for algal growth which drives eutrophication and the existing DO impairments. In July 2017, Ecology launched the Puget Sound Nutrient Reduction Project to work on a collaborative plan to address human sources of nutrients in Puget Sound. In addition, Ecology refined the Salish Sea Model and concluded that all domestic WWTPs that discharge nitrogen to Puget Sound have reasonable potential to exceed the numeric DO criteria. As a result of these findings, on January 30, 2020, the Washington Department of Ecology announced plans to develop a Puget Sound Nutrient General Permit (PSNGP), which provides coverage to nearly 70 domestic WWTPs that discharge nitrogen. Ecology issued the PSNGP on December 1, 2021. The PSNGP and related fact sheet and response to public comments can be accessed as a free download here https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Nutrient-Permit The PSNGP specifically excludes coverage to the following types of facilities:

1. WWTPs that are federally owned or operated, or located on tribal land, or discharge to tribal waters with EPA approved water quality standards.

2. Privately owned WWTPs currently permitted by Ecology with an individual NPDES permit.
3. POTWs located in tributary watersheds feeding Puget Sound.
4. Industrial WWTPs discharging to Puget Sound.

Naval Magazine Indian Island is a federally owned treatment facility (FOTW-category 1 above), not a POTW. Since the Washington Department of Ecology does not have permitting authority over federal facilities, this facility cannot obtain coverage under the PSNGP for its nitrogen discharges.

Under 40 CFR § 125.3(c), technology-based treatment requirements may be imposed on a case-by-case basis where EPA has not promulgated effluent limitations for the specific pollutant. The permit writer must apply the factors set forth in 40 CFR § 125.3(d)(3) which includes the consideration of appropriate technology for the category or class of point sources that the applicant is a member, based upon all available information, and any unique factors relating to the applicant. In setting best professional judgement (BPJ) case-by-case limitations based on best available technology (BAT) pursuant to § 125.3(c), EPA considered the following factors:

(i) The age of equipment and facilities involved;

(ii) The process employed;

(iii) The engineering aspects of various types of control techniques;

(iv) Process changes;

(v) The cost of achieving such effluent reduction; and

(vi) Non-water quality environmental impact (including energy requirements).

A discussion of each of the factors is presented below.

The age of equipment and facilities involved

EPA conducted site visits as well as gathered additional information from the Navy regarding the age of equipment and facilities, please see section II.A for more information. EPA concluded the age of equipment and facilities will not be a barrier to adding nitrogen removal, however time will need to be allowed for design, construction, and facility start up.

The process employed

The facility utilizes conventional secondary wastewater treatment technology. This technology is considered well understood and is used successfully in many industries. Numerous nitrogen removal technologies are compatible with conventional secondary wastewater treatment technology. The addition of nitrogen removal processes would be considered tertiary treatment.

The engineering aspects of various types of control techniques

Nitrogen removal technology is available in the commercial marketplace from many manufacturers. Based on the nitrogen removal technology the Navy selects, engineering support will likely be needed to assess nitrogen removal requirements, size the process and equipment, and plan construction for the required facility upgrades.

EPA published *Innovative Nutrient Removal Technologies: Case Studies of Intensified or Enhanced Treatment* -EPA830-R-01-001 in August 2021. This document is available as a free download here https://www.epa.gov/system/files/documents/2021-08/innovative-nutrient-removal-technologies-report-082721.pdf A nutrient limit is being established based on examples of BAT cited in recent case studies for three example treatment facilities: AlexRenew Advanced Resource Recovery Facility – Alexandria Virginia (AWRRF), South Durham Water Reclamation Facility – Durham, North Carolina (SDWRF), and Town of Hillsborough Wastewater Treatment Plant – Hillsborough, North Carolina (HWWTP) (EPA, 2021). The three facilities selected are utilizing available treatments technology to reduce nitrogen in their respective discharges. A summary of nitrogen removal performance is summarized below in EPA does not anticipate any significant non-water quality environmental related impacts as a result of the addition of nitrogen removal. Technologies exist for nitrogen removal that have minimal energy requirements. The application of additional automation and energy efficient technology during a facility upgrade can result in a overall reduction in the energy use of a facility even with the addition of new processes.

Establishment of TBEL for TIN

As part of the BPJ determination of what constitutes BAT, EPA has determined that the 3.0 mg/L TBEL will not apply until five years after the effective date of the permit. In order for the facility to comply with this deadline, EPA has established the schedule set forth in Table 9. Implementation Schedule for TIN BAT Determination.

Table 9. Implementation Schedule for TIN BAT Determination

Task No.	Due By	Task Activity
1	12 months from the effective date of the permit	**Facility Planning** The permittee must develop a facility plan that evaluates alternatives to meet the final effluent limitations for TIN* and select a preferred alternative. The facility plan will include a cost estimate for design and construction of the preferred alternative.

Task No.	Due By	Task Activity
2	18 months from the effective date of this permit.	**Facility Funding** The permittee must acquire the funds necessary to complete all facility upgrades/changes in facility operations outlined in the facility plan required to meet the final effluent limitations for TIN by the end of this schedule.
3	30 months from the effective date of the permit	**Final Design** The permittee must complete design of the selected alternative for meeting the final TIN effluent limitations.
4	36 months from the effective date of the permit	**Award Bid for Construction**
5	48 months from the effective date of the permit	**Construction Complete** The permittee must complete construction to achieve the TIN effluent limitations.
6	60 months from the effective date of the permit	**Meet Effluent Limitation for TIN** Training and optimization of process such that compliance with the TIN effluent limitations are achieved.
*Note – If compliance with the final TIN effluent limits is achieved sooner than the listed schedule, the permittee may submit the supporting documentation earlier than the dates listed above. The permittee must provide written notice to EPA that the TIN limits are achieved.		

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Table 8. Summary Statistics for Final Effluent Total Nitrogen

Facility		TN Monthly Average (mg/L)	TN 12 Month Rolling Average (mg/L)
AWRRF	Min	2.00	2.49
	Max	4.93	3.81
SDWRF	Min	3.63	5.82
	Max	9.30	7.99
HWWTP	Min	0.74	1.44
	Max	4.95	1.96
	Ave Min	2.12	3.25
	Ave Max	6.39	4.59

Average maximum nitrogen removal performance ranged from a monthly average of 2.12 mg/L to a 12 month rolling average of 3.25 mg/L, therefore according to BPJ, EPA proposes to establish a technology based limit for TIN of 3.0 mg/L with a corresponding maximum daily nitrogen discharge of 1.1 lbs/day. EPA has determined that this constitutes the BAT TBEL for FOTWs that discharge nitrogen to Puget Sound.

Process Changes

Process changes may be made to the existing facility to reduce nitrogen levels prior to the installation of tertiary treatment. EPA is requiring the Navy to optimize the current process for nitrogen removal utilizing best management practices (BMPs), In addition to the numeric TBEL, BMP requirements for nitrogen removal optimization and reporting will be included in the Special Conditions of the draft permit.

The cost of receiving such effluent reduction

Unlike POTWs, federal facilities obtain their funding through appropriations, not through ratepayer fees. Thus, FOTWs do not need to rely upon increasing ratepayer fees to upgrade treatment at the facility. EPA recognizes cost for the installation of nutrient removal technology is highly variable depending on site conditions, climate, and wastewater characteristics. EPA does not believe cost will be a barrier and the commercial marketplace can provide the Navy suitable technology in a competitive environment. However, FOTWs do need time to obtain the appropriations necessary to upgrade a facility and must also have time to complete the necessary upgrades. Therefore, in making this BPJ determination, EPA has also considered the treatment upgrades that would need to be made and the timing of the potential issuance of this permit with the fiscal funding calendar for federal agencies.

Non-water quality environmental impact, including energy requirements

EPA does not anticipate any significant non-water quality environmental related impacts as a result of the addition of nitrogen removal. Technologies exist for nitrogen removal that have minimal energy requirements. The application of additional automation and energy efficient technology during a facility upgrade can result in a overall reduction in the energy use of a facility even with the addition of new processes.

Establishment of TBEL for TIN

As part of the BPJ determination of what constitutes BAT, EPA has determined that the 3.0 mg/L TBEL will not apply until five years after the effective date of the permit. In order for the facility to comply with this deadline, EPA has established the schedule set forth in Table 9. Implementation Schedule for TIN BAT Determination.

Table 9. Implementation Schedule for TIN BAT Determination

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2	18 months from the effective date of this permit.	**Facility Funding** The permittee must acquire the funds necessary to complete all facility upgrades/changes in facility operations outlined in the facility plan required to meet the final effluent limitations for TIN by the end of this schedule.
3	30 months from the effective date of the permit	**Final Design** The permittee must complete design of the selected alternative for meeting the final TIN effluent limitations.
4	36 months from the effective date of the permit	**Award Bid for Construction**

Task No.	Due By	Task Activity
5	48 months from the effective date of the permit	**Construction Complete** The permittee must complete construction to achieve the TIN effluent limitations.
6	60 months from the effective date of the permit	**Meet Effluent Limitation for TIN** Training and optimization of process such that compliance with the TIN effluent limitations are achieved.
*Note – If compliance with the final TIN effluent limits is achieved sooner than the listed schedule, the permittee may submit the supporting documentation earlier than the dates listed above. The permittee must provide written notice to EPA that the TIN limits are achieved.		

EPA also acknowledges WAC 173-201A-400 which states a discharger shall be required to fully apply all known, available and reasonable methods of prevention, control and treatment (AKART) and concentrations of pollutants present shall be minimized. AKART is a technology-based approach to limiting pollutants, which includes both an engineering and an economic judgment, which is similar to the BPJ analysis that EPA utilized for TIN.

3. Water Quality Based Effluent Limits (WQBELs)

a. Statutory and Regulatory Basis

CWA § 301(b)(1)(C) requires the development of limitations in permits necessary to meet WQSs. Discharges to State or Tribal waters must also comply with conditions imposed by the State or Tribe as part of its certification of NPDES permits under CWA § 401. 40 CFR 122.44(d)(1) requires that permits include limits for all pollutants or parameters which are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State or Tribal WQS, including narrative criteria for water quality. Effluent limits must also meet the applicable water quality requirements of affected States other than the State in which the discharge originates, which may include downstream States (40 CFR 122.4(d), 122.44(d)(4), see also CWA § 401(a)(2)).

The regulations require the permitting authority to make this evaluation using procedures which account for existing controls on point and nonpoint sources of pollution, the variability of the pollutant in the effluent, species sensitivity (for toxicity), and where appropriate, dilution in the receiving water. The limits must be stringent enough to ensure that WQSs are met and must be consistent with any available wasteload allocation for the discharge in an approved TMDL. If there are no approved TMDLs that specify wasteload allocations for this discharge, all of the WQBELs are calculated directly from the applicable WQSs.

b. *Reasonable Potential Analysis*

EPA uses the process described in the *Technical Support Document for Water Quality-based Toxics Control* (*TSD*) to determine reasonable potential. To determine if there is reasonable potential for the discharge to cause or contribute to an exceedance of water quality criteria for a given pollutant, EPA compares the maximum projected receiving water concentration to the water quality criteria for that pollutant. If the projected receiving water concentration exceeds the criteria, there is reasonable potential, and a WQBEL must be included in the permit.

In some cases, a dilution allowance or mixing zone is permitted. A mixing zone is a limited area or volume of water where initial dilution of a discharge takes place and within which certain water quality criteria may be exceeded (EPA, 2014). While the criteria may be exceeded within the mixing zone, the use and size of the mixing zone must be limited such that the waterbody as a whole will not be impaired, all designated uses are maintained and acutely toxic conditions are prevented.

WAC 173-201A-400(7)(b)(ii) states that the area of Puget Sound including Port Townsend Bay is considered to be estuarine. Therefore, Port Townsend Bay is “estuarine” for purposes of determining the size of a mixing zone.

The facility’s outfall is located at the depth of 11.6 feet below mean lower low water (MLLW).

WAC 173-201A-400(7)(b)(i) defines the chronic mixing zone for estuarine receiving waters. The mixing zone is determined by adding 200 feet to the depth of water over the discharge port as measured during Mean Lower Low Water (MLLW). Accordingly, it is determined that the size of the mixing zone is 211.6 feet for the Chronic Criteria. EPA used these site-specific parameters to determine dilution ratios, and reasonable potential calculations as shown in the Appendix D.

WAC 173-201A-400(8)(b) states that in estuarine waters, a zone where acute criteria may be exceeded shall not extend beyond ten percent of the distance established in subsection (7)(b) of this section as measured independently from the discharge port(s). Therefore, for the acute criteria, the size of the mixing zone is 10%, which calculates to 21.2 feet.

In developing the proposed permit conditions, the Navy’s Basic & Applied Research Division, Naval Information Warfare Center Pacific (NIWC PAC) modeled the dilution at the edges of the acute and chronic mixing zones using site-specific conditions in a CORMIX model. CORMIX is a USEPA-supported mixing zone model and decision support system for an environmental impact assessment of regulatory mixing zones resulting from continuous point source discharges. The system emphasizes the role of boundary interaction to predict steady-state mixing behavior and plume geometry. CORMIX uses a series of dilution equations based on characteristics of the wastewater effluent and ambient receiving water to determine the physical dispersion of pollutants. For the purpose of the proposed permit, a three dimensional model was used to incorporate the presence of ambient current into the model. Effluent parameters for the model include design flow rate, temperature, salinity, and information on the diffuser, including the depth of the diffuser and the number of ports and their sizes, spacing, and angle-orientation. The ambient receiving water characteristics required by the model include temperature, current speed and current direction. The model enables users to model site-specific circumstances and calculate the acute and chronic mixing zone dilution ratios.

Table 11 in Appendix D summarizes the input parameters used in the CORMIX model.

Using the above approach and mixing zone size, the model predicted the following dilution factors:

Acute Mixing Zone dilution factor: 31

Chronic Mixing Zone dilution factor: 356

The following reasonable potential analysis and WQBEL calculations were based on mixing zones and dilution factors shown above. While EPA used Washington's mixing zone water quality standard to determine the size of the mixing zone, EPA does not have the authority to use a mixing zone if Ecology does not authorize the mixing zone in its CWA 401 Certification. Therefore, if Ecology does not provide a mixing zone or provides different dilution factors in the CWA 401 Certification for this permit, EPA will recalculate the reasonable potential analysis and water quality-based effluent limits based on the dilution provided in the CWA 401 Certification.

The equations used to conduct the reasonable potential analysis and calculate the WQBELs are provided in Appendix D.

c. *Reasonable Potential Analysis Summary by Pollutant*

The reasonable potential and WQBEL for specific parameters are summarized below. The calculations are provided in Appendix A.

BOD_5

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 BOD_5 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.

As explained above, the permit contains the secondary treatment standards set forth in 40 CFR 125.3 based upon BPJ for BOD_5.

EPA modeled the predicted impact of the effluent on the receiving water. The predicted difference between ambient DO and the DO at the chronic mixing boundary is 0.03 mg/L with a predicted DO concentration at the edge of the chronic mixing zone of 8.97 mg/L, well above the DO water quality standard of 7.0 mg/L. Modeling results are presented in Appendix D.

When BOD_5 is discharged at permitted levels into the marine waters from the facility, there is not reasonable potential to have an appreciable effect on the DO concentration in Port Townsend Bay. The point of maximum oxygen depletion occurs miles from the source, thus the dilution factor will be far greater than the chronic dilution factor of 356, see Section III.A.3(b) for discussion of outfall modeling and corresponding dilution factors. The proposed effluent limitation for BOD_5 will control the discharge of oxygen demanding constituents into Puget Sound, thus the secondary treatment standards set forth in 40 CFR § 125.3 for BOD_5 are proposed to be retained for the next permit cycle.

pH

The Washington water quality criterion for extraordinary quality marine water specifies a pH range of 7.0 to 8.5 standard units, with human-caused variation within the above range of less than 0.2 units (WAC 173-201A-210(1)(f)). The DMR data from the last permit cycle show that the facility reported the effluent having a pH range from 6.5 s.u. (minimum) to 8.6 s.u. (maximum).

EPA conducted analysis that demonstrated that compliance with the technology-based limits of 6.0 to 9.0 standard units will assure compliance with the relevant WQS because of the high buffering capacity of marine water. The impact of effluent pH on the receiving water was modeled and confirms compliance with the water quality standards using calculations developed by Lewis and Wallace, 1988. As shown in Appendix D, the largest impact predicted is 0.02 standard units. There is no reasonable potential to exceed WQS, therefore the permit contains the technology-based pH effluent limits.

Ammonia

Ammonia criteria are based on a formula which relies on the pH and temperature of the receiving water, because the fraction of ammonia present as the toxic, un-ionized form increases with increasing pH and temperature. Therefore, the criteria become more stringent as pH and temperature increase.

Currently, no ammonia testing results exist for the Naval Magazine Indian Island effluent discharge. To better understand the possible impacts of ammonia levels in the effluent, the proposed permit requires monitoring for ammonia. The data generated will be used to assess reasonable potential during the next permit cycle.

Enterococci bacteria

Washington State's water quality criteria for Primary Contact Recreation WAC 173-201A-210(3)(b) Table 210 require enterococci organism levels within an averaging period must not exceed a geometric mean value of 30 CFU or MPN per 100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample values exist) obtained within the averaging period exceeding 110 CFU or MPN per 100 mL. WAC 173-201A-400 states a discharger shall be required to fully apply all known, available and reasonable methods of prevention, control and treatment (AKART) prior to being authorized a mixing zone and the size of a mixing zone and the concentrations of pollutants present shall be minimized. The Naval Magazine Indian Island WWTP has demonstrated the ability to reduce bacteria in effluent to low levels using UV disinfection, thus the Washington water quality based criteria are to be met at the point of discharge.

Fecal coliform bacteria

Washington State's water quality criteria for Shellfish Harvesting WAC 173-201A-210-(2)(b) requires that the fecal coliform levels shall both not exceed a geometric mean of 14 colonies/100mL and not have more than 10 percent of all samples obtained for calculating the geometric mean value exceeding 43 colonies/100mL. WAC 173-201A-400 states a discharger shall be required to fully apply AKART prior to being authorized a mixing zone and the size of a mixing zone and the concentrations of pollutants present shall be minimized. The Naval Magazine Indian Island WWTP has demonstrated the ability to reduce fecal coliform bacteria in effluent to low levels. The DMR data shows a 90^{th} percentile of 2 CFU/100ml, thus the Washington water quality based criteria are to be met at the point of discharge.

Temperature

In WAC 173-201A-210 Table 210(1)(c), Washington's aquatic life temperature criteria limit the ambient water temperature to 13ºC (1-day Maximum) for Extraordinary Quality marine water.

The highest 1-day maximum ambient temperature of water in the vicinity of Ecology's monitoring station PTH005 Port Townsend Harbor - Walan Point is 7.8°C.

As shown in Appendix D, the Navy conducted modeling to determine if there was reasonable potential to exceed Washington's WQS for temperature. Since the ambient temperature increase in the receiving water is predicted to be a maximum of 0.025°C, there is no potential to violate Washington's WQS for temperature; therefore, no effluent limit for temperature is warranted. Effluent temperature monitoring is proposed for the draft permit to assess reasonable potential during the next permit cycle.

Narrative Criteria

In addition, Washington State WQS require that surface waters be free from floating, suspended, or submerged matter of any kind in concentrations impairing designated beneficial uses. The draft permit contains a narrative limitation prohibiting the discharge of such materials.

d. Antibacksliding

CWA § 402(o) and 40 CFR §122.44 (l) generally prohibit the renewal, reissuance or modification of an existing NPDES permit that contains effluent limits, permit conditions or standards that are less stringent than those established in the previous permit (i.e., anti-backsliding) but provides limited exceptions. For explanation of the antibacksliding exceptions refer to Chapter 7 of the Permit Writers Manual *Final Effluent Limitations and Anti-backsliding*.

While the mass loadings did increase due to an increase in design flow, the concentration based BOD and TSS limits remain the same as the previous permit.

Since all the proposed effluent limits are as stringent as the previous permit, the draft permit complies with the antibacksliding provisions and an antibacksliding analysis is not necessary.

B. MONITORING REQUIREMENTS

CWA § 308 and federal regulation 40 CFR 122.44(i) require monitoring in permits to determine compliance with effluent limitations. Monitoring may also be required to gather effluent and surface water data to determine if additional effluent limitations are required and/or to monitor effluent impacts on receiving water quality.

The permit also requires the permittee to perform effluent monitoring required by the NPDES Form 2A application, so that these data will be available when the permittee applies for a renewal of its NPDES permit.

The permittee is responsible for conducting the monitoring and for reporting results on DMRs or on the application for renewal, as appropriate, to EPA.

1. Effluent Monitoring

Monitoring frequencies are based on the nature and effect of the pollutant, as well as a determination of the minimum sampling necessary to adequately monitor the facility’s performance. Permittees have the option of taking more frequent samples than are required under the permit. These samples must be used for averaging if they are conducted using EPA-approved test methods (generally found in 40 CFR 136) or as specified in the permit. Effluent monitoring changes from the previous permit are summarized in Table 6.

2. Surface Water Monitoring

In general, surface water monitoring may be required for pollutants of concern to assess the assimilative capacity of the receiving water for the pollutant. In addition, surface water monitoring may be required for pollutants for which the water quality criteria are dependent and to collect data for TMDL development if the facility discharges to an impaired water body. Table 10 presents the proposed surface water monitoring requirements for the draft permit. Surface water monitoring results must be submitted with the DMR.

Table 10. Surface Water Monitoring in Draft Permit

Parameter	Units	Sample Type	Sample Quantity/Frequency
DO[2]	mg/L	Grab	3/Quarterly
Enterococci bacteria[1]	CFU/100 ml	Grab	1/Quarterly
Fecal coliform bacteria[1]	CFU/100 ml	Grab	1/Quarterly
pH	Standard units	Grab	1/Quarterly
Salinity	g/kg	Grab	1/Quarterly
Temperature	°C	Grab	1/Quarterly

1 – Monitor at edge of chronic mixing zone in direction of prevalent current at time of sampling.

2 – DO samples must be taken in upper third, middle third, and lower third of water column.

3. Outfall 001 Evaluation Report

The draft permit requires the facility to inspect the submerged portion of the outfall pipe and diffuser to document its integrity and continued function, confirm and verify the outfall coordinates, and provide an inspection video. The inspection shall evaluate the structural condition of the submarine portion of the outfall, determine whether portions of the outfall are covered by sediments, and determine whether all diffuser ports are flowing freely. The facility must also perform a dye test to determine the structural integrity of the submarine outfall pipe. Photographic verification shall be included in the report. A brief report of this inspection shall be submitted to EPA, together with the next permit application.

4. Electronic Submission of Discharge Monitoring Reports

The draft permit requires that the permittee submit DMR data electronically using NetDMR. NetDMR is a national web-based tool that allows DMR data to be submitted electronically via a secure Internet application.

EPA currently conducts free training on the use of NetDMR. Further information about NetDMR, including upcoming trainings and contacts, is provided on the following website: https://netdmr.epa.gov. The permittee may use NetDMR after requesting and receiving permission from EPA Region 10.

C. SLUDGE (BIOSOLIDS) REQUIREMENTS

EPA Region 10 separates wastewater and sludge permitting. EPA has authority under the CWA to issue separate sludge-only permits for the purposes of regulating biosolids. EPA may issue a sludge-only permit to each facility at a later date, as appropriate.

Until future issuance of a sludge-only permit, sludge management and disposal activities at each facility continue to be subject to the national sewage sludge standards at 40 CFR Part 503 and any requirements of the State's biosolids program. The Part 503 regulations are self-implementing, which means that facilities must comply with them whether or not a permit has been issued.

IV. OTHER PERMIT CONDITIONS

D. COMPLIANCE SCHEDULES

Compliance schedules are authorized by federal NPDES regulations at 40 CFR 122.47. Compliance schedules allow a discharger to phase in, over time, compliance with WQBELs when limitations are in the permit for the first time. EPA has found that a compliance schedule is not appropriate for enterococci bacteria because the facility can immediately comply with the new effluent on the effective date of the permit.

E. QUALITY ASSURANCE PLAN

The United States Department of the Navy is required to update the Quality Assurance Plan (QAP) within 90 days of the effective date of the permit. The QAP must consist of standard operating procedures the permittee must follow for collecting, handling, storing and shipping samples, laboratory analysis, and data reporting. The plan must be retained on site and made available to EPA upon request.

F. OPERATION AND MAINTENANCE PLAN

The permit requires the United States Department of the Navy to properly operate and maintain all facilities and systems of treatment and control. Proper operation and maintenance is essential to meeting discharge limits, monitoring requirements, and all other permit requirements at all times. The permittee is required to develop and implement an operation and maintenance plan for their facility within 180 of the effective date of the permit. The plan must be retained on site and made available to EPA upon request.

G. SANITARY SEWER OVERFLOWS & PROPER COLLECTION SYSTEM O&M

SSOs are not authorized under this permit. The permit contains language to address SSO reporting and public notice and operation and maintenance of the collection system. The permit requires that the permittee identify SSO occurrences and their causes. In addition, the permit establishes reporting, record keeping and third party notification of SSOs. Finally, the permit requires proper operation and maintenance of the collection system.

The following specific permit conditions apply:

Immediate Reporting – The permittee is required to notify EPA of an SSO within 24 hours of the time the permittee becomes aware of the overflow. (See 40 CFR 122.41(l)(6))

Written Reports – The permittee is required to provide EPA a written report within five days of the time it became aware of any overflow that is subject to the immediate reporting provision. (See 40 CFR 122.41(l)(6)(i)).

Third Party Notice – The permit requires that the permittee establish a process to notify specified third parties of SSOs that may endanger health due to a likelihood of human exposure; or unanticipated bypass and upset that exceeds any effluent limitation in the permit or that may endanger health due to a likelihood of human exposure. The permittee is required to develop, in consultation with appropriate authorities at the local, county, tribal and/or state level, a plan that describes how, under various overflow (and unanticipated bypass and upset) scenarios, the public, as well as other entities, would be notified of overflows that may endanger health. The plan should identify all overflows that would be reported and to whom, and the specific information that would be reported. The plan should include a description of lines of communication and the identities of responsible officials. (See 40 CFR 122.41(l)(6)).

Record Keeping – The permittee is required to keep records of SSOs. The permittee must retain the reports submitted to EPA and other appropriate reports that could include work orders associated with investigation of system problems related to a SSO, that describes the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the SSO. (See 40 CFR 122.41(j)).

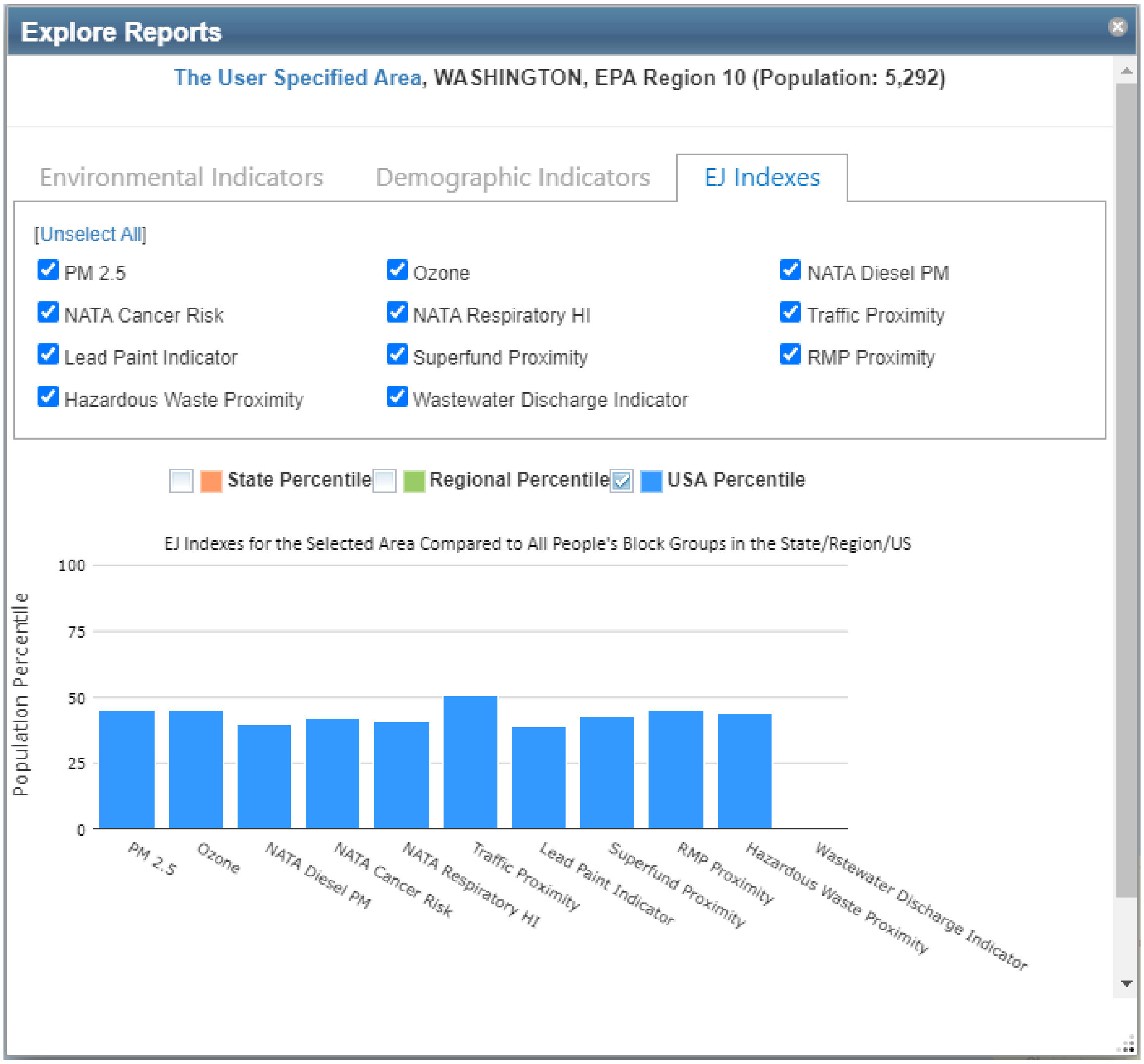
Proper Operation and Maintenance – The permit requires proper operation and maintenance of the collection system. (See 40 CFR 122.41(d) and (e)). SSOs may be indicative of improper operation and maintenance of the collection system. The permittee may consider the development and implementation of a capacity, management, operation and maintenance (CMOM) program.

The permittee may refer to the Guide for Evaluating Capacity, Management, Operation, and Maintenance (CMOM) Programs at Sanitary Sewer Collection Systems (EPA 305-B-05-002). This guide identifies some of the criteria used by EPA inspectors to evaluate a collection system's management, operation and maintenance program activities. Owners/operators can review their own systems against the checklist (Chapter 3) to reduce the occurrence of sewer overflows and improve or maintain compliance.

H. ENVIRONMENTAL JUSTICE

As part of the permit development process, EPA Region 10 conducted a screening analysis to determine whether this permit action could affect overburdened communities. "Overburdened" communities can include minority, low-income, tribal, and indigenous populations or communities that potentially experience disproportionate environmental harms and risks. EPA used a nationally consistent geospatial tool that contains demographic and environmental data for the United States at the Census block group level. This tool is used to identify permits for which enhanced outreach may be warranted.

en Cove
Fort Flagler
State Park
Port Townsend
Fort Townsend
State Park
Marrowstone
Airport Cutoff Rd
US Naval
Reservation
Nordland
rs
Irondale
Port Hadlock
Marrowstone
Island
Rhody Dr
Indian Island
Park
derson Lake
State Park
Chimacum
Oak Bay



The Naval Magazine Indian Island is not located within or near a Census block group that is potentially overburdened. The draft permit does not include any additional conditions to address environmental justice.

Regardless of whether a facility is located near a potentially overburdened community, EPA encourages permittees to review (and to consider adopting, where appropriate) Promising Practices for Permit Applicants Seeking EPA-Issued Permits: Ways To Engage Neighboring Communities (see https://www.federalregister.gov/d/2013-10945). Examples of promising practices include: thinking ahead about community's characteristics and the effects of the permit on the community, engaging the right community leaders, providing progress or status reports, inviting members of the community for tours of the facility, providing informational materials translated into different languages, setting up a hotline for community members to voice concerns or request information, follow up, etc.

For more information, please visit https://www.epa.gov/environmentaljustice and Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*.

I. DESIGN CRITERIA

The permit includes design criteria requirements. This provision requires the permittee to compare influent flow and loading to the facility's design flow and loading and prepare a facility plan for maintaining compliance with NPDES permit effluent limits when the flow or loading exceeds 85% of the design criteria values for any two months in a twelve-month period.

J. PRETREATMENT REQUIREMENTS

The United States Department of the Navy does not have an approved pretreatment program per 40 CFR 403.8 due to not being a POTW. EPA is the Control Authority of industrial users that might introduce pollutants into the Naval Magazine Indian Island.

Permit Part II.E reminds the Permittee that it cannot authorize discharges which may violate the national specific prohibitions of the General Pretreatment Program.

Although, not a permit requirement, the Permittee may wish to consider developing the legal authority enforceable in Federal, State or local courts, which authorizes or enables the FOTW to apply and to enforce the requirement of the CWA. EPA has a Model Pretreatment Ordinance to regulate industrial discharges to their systems (EPA, 2007). The model ordinance should also be useful for treatment systems that are not required to implement a pretreatment program in drafting local ordinances to control nondomestic dischargers within their jurisdictions.

Background on the pretreatment program may be found at Introduction to the National Pretreatment Program (EPA, 2011).

K. STANDARD PERMIT PROVISIONS

Permit Parts III., IV. and V. contain standard regulatory language that must be included in all NPDES permits. The standard regulatory language covers requirements such as monitoring, recording, and reporting requirements, compliance responsibilities, and other general requirements.

V. OTHER LEGAL REQUIREMENTS

A. ENDANGERED SPECIES ACT

The Endangered Species Act requires federal agencies to consult with National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries) and the U.S. Fish and Wildlife Service (USFWS) if their actions could beneficially or adversely affect any threatened or endangered species. A review of the facility discharge's impact on threatened and endangered species located in the vicinity of the discharge finds that there is no effect caused by the discharge from the Naval Magazine Indian Island. (see Appendix E).

B. ESSENTIAL FISH HABITAT

Essential fish habitat (EFH) is the waters and substrate (sediments, etc.) necessary for fish to spawn, breed, feed, or grow to maturity. The Magnuson-Stevens Fishery Conservation and Management Act (January 21, 1999) requires EPA to consult with

NOAA Fisheries when a proposed discharge has the potential to adversely affect EFH (i.e., reduce quality and/or quantity of EFH).

The EFH regulations define an adverse effect as any impact which reduces quality and/or quantity of EFH and may include direct (e.g. contamination or physical disruption), indirect (e.g. loss of prey, reduction in species' fecundity), site specific, or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions. EPA has prepared an EFH assessment which appears in Appendix F.

For the same reasons as listed for endangered species, EPA has determined that issuance of this permit would have no effect on EFH in the vicinity of the discharge. EPA will provide NOAA Fisheries with copies of the draft permit and fact sheet during the public notice period. Any comments received from NOAA Fisheries regarding EFH will be considered prior to issuance of this permit.

C. CWA § 401 CERTIFICATION

Section 401 of the CWA requires EPA to seek State certification before issuing a final permit. As a result of the certification, the State may require more stringent permit conditions or additional monitoring requirements to ensure that the permit complies with water quality standards, or treatment standards established pursuant to any State law or regulation. Since this facility discharges to waters under the jurisdiction of Washington Department of Ecology, the Washington Department of Ecology is the certifying authority. EPA had preliminary discussions with Washington Department of Ecology regarding the CWA § 401 Certification during development of the draft permit. EPA is sending a request for CWA § 401 Certification to Washington Department of Ecology.

D. ANTIDEGRADATION

The antidegradation policy of a state's WQS represents a three-tiered approach to protecting and maintaining current water quality and uses into the future [40 CFR 131.12]. Tier I of antidegradation protection applies to all water bodies under the CWA and ensures that existing in-stream water uses and the water quality necessary to protect those uses will be maintained and protected. Tier II protection applies to any water bodies considered to be high quality waters (where the water quality exceeds levels necessary to support propagation of fish, shellfish, wildlife, and recreation in and on the water) and provides that water quality will be maintained and protected unless allowing for lower water quality is deemed by the state as necessary to accommodate important economic or social development in the area. In allowing any lowering of water quality, the state must ensure adequate water quality to fully protect existing uses, as well as designated uses. Tier III protection applies to water bodies that have been designated by the state as outstanding national resource waters and provides that water quality is to be maintained and protected.

The purpose of Washington's Antidegradation Policy (WAC 173-201A-300-330; 2006) is to:

• Restore and maintain the highest possible quality of the surface waters of Washington.

• Describe situations under which water quality may be lowered from its current condition.

• Apply to human activities that are likely to have an impact on the water quality of surface water.

• Ensure that all human activities likely to contribute to a lowering of water quality, at a minimum, apply all known, available, and reasonable methods of prevention, control, and treatment.

• 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 Tier II analysis is necessary 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.

• For waters that do not meet assigned criteria, or protect existing or designated uses, Ecology will take appropriate and definitive steps to bring the water quality back into compliance with the WQS.

All the effluent limits in the Draft Permit are equally or more stringent as the previous permit, and beneficial uses will not be impaired by the facility. For nutrients, the Draft Permit has also included a TBEL for TIN as well as additional monitoring and loading calculations that would characterize nutrients in the effluent so that additional appropriate measures could be considered.

Pertaining to the criteria above, the facility meets Tier I, and the facility does not meet the conditions that requires a further Tier II analysis. The facility is not planning a new or expanded action. The analysis described demonstrates that the proposed permit conditions will protect existing and designated uses of the receiving water. Therefore, the Draft Permit meets the criteria for Tier I, and Ecology’s Antidegradation policy.

E. PERMIT EXPIRATION

The permit will expire five years from the effective date.

VI. References

EPA, 1991. *Technical Support Document for Water Quality-based Toxics Control.* US Environmental Protection Agency, Office of Water, EPA/505/2-90-001. https://www3.epa.gov/npdes/pubs/owm0264.pdf

EPA, 2010. *NPDES Permit Writers' Manual.* Environmental Protection Agency, Office of Wastewater Management, EPA-833-K-10-001. September 2010. https://www3.epa.gov/npdes/pubs/pwm_2010.pdf

EPA, 2007. *EPA Model Pretreatment Ordinance*, Office of Wastewater Management/Permits Division, January 2007.

EPA, 2011. *Introduction to the National Pretreatment Program*, Office of Wastewater Management, EPA 833-B-11-011, June 2011.

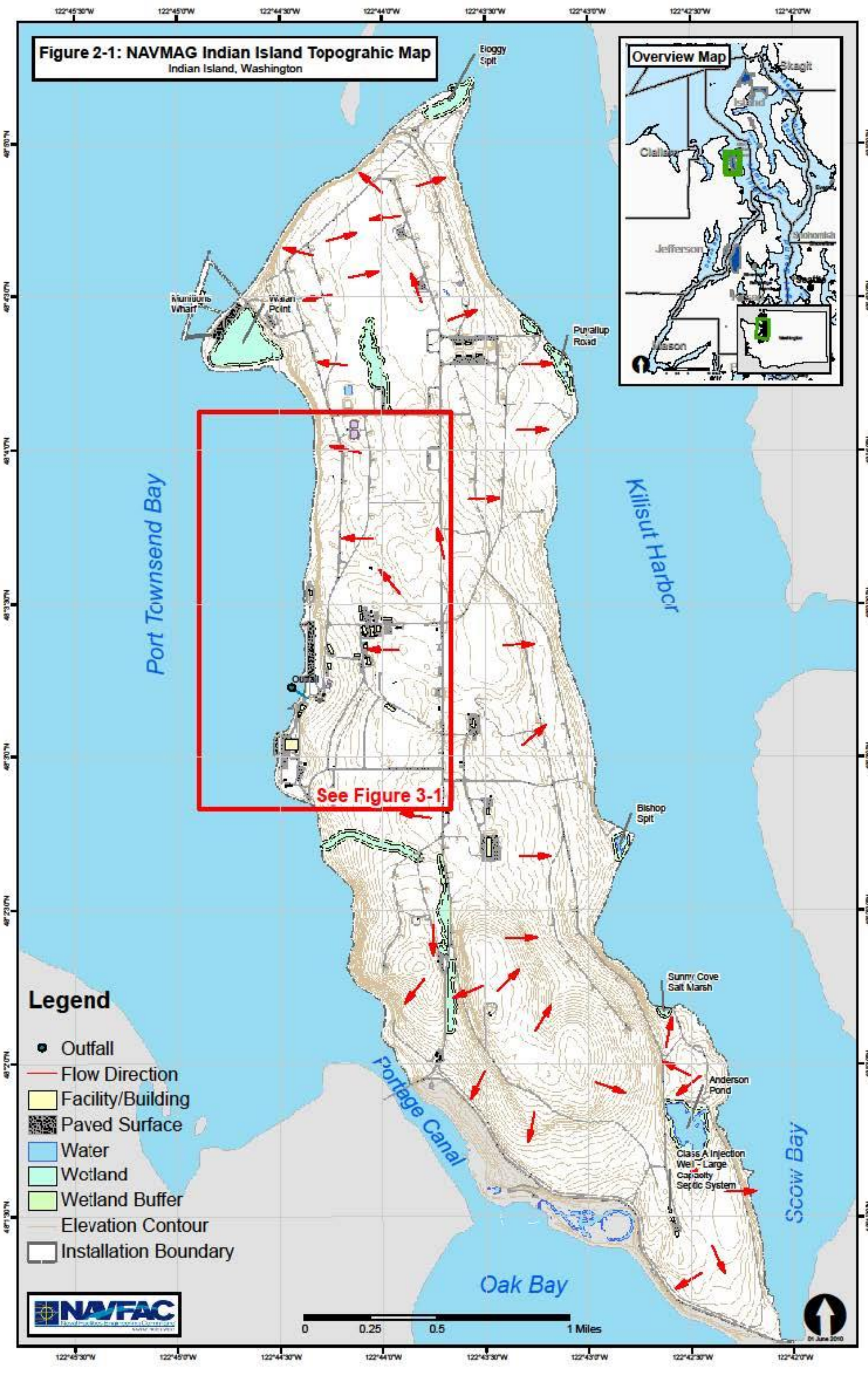
EPA, 2014. *Water Quality Standards Handbook* Chapter 5: General Policies. Environmental Protection Agency. Office of Water. EPA 820-B-14-004. September 2014. https://www.epa.gov/sites/production/files/2014-09/documents/handbook-chapter5.pdf

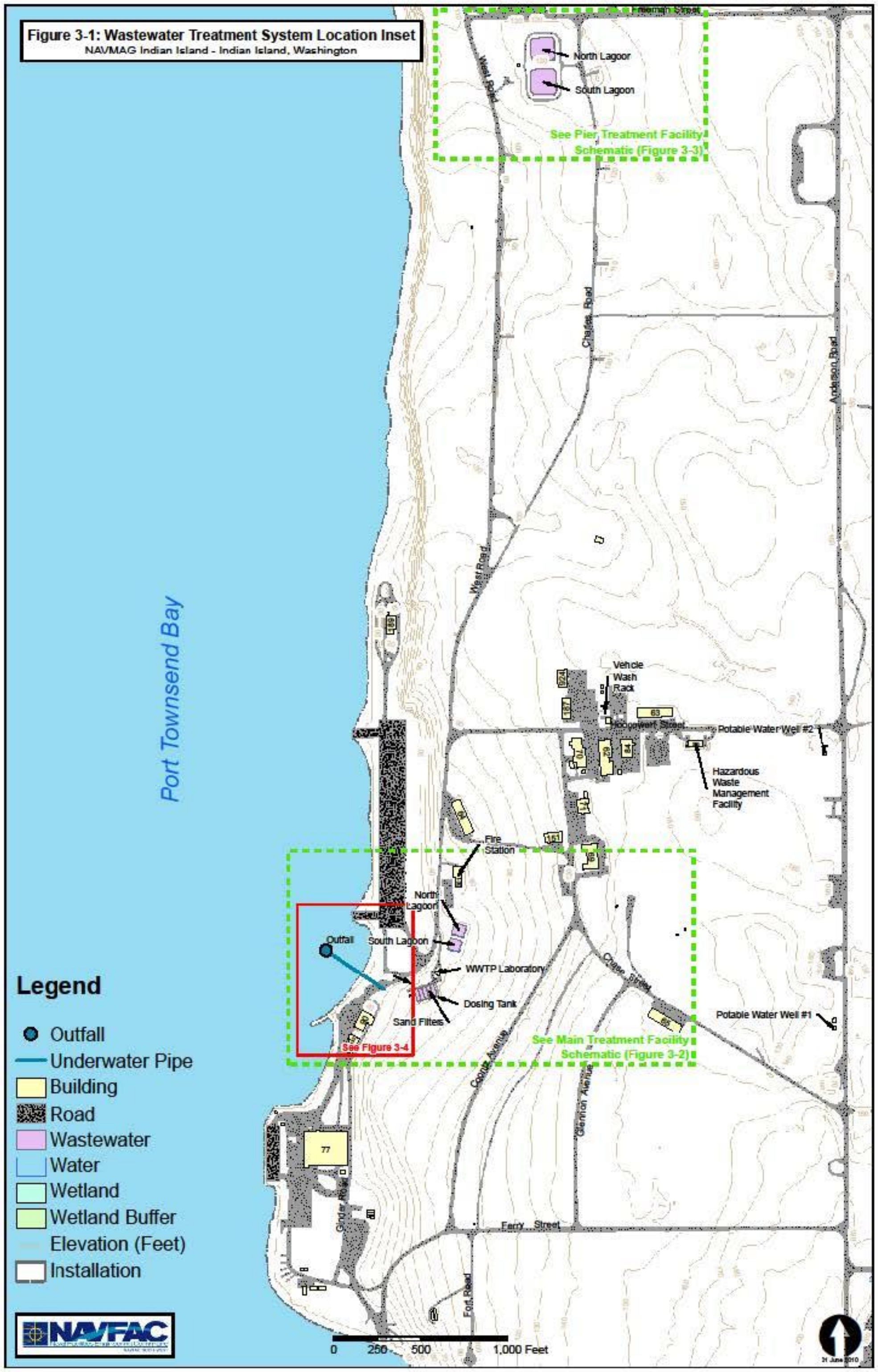
EPA, 2021. *Innovative Nutrient Removal Technologies-Case Studies of Intensified or Enhanced Treatment.* Environmental Protection Agency. Office of Water. EPA 830-R-01-001. August 2021.

State of Washington, 2018. *Water Quality Program Permit Writer's Manual*. Department of Ecology publication 92-109. July 2018 https://apps.ecology.wa.gov/publications/SummaryPages/92109.html

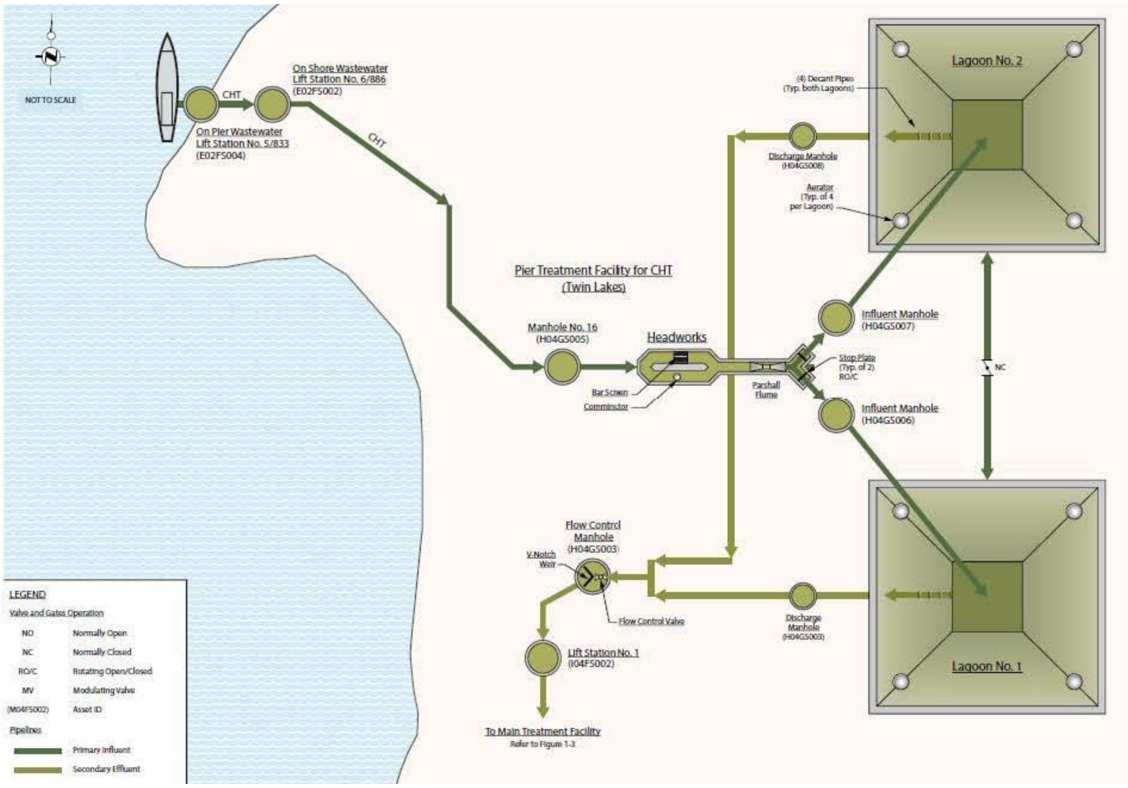
Water Pollution Control Federation. Subcommittee on Chlorination of Wastewater. *Chlorination of Wastewater.* Water Pollution Control Federation. Washington, D.C. 1976.

Appendix A. **Facility Information**





Pier Treatment Facility Schematic



Main Treatment Plant Schematic

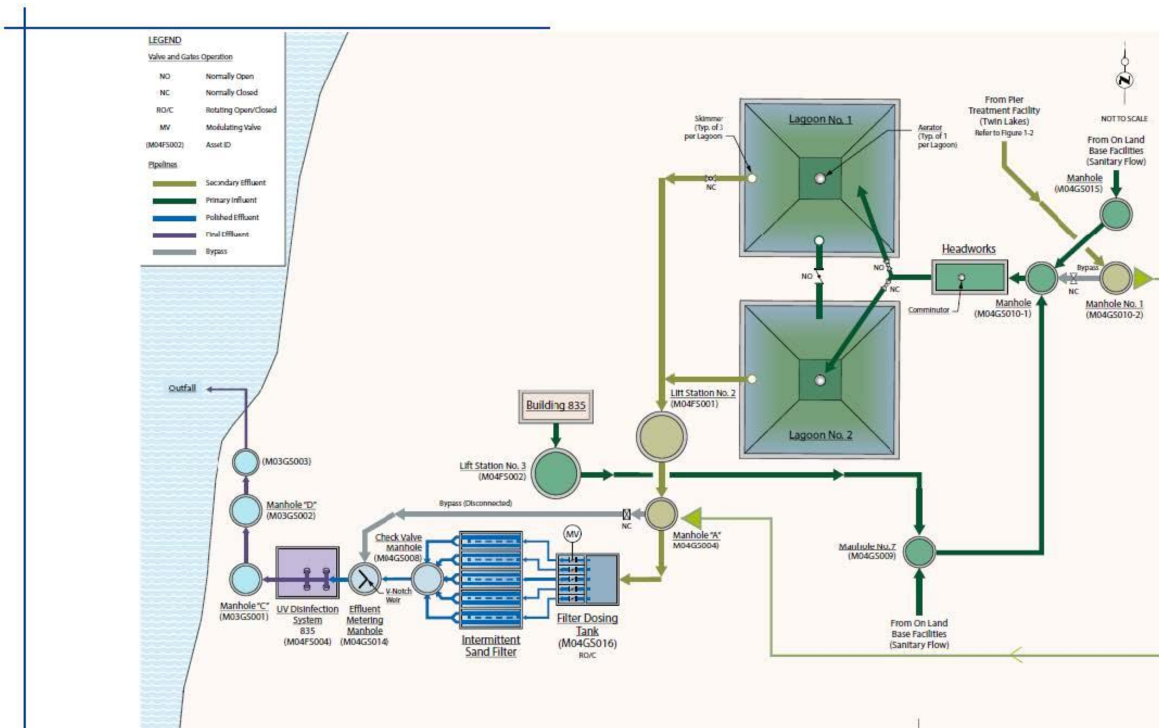
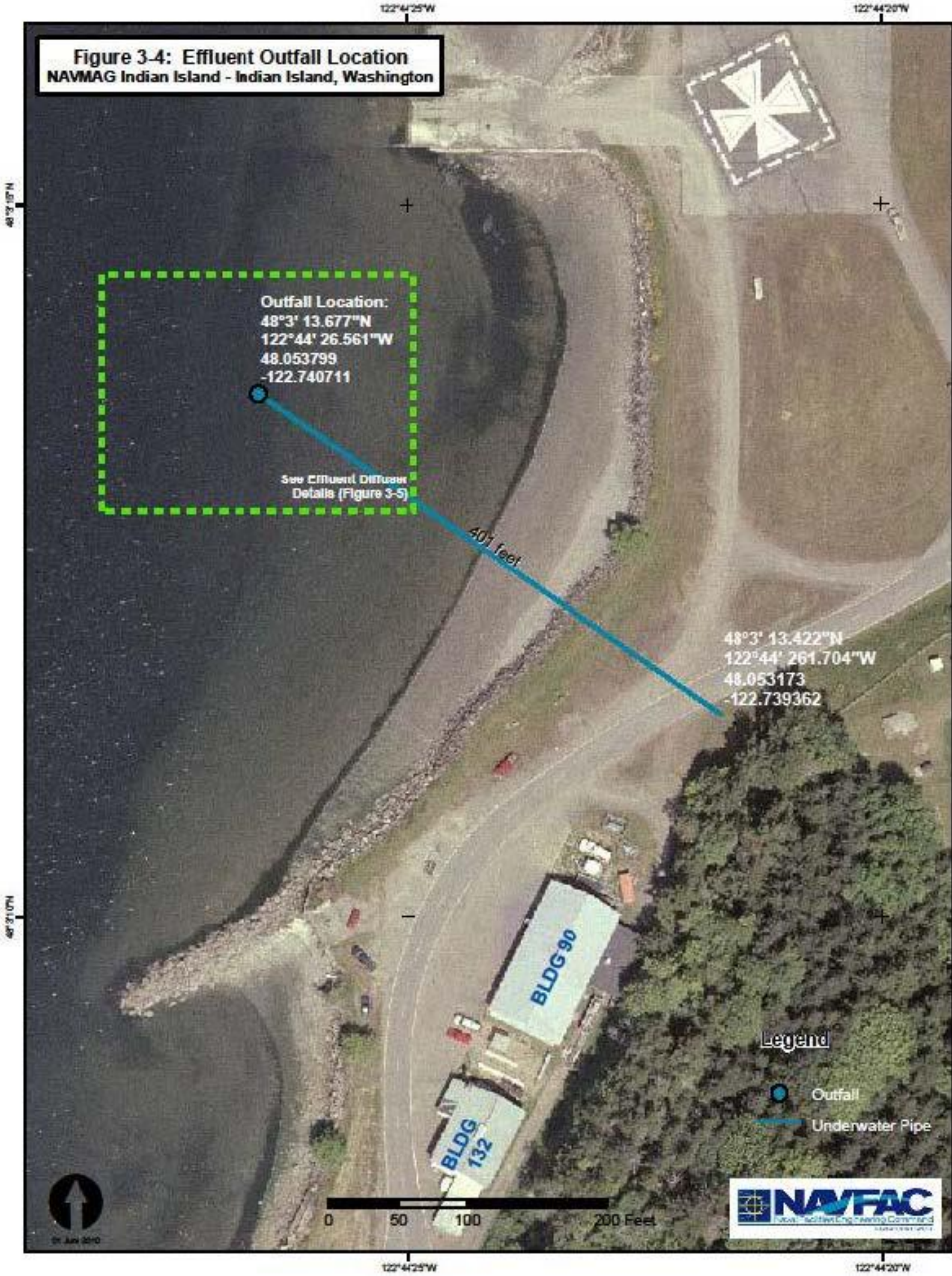
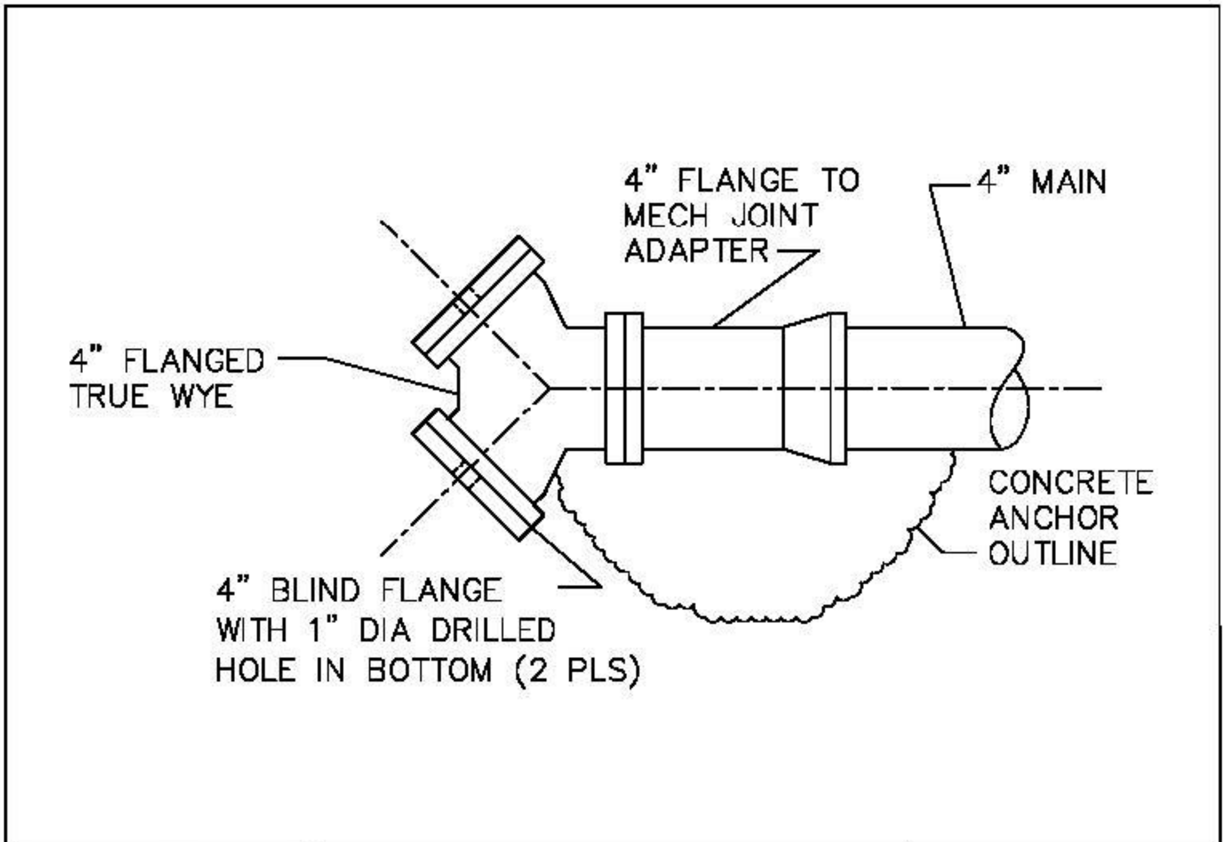


Figure 1-3: Main Wastewater Treatment Plant Process Flow Schematic

Effluent Outfall Location



Effluent Diffuser



NAVFAC Naval Facilities Engineering Command

Figure 3–5: Effluent Diffuser

Scale: N/A | Date: 01 June 2010

NAVMAG Indian Island
Indian Island, Washington

Appendix B. **Treatment Plant Effluent Data**

Parameter	Flow, in conduit or thru treatment plant	BOD, 5-day, 20 deg. C	BOD, 5-day, 20 deg. C	BOD, 5-day, 20 deg. C	BOD, 5-day, 20 deg. C	BOD, 5-day, 20 deg. C	BOD, 5-day, 20 deg. C	Solids, total suspended	Solids, total suspended	Solids, total suspended	Solids, total suspended	Solids, total suspended	Solids, total suspended	pH	pH	Fecal Coliform	Fecal Coliform	Temperature
Monitoring Location	Effluent Gross	Influent Gross	Effluent Gross	Effluent Gross	Effluent Gross	Effluent Gross	Percent Removal	Influent Gross	Effluent Gross	Effluent Gross	Effluent Gross	Effluent Gross	Percent Removal	Effluent Gross	Effluent Gross	Effluent Gross	Effluent Gross	Effluent Gross
Statistical Base	MO AVE	MO AVG	MO AVG	MO AVG	WKLY AVG	WKLY AVG	MIN % RMV	MO AVG	MO AVG	MO AVG	WKLY AVG	WKLY AVG	MIN % RMV	INST MAX	INST MIN	MONTHLY AVERAGE	WEEKLY AVERAGE	MX DA AV
Limit Units	MGD	mg/L	mg/L	lb/d	mg/L	lb/d	%	mg/L	mg/L	lb/d	mg/L	lb/d	%	SU	SU	#/100mL	#/100mL	C
Current Limit	Report	Report	30	9	45	14	85	Report	30	9	45	14	85	9	6.5	200	400	Report
06/30/2016	0.00689	474	3	0.16	3.4	0.17	99	565	1	0.1	1.6	0.15	100	7.1	6.9	1	1	18
07/31/2016	0.00981	533	2	0.37	2.4	0.7	100	765	4	1.05	7	2.05	99	7.4	6.8	1	1	21
08/31/2016	0.01007	413	1	0	1.1	0.04	100	745	3	0	4.2	0.05	99	7.3	6.9	1	1	21
09/30/2016	0.01642	663	2	0	2.9	0.22	100	904	5	0	19.2	1.14	99	7.6	6.8	1	1	20
10/31/2016	0.0125	248	2	0	2.9	0.19	98	578	5	0	8.6	0.47	99	7.9	7	1	1	19
11/30/2016	0.01135	481	2	0	2.4	0.2	100	323	3	0	4	0.34	99	7.6	7.3	1	1	14
12/31/2016	0.01104	359	2.5	0.23	2.6	0.27	99.1	275.7	2.5	0.24	3.4	0.36	99.1	7.4	7.1	1	1	13
01/31/2017	0.01174	260.8	2.9	0.19	3.4	0.28	98.5	326	2.4	0.15	3	0.26	98.9	7.5	6.9	1	1	8
02/28/2017	0.01116	257.7	2.9	0.46	3.5	1.07	97.9	207.3	2.9	0.45	3.8	1.04	95.1	7.3	6.8	1	1	9
03/31/2017	0.01626	279.6	5.7	0.8	9.2	1.31	96.4	351.8	8.2	1.2	11.8	2.43	93.2	7.2	6.7	1	1	11
04/30/2017	0.01796	338.3	5.3	0.99	6.3	1.98	98.4	483	5.8	1.06	6.6	2.01	98.7	7	6.7	1	1	14
05/31/2017	0.01151	332.3	2.8	0.16	3.6	0.45	99.1	384.5	2.7	0.15	3.6	0.45	99.3	7	6.7	1	1	17
06/30/2017	0.01185	404.5	2.3	0.07	2.9	0.11	99.4	613	1.8	0.04	2.6	0.07	99.4	7	6.7	1	1	19
07/31/2017																		
08/31/2017	0.00658	448	2.6	0.47	3.8	0.057	99	488	3.9	0.73	5.2	0.79	99	7.5	6.8	1	1	22
09/30/2017	0.02076	414.5	2.75	0.34	2.8	0.58	99	326.5	3.5	0.66	6	1.29	98	7.6	7.3	1	1	20
10/31/2017	0.00633	249	2.85	0.07	3.2	0.12	97.8	249.5	0.6	0.03	1.6	0.03	99.3	7.5	6.9	1	1	14
11/30/2017	0.0073	250.67	3.13	0.09	3.5	0.14	98.39	242.67	1.53	0.05	2.4	0.08	99.17	7.7	6.8	1	1	11
12/31/2017	0.01485	245.5	2.15	0.24	3.2	0.41	97.71	269.5	2.05	0.3	3.2	0.6	98.87	7.8	7.2	1	1	14
01/31/2018	0.00401	393	1.6	0.03	1.6	0.03	99.59	200	2	0.04	2	0.04	99	7.6	7.1	1	1	10
02/28/2018	0.01054	123	1.7	0.017	1.7	0.017	85	115					85	7.9	6.7	1	1	11
03/31/2018	0.0133	220	9.63	0.9	11.9	1.4	85	231.6	6.33	0.78	14	1.84	85	7.8	6.7	1	1	13
04/30/2018	0.02431	203.8	5.83	1.01	10.9	1.34	94.04	215.6	3.7	0.66	9.31	1.15	95.04	7.2	6.6	1	1	16
05/31/2018	0.01864	388	2.33	0.35	3.2	0.48	99.03	576	2.71	0.48	7.85	0.64	97.91	8.6	6.6	1	1	17
06/30/2018	0.01657	786	2.28	0.22	3	0.046	99.48	781	4.14	0.49	7	1.08	85	7.3	6.8	1	1	20
07/31/2018	0.0147	442.7	2.3	0.44	2.6	0.63	98.13	550.7	3	0.56	6	1.01	97.41	7.5	7	1	1	21
08/31/2018	0.02468	388.7	2.2	0.37	2.3	0.51	99.34	466.3	3.33	0.63	7	1.55	98.55	7.4	7	1	1	21
09/30/2018																		
10/31/2018	0.00845	334	2.08	0.1	2.3	0.19	99.37	475.25	2.25	0.1	4	0.17	98.31	7.8	7.1	1	1	17
11/30/2018	0.0100869	368	2	0.21	2	0.34	99.29	548	3.25	0.37	4	0.68	99.02	7.4	6.8	1	1	15
12/31/2018	0.006201	380	3.2	0.16	3.6	0.27	98.92	280	6.7	0.31	10	0.43	97.08	7.1	6.8	1.3	2	9
01/31/2019	0.0028091	370.7	2.7	0.06	4	0.1	99	287	4.67	0.11	6	0.2	98	7.6	7	1	1	9
02/28/2019	0.003433	294	2.2	0.09	2.5	0.16	99	312	4	0.17	4	0.32	98	7.7	7	1	1	8
03/31/2019																		
04/30/2019	0.015	390.5	2.2	0.59	2.4	0.85	99	385	6	1.96	8	3.38	98	7.5	6.8	1	1	14
05/31/2019	0.0184	425.25	2.38	0.27	2.8	0.43	99.3	450.5	6	0.76	9	1.72	97.27	7.3	6.7	1	1	17
06/30/2019	0.00849	395	2.43	0.11	2.7	0.15	99.35	562.67	4	0.23	4	0.26	99.2	7.4	7	1	1	20
07/31/2019	0.01294	380	2.2	0.07	2.2	0.07	99	548	4	0.12	4	0.12	99	7.7	7.1	1	1	20
08/31/2019	0.01135	561.67	2.27	0.22	2.5	0.34	99.47	983.33	4	0.4	4	0.59	99.39	7.3	6.6	1	1	22
09/30/2019																		
10/31/2019	0.00339	329.5	2.25	0.05	2.4	0.06	99.29	480	4	0.09	4	0.1	98.97	7.9	7.4	1	1	14
11/30/2019	0.00448	320	3.25	0.09	3.7	0.15	98.98	473.5	3.1	0.12	4	0.21	99.25	7.8	7.4	1	1	12
12/31/2019	0.00374	317.67	2	0.08	2.8	0.15	99.1	410	4	0.13	4	0.22	98.8	7.8	7.3	1	1	10
01/31/2020	0.01833	208.2	3.84	0.42	6.8	0.97	96.34	230.6	4	0.36	4	0.73	97.65	7.9	6.7	1	1	11
02/29/2020	0.03043	230.25	3.53	0.61	4.6	1.11	97.02	626	5.5	1.03	7	2.29	96.43	7	6.8	1	1	9
03/31/2020	0.02505	804.33	7.17	1.6	9.2	2.33	98.51	1418.3	4	0.86	4	1.01	98.77	7.1	6.8	1	1	10
04/30/2020	0.02537	493.5	7.1	1.71	8.6	2.14	97.16	751	4	0.95	4	1	97.37	7.8	6.7	1	1	14
05/31/2020	0.01438	733	11.6	1.07	16.3	1.99	92.01	1069.3	4	0.37	4	0.49	98.49	7.3	6.7	4	10	16
06/30/2020	0.00809	578	5.05	0.44	5.9	0.86	99.03	995	4	0.3	4	0.59	99.48	7.3	6.9	1	1	18
07/31/2020	0.00448	548	5	0.13	5	0.13	99.09	610	4	0.1	4	0.1	99.34	7.3	6.9	1	1	19
08/31/2020	0.01024	296.67	2.33	0.21	2.6	0.33	98.72	475.7	4	0.36	4	0.51	98.84	7.15	6.51	1	1	20.5
09/30/2020	0.00553	377	2	0.08	2	0.08	99.47	444	6	0.23	6	0.23	98.65	7.2	7	1	1	18.9
10/31/2020																		
11/30/2020	0.00989	360	3.35	0.27	3.6	0.37	98.52	388.5	5	0.36	6	0.41	98.24	7.4	7.2	1	1	12
12/31/2020	0.02102	203.5	3.95	0.79	4.2	1.24	97.57	196.5	4	0.77	4	1.18	97.84	7.53	7.11	1	1	10.1
01/31/2021	0.00662	171	7.35	0.24	10.3	0.28	94.41	249.99	45	0.93	86	1.61	79.74	7.38	6.95	1	1	9.3
02/28/2021	0.01459	125.08	2.88	0.34	3.3	0.46	95.84	166.3	4	0.49	4	0.77	95.51	7.3	6.63	1	1	8.1
03/31/2021	0.01515	276	5.48	0.54	7.6	1.09	96.45	339	5.75	0.58	8	1.15	97.2	7.66	6.86	1	1	13.6
04/30/2021	0.01073	454.5	4.9	0.68	5.6	1.25	98.21	835	5	0.72	6	1.34	98.42	6.99	6.58	1	1	14.3
Average	0.0124037	376.34	3.4156	0.3557	4.2926	0.5674	97.865	485.63	4.6851	0.4364	7.0747	0.8062	97.189	7.4687	6.8915	1.06111111	1.1851852	14.9037037
Minimum	0.0028091	123	1	0	1.1	0.017	85	115	0.6	0	1.6	0.03	79.74	6.99	6.51	1	1	8
Maximum	0.03043	804.33	11.6	1.71	16.3	2.33	100	1418.3	45	1.96	86	3.38	100	8.6	7.4	4	10	22
Count	54	54	54	54	54	54	54	54	53	53	53	53	54	54	54	54	54	54
Std Dev	0.0064089	149.83	2.0651	0.3806	3.0008	0.5937	2.9804	261.47	5.8316	0.3942	11.488	0.7274	4.1044	0.3102	0.219	0.40951728	1.2297273	4.37945301
CV	0.5166894	0.3981	0.6046	1.0702	0.6991	1.0464	0.0305	0.5384	1.2447	0.9033	1.6238	0.9022	0.0422	0.0415	0.0318	0.38593252	1.0375824	0.293849978
95th Percentile	0.0248095	687.5	7.233	1.031	10.51	1.9835	100	987.41	6.478	1.054	12.68	2.146	99.394	7.9	7.3	1	1	21
5th Percentile	0.0036326	192.13	1.895	0	1.895	0.0439	93.33	198.78	1.692	0	2.24	0.062	85	7	6.6	1	1	8.685
90th percentile	0.020942	557.57	5.791	0.87	9.02	1.331	99.477	818.8	6	0.946	9.248	1.816	99.3	7.8	7.2	1	1	20.85
50th percentile	0.01143	369.35	2.65	0.235	3.2	0.34	98.99	458.4	4	0.36	4	0.6	98.6	7.4344	6.83	1	1	14

Appendix C. **Reasonable Potential and WQBEL Formulae**

A. Reasonable Potential Analysis

EPA uses the process described in the *Technical Support Document for Water Quality-based Toxics Control* (EPA, 1991) to determine reasonable potential. To determine if there is reasonable potential for the discharge to cause or contribute to an exceedance of water quality criteria for a given pollutant, EPA compares the maximum projected receiving water concentration to the water quality criteria for that pollutant. If the projected receiving water concentration exceeds the criteria, there is reasonable potential, and a WQBEL must be included in the permit.

1. Mass Balance

For discharges to flowing water bodies, the maximum projected receiving water concentration is determined using the following mass balance equation:

$$C_d Q_d = C_e Q_e + C_u Q_u \qquad \textit{Equation 1}$$

where,

C_d	=	Receiving water concentration downstream of the effluent discharge (that is, the concentration at the edge of the mixing zone)
C_e	=	Maximum projected effluent concentration
C_u	=	95th percentile measured receiving water upstream concentration
Q_d	=	Receiving water flow rate downstream of the effluent discharge = Q_e+Q_u
Q_e	=	Effluent flow rate (set equal to the design flow of the WWTP)
Q_u	=	Receiving water low flow rate upstream of the discharge (1Q10, 7Q10 or 30B3)

When the mass balance equation is solved for C_d, it becomes:

$$C_d = \frac{C_e \times Q_e + C_u \times Q_u}{Q_e + Q_u} \qquad \textit{Equation 2}$$

The above form of the equation is based on the assumption that the discharge is rapidly and completely mixed with 100% of the receiving stream.

If the mixing zone is based on less than complete mixing with the receiving water, the equation becomes:

$$C_d = \frac{C_e \times Q_e + C_u \times (Q_u \times \%MZ)}{Q_e + (Q_u \times \%MZ)} \qquad \textit{Equation 3}$$

Where:

% MZ = the percentage of the receiving water flow available for mixing.

If a mixing zone is not allowed, dilution is not considered when projecting the receiving water concentration and,

$$C_d = C_e \qquad \textit{Equation 4}$$

A dilution factor (D) can be introduced to describe the allowable mixing. Where the dilution factor is expressed as:

$$D = \frac{Q_e + Q_u \times \%MZ}{Q_e} \qquad \textit{Equation 5}$$

After the dilution factor simplification, the mass balance equation becomes:

$$C_d = \frac{C_e - C_u}{D} + C_u \qquad \textit{Equation 6}$$

If the criterion is expressed as dissolved metal, the effluent concentrations are measured in total recoverable metal and must be converted to dissolved metal as follows:

$$C_d = \frac{CF \times C_e - C_u}{D} + C_u \qquad \textit{Equation 7}$$

Where C_e is expressed as total recoverable metal, C_u and C_d are expressed as dissolved metal, and CF is a conversion factor used to convert between dissolved and total recoverable metal.

The above equations for C_d are the forms of the mass balance equation which were used to determine reasonable potential and calculate wasteload allocations.

2. Maximum Projected Effluent Concentration

When determining the projected receiving water concentration downstream of the effluent discharge, EPA's Technical Support Document for Water Quality-based Toxics Controls (TSD, 1991) recommends using the maximum projected effluent concentration (Ce) in the mass balance calculation (see equation 3, page C-5). To determine the maximum projected effluent concentration (Ce) EPA has developed a statistical approach to better characterize the effects of effluent variability. The approach combines knowledge of effluent variability as estimated by a coefficient of variation (CV) with the uncertainty due to a limited number of data to project an estimated maximum concentration for the effluent. Once the CV for each pollutant parameter has been calculated, the reasonable potential multiplier (RPM) used to derive the maximum projected effluent concentration (Ce) can be calculated using the following equations:

First, the percentile represented by the highest reported concentration is calculated.

$$p_n = (1 - \text{confidence level})^{1/n} \qquad \textit{Equation 8}$$

where,

p_n = the percentile represented by the highest reported concentration

n = the number of samples

confidence level = 99% = 0.99

and

$$RPM = \frac{C_{99}}{C_{P_n}} = \frac{e^{Z_{99} \times \sigma - 0.5 \times \sigma^2}}{e^{Z_{P_n} \times \sigma - 0.5 \times \sigma^2}}$$ *Equation 9*

Where,

σ^2 = $\ln(CV^2 + 1)$

Z_{99} = 2.326 (z-score for the 99th percentile)

Z_{Pn} = z-score for the P_n percentile (inverse of the normal cumulative distribution function at a given percentile)

CV = coefficient of variation (standard deviation ÷ mean)

The maximum projected effluent concentration is determined by simply multiplying the maximum reported effluent concentration by the RPM:

$$C_e = (RPM)(MRC)$$ *Equation 10*

where MRC = Maximum Reported Concentration

3. Maximum Projected Effluent Concentration at the Edge of the Mixing Zone

Once the maximum projected effluent concentration is calculated, the maximum projected effluent concentration at the edge of the acute and chronic mixing zones is calculated using the mass balance equations presented previously.

4. Reasonable Potential

The discharge has reasonable potential to cause or contribute to an exceedance of water quality criteria if the maximum projected concentration of the pollutant at the edge of the mixing zone exceeds the most stringent criterion for that pollutant.

B. WQBEL Calculations

1. Calculate the Wasteload Allocations (WLAs)

Wasteload allocations (WLAs) are calculated using the same mass balance equations used to calculate the concentration of the pollutant at the edge of the mixing zone in the reasonable potential analysis. To calculate the wasteload allocations, C_d is set equal to the acute or chronic criterion and the equation is solved for C_e. The calculated C_e is the acute or chronic WLA. Equation 6 is rearranged to solve for the WLA, becoming:

$$C_e = WLA = D \times (C_d - C_u) + C_u$$ *Equation 11*

Some state water quality criteria for some metals are expressed as the dissolved fraction, but the Federal regulation at 40 CFR 122.45(c) requires that effluent limits be expressed as total recoverable metal. Therefore, EPA must calculate a wasteload allocation in total recoverable metal that will be protective of the dissolved criterion. This is accomplished by dividing the WLA expressed as dissolved by the criteria translator. The criteria translator (CT) is equal to the conversion factor, because site-specific translators are not available for this discharge.

$$C_e = WLA = \frac{D \times (C_d - C_u) + C_u}{CT}$$ *Equation 12*

The next step is to compute the "long term average" concentrations which will be protective of the WLAs. This is done using the following equations from EPA's *Technical Support Document for Water Quality-based Toxics Control* (TSD):

$$LTA_a = WLA_a \times e^{(0.5\sigma^2 - z\,\sigma)}$$ *Equation 13*

$$LTA_c = WLA_c \times e^{(0.5\sigma_4^2 - z\sigma_4)}$$ *Equation 14*

where,

σ^2	=	$\ln(CV^2 + 1)$
Z_{99}	=	2.326 (z-score for the 99^{th} percentile probability basis)
CV	=	coefficient of variation (standard deviation ÷ mean)
σ_4^2	=	$\ln(CV^2/4 + 1)$

For ammonia, because the chronic criterion is based on a 30-day averaging period, the Chronic Long Term Average (LTAc) is calculated as follows:

$$LTA_c = WLA_c \times e^{(0.5\sigma_{30}^2 - z\sigma_{30})}$$ *Equation 15*

where,

σ_{30}^2 = $\ln(CV^2/30 + 1)$

The LTAs are compared and the more stringent is used to develop the daily maximum and monthly average permit limits as shown below.

2. Derive the maximum daily and average monthly effluent limits

Using the TSD equations, the MDL and AML effluent limits are calculated as follows:

$$\mathrm{MDL} = \mathrm{LTA} \times e^{(z_m\sigma - 0.5\sigma^2)}$$ *Equation 16*

$$\mathrm{AML} = \mathrm{LTA} \times e^{(z_a\sigma_n - 0.5\sigma_n^2)}$$ *Equation 17*

where σ, and σ² are defined as they are for the LTA equations above, and,

σ_n^2 = $\ln(CV^2/n + 1$

z_a	=	1.645 (z-score for the 95^{th} percentile probability basis)
z_m	=	2.326 (z-score for the 99^{th} percentile probability basis)
n	=	number of sampling events required per month. With the exception of ammonia, if the AML is based on the LTA_c, i.e., $LTA_{minimum} = LTA_c$), the value of ‘‘n’’ should is set at a minimum of 4. For ammonia, In the case of ammonia, if the AML is based on the LTA_c, i.e., $LTA_{minimum} = LTA_c$), the value of ‘‘n’’ should is set at a minimum of 30.

Appendix D. **Reasonable Potential and WQBEL Calculations**

Table 11. CORMIX Dilution Input Parameters

CORMIX input parameters

1. Effluent Characterization/Pollutant Type

Input	Units	Value	Source				
Discharge Conc.	mg/L	1000.00	Per Ripan				
Flow Rate (acute)	gpm	58.90	WA State NPDES, Table C-1 (period = June 2018-June 2021): a. If monthly Qmax < 0.85 Qdesign (dry weather) use daily Qmax. Monthly Qmax = 0.03043 (Feb 2020); 0.85 Qdesign = 0.037; **Daily Qmax = 0.08482 (Jan 2020)**		0.08482	84820	58.90278
Flow Rate (chronic)	gpm	21.13	WA State NPDES, Table C-1 (period = June 2018-June 2021): a. If monthly Qmax < 0.85 Qdesign (dry weather) use monthly Qmax. 0.85 Qdesign = 0.037 mgd; **monthly Qmax = .03043 (Feb 2020)**		0.03043	30430	21.13194
Effluent density (mixing zone)	kg/m3	1001.29	Xiang et al. 2016: treated effluent = 1.00129g/mL		1.00129	1001.29	
Effluent temp (temp effects)	degrees	20.50	NAVFAC spreadsheet Temperture Data; calculated 90th %-ile (period = June 2018-June 2021); **daily max = 20.5**				
Effluent temp (temp effects)	degrees	19.50	NAVFAC spreadsheet Temperture Data; calculated 90th %-ile (period = June 2018-June 2021); **monthly max = 19.5**				

2. Ambient Geometry/Flow Field Data

Input	Units	Value	Source
Avg. Depth	ft	11.60	Discharge at bottom of channel
Depth at discharge	ft	11.60	Per Monika Glandorff email 7/13/21
Wind Speed	m/s	N/A	N/A
Velocity (acute; 10%)	m/s	0.03	Ahmed (SSM)
Velocity (acute; 90%)	m/s	0.155	Ahmed (SSM)
Velocity (chronic; 50%)	m/s	0.08	Ahmed (SSM)
Manning's n	N/A	0.022	Per Ripan
Ambient density	kg/m3	1023.2161	NAVFAC spreadsheet: MarineAmbioentProfileResults_2021Jun23_652; 3.5m depth

3. Discharge Geometry Data

Input	Units	Value	Source			
Distance to bank	ft	275.00	Per Monika email 7/15/21			
Vertical angle THETA	degrees	?	bathymetry unavailable; assume uniform slope? Per Monika email (7/15/21): rise = 17.2ft; run = 275ft			
Horizontal angle SIGMA	degrees	?	bathymetry unavailable; assume uniform slope? Per Monika email (7/15/21): rise = 17.2ft; run = 275ft			
Port diameter	m	0.1016	NAVFAC Fig 3-5; port dia = 4 in		4	0.1016
Port ht. above bottom	m	0.50	Per Ripan: CORMIX does not provide option for locating outfall on bottom; 0.5m minimum allowed			

4. Mixing Zone Specifications

Input	Units	Value	Source
Distance (acute)	ft	21.16	10% chronic MZ
Distance (chronic)	ft	211.60	WA standard plus outfall depth adjustment
Region of interest	m	1000.00	Per Ripan
Output steps per module	N/A	100.00	Per Ripan

Figures 1-3. CORMIX Dilution Model Outputs

Figure 1

Indian Island acute 10%

Ambient velocity = 0.03 m/s

Effluent flow rate = 58.9 GPM

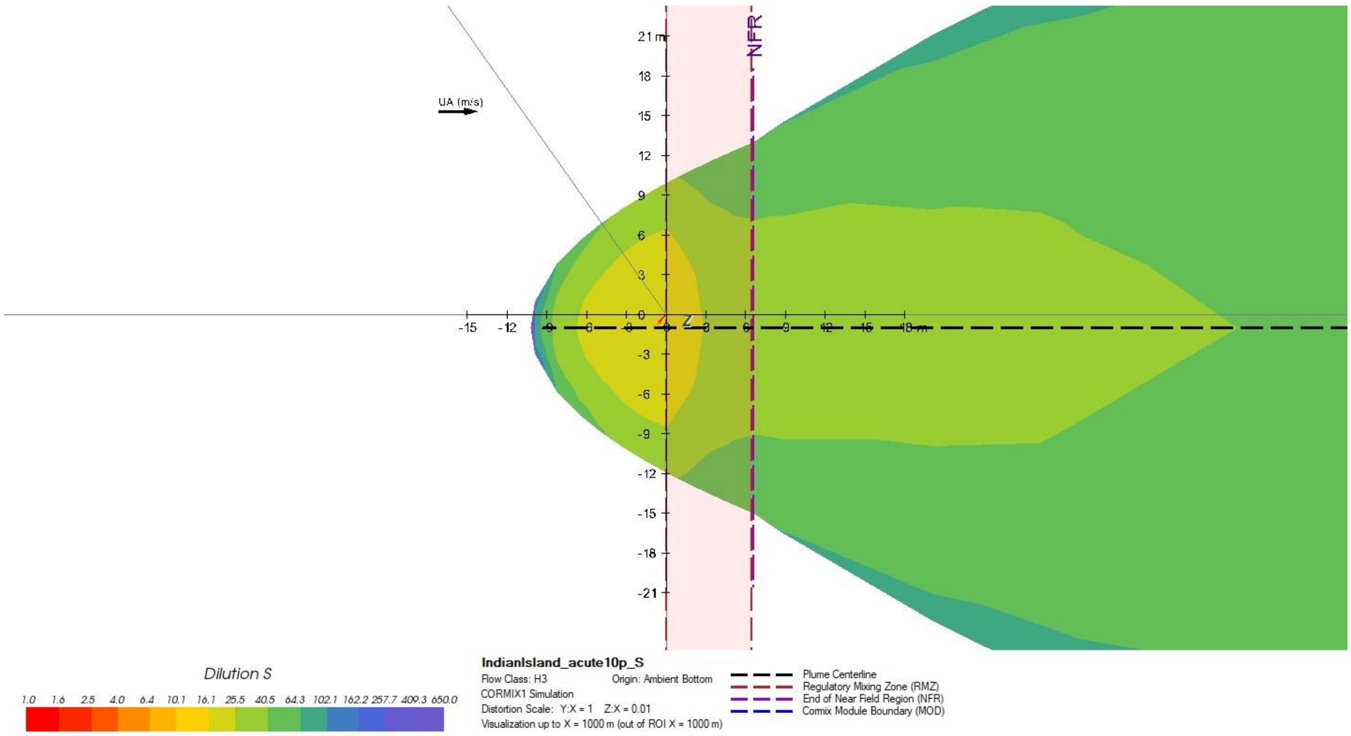


Figure 2

Indian Island acute 90%

Ambient velocity = 0.155 m/s

Effluent flow rate = 58.9 GPM

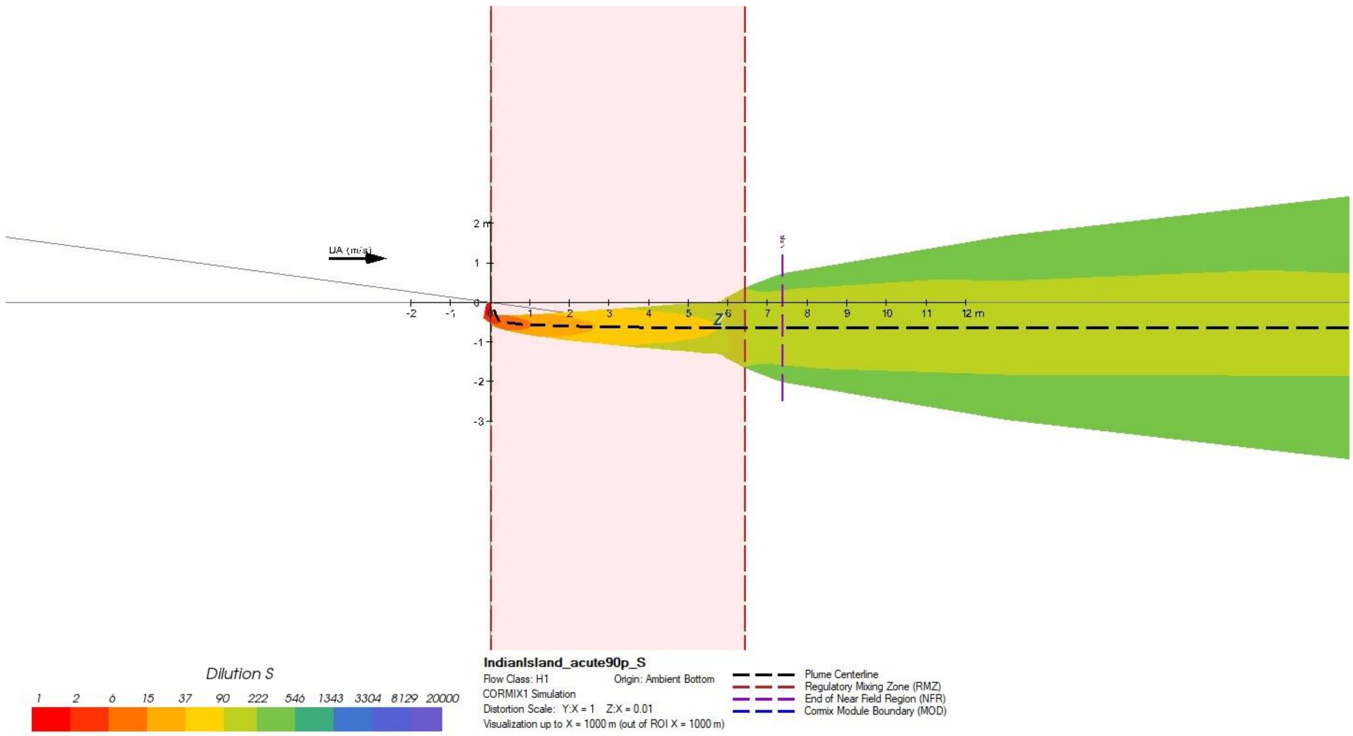
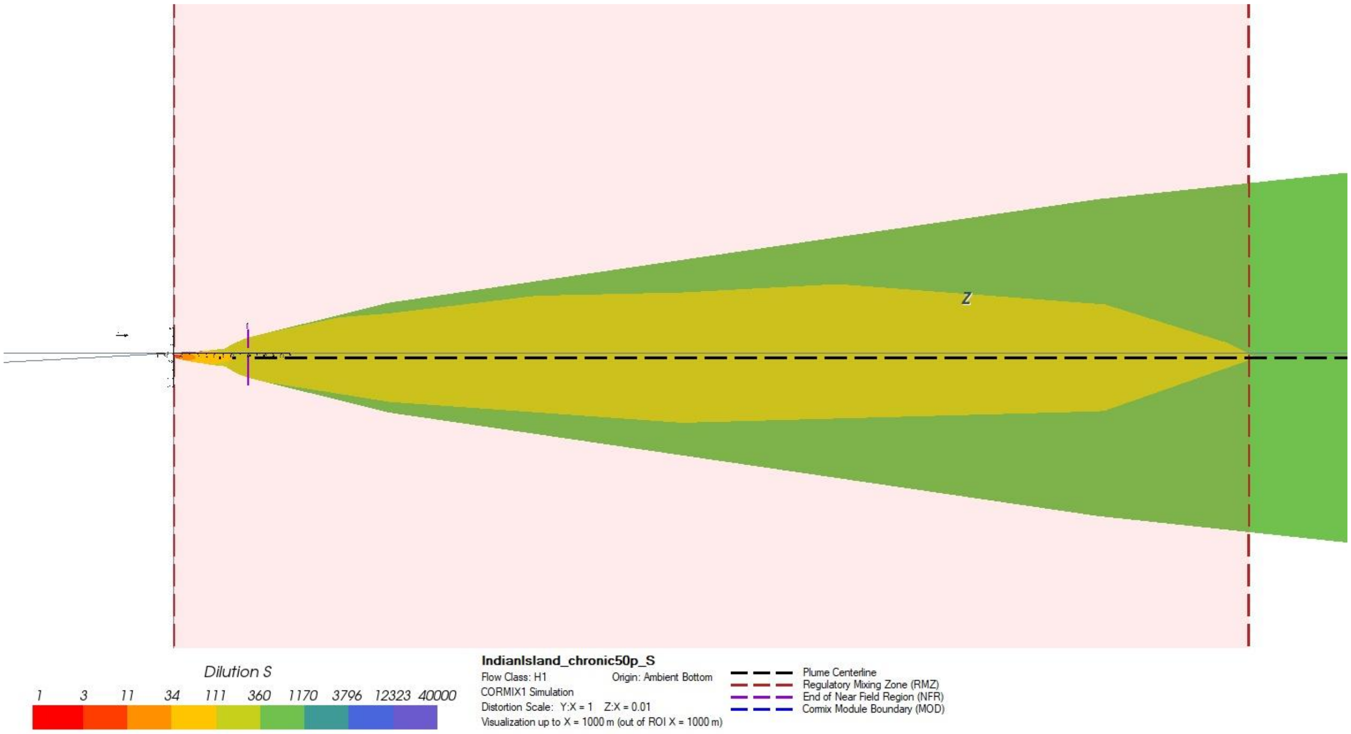


Figure 3

Indian Island chronic 50%

Ambient velocity = 0.08 m/s

Effluent flow rate = 21.13 GPM



A. Reasonable Potential Analysis for DO

Calculation of BOD_5 Oxidation with Temperature Adjustment

INPUT	
Effluent BOD_5 (mg/L)	10.5
Effluent Dissolved Oxygen (DO) (mg/L)	0
Receiving Water Temperature (deg C)	7.8
Receiving Water DO (mg/L)	9
DO WQ Standards (mg/L)	7
Chronic Mixing Dilution Factor	356.0
Time for effluent to travel from outfall to chronic mixing boundary (days)	0.010
Oxidation rate of BOD, base e at 20 deg C, k_1 (day^-1)*	0.23
OUTPUT	
Effluent Ultimate BOD (mg/L)	15.37
Oxidation rate of BOD at ambient temperature, base e (day^-1)	0.13
BOD oxidized between outfall and chronic mixing zone (mg/L)	0.02
RESULTS	
DO at chronic mixing zone	8.97
Difference between ambient DO and DO at chronic mixing boundary	0.03
There is no reasonable potential of not meeting the DO criteria under these conditions.	

Source-WA DOE Spreadhseets for Water Quality Based NPDES Permit Calculations 2012 Version.

B. Reasonable Potential Analysis for pH

Calculation of pH of a Mixture in Marine Water

Based on the CO2SYS program (Lewis and Wallace, 1998), http://cdiac.esd.ornl.gov/oceans/co2rprt.html

INPUT	
1. MIXING ZONE BOUNDARY CHARACTERISTICS	
Dilution factor at mixing zone boundary	356.0
Depth at plume trapping level (m)	3.250
2. BACKGROUND RECEIVING WATER CHARACTERISTICS	
Temperature (deg C):	7.80
pH:	8.00
Salinity (psu):	29.90
Total alkalinity (meq/L)	2.32
3. EFFLUENT CHARACTERISTICS	
Temperature (deg C):	10.40
pH:	9.00
Salinity (psu)	12.00
Total alkalinity (meq/L):	1.84
4. CLICK THE 'Calculate" BUTTON TO UPDATE OUTPUT RESULTS -->	Calculate
OUTPUT	
CONDITIONS AT THE MIXING ZONE BOUNDARY	
Temperature (deg C):	7.81
Salinity (psu)	29.85
Density (kg/m^3)	1023
Alkalinity (mmol/kg-SW):	2.27
Total Inorganic Carbon (mmol/kg-SW):	2
pH at Mixing Zone Boundary:	**8.00**

INPUT	
1. MIXING ZONE BOUNDARY CHARACTERISTICS	
Dilution factor at mixing zone boundary	356.0
Depth at plume trapping level (m)	3.250
2. BACKGROUND RECEIVING WATER CHARACTERISTICS	
Temperature (deg C):	7.80
pH:	8.00
Salinity (psu):	29.90
Total alkalinity (meq/L)	2.32
3. EFFLUENT CHARACTERISTICS	
Temperature (deg C):	10.40
pH:	6.00
Salinity (psu)	12.00
Total alkalinity (meq/L):	1.84
4. CLICK THE 'Calculate" BUTTON TO UPDATE OUTPUT RESULTS -->	Calculate
OUTPUT	
CONDITIONS AT THE MIXING ZONE BOUNDARY	
Temperature (deg C):	7.81
Salinity (psu)	29.85
Density (kg/m^3)	1023
Alkalinity (mmol/kg-SW):	2.27
Total Inorganic Carbon (mmol/kg-SW):	2
pH at Mixing Zone Boundary:	**7.98**

Source-WA DOE Spreadhseets for Water Quality Based NPDES Permit Calculations 2012 Version.

Table 12. CORMIX Input Parameters for Temperature Effects Analysis

CORMIX input parameters

1. Effluent Characterization/Pollutant Type

Input	Units	Value	Source	
Discharge Conc.	mg/L	1000.00	Per Ripan	
Flow Rate (acute)	gpm	58.90	WA State NPDES, Table C-1 (period = June 2018-June 2021): a. If monthly Qmax < 0.85 Qdesign (dry weather) use daily Qmax. Monthly Qmax = 0.03043 (Feb 2020); 0.85 Qdesign = 0.037; **Daily Qmax = 0.08482 (Jan 2020)**	0.08482
Flow Rate (chronic)	gpm	21.13	WA State NPDES, Table C-1 (period = June 2018-June 2021): a. If monthly Qmax < 0.85 Qdesign (dry weather) use monthly Qmax. 0.85 Qdesign = 0.037 mgd; **monthly Qmax = .03043 (Feb 2020)**	0.03043
Effluent density (mixing zone)	kg/m3	1001.29	Xiang et al. 2016: treated effluent = 1.00129g/mL	1.00129
Effluent temp (temp effects)	degrees	20.50	NAVFAC spreadsheet Temperture Data; calculated 90th %-ile (period = June 2018-June 2021); **daily max = 20.5**	
Effluent temp (temp effects)	degrees	19.50	NAVFAC spreadsheet Temperture Data; calculated 90th %-ile (period = June 2018-June 2021); **monthly max = 19.5**	

2. Ambient Geometry/Flow Field Data

Input	Units	Value	Source
Avg. Depth	ft	11.60	Discharge at bottom of channel
Depth at discharge	ft	11.60	Per Monika Glandorff email 7/13/21
Wind Speed	m/s	N/A	N/A
Velocity (acute; 10%)	m/s	0.03	Ahmed (SSM)
Velocity (acute; 90%)	m/s	0.155	Ahmed (SSM)
Velocity (chronic; 50%)	m/s	0.08	Ahmed (SSM)
Manning's n	N/A	0.022	Per Ripan
Ambient density	kg/m3	1023.2161	NAVFAC spreadsheet: MarineAmbioentProfileResults_2021Jun23_652; 3.5m depth

3. Discharge Geometry Data

Input	Units	Value	Source	
Distance to bank	ft	275.00	Per Monika email 7/15/21	
Vertical angle THETA	degrees	?	bathymetry unavailable; assume uniform slope? Per Monika email (7/15/21): rise = 17.2ft; run = 275ft	
Horizontal angle SIGMA	degrees	?	bathymetry unavailable; assume uniform slope? Per Monika email (7/15/21): rise = 17.2ft; run = 275ft	
Port diameter	m	0.1016	NAVFAC Fig 3-5; port dia = 4 in	4
Port ht. above bottom	m	0.50	Per Ripan: CORMIX does not provide option for locating outfall on bottom; 0.5m minimum allowed	

4. Mixing Zone Specifications

Input	Units	Value	Source
Distance (acute)	ft	21.16	10% chronic MZ
Distance (chronic)	ft	211.60	WA standard plus outfall depth adjustment
Region of interest	m	1000.00	Per Ripan
Output steps per module	N/A	100.00	Per Ripan

Figures 1-9. CORMIX Temperature Model Outputs

Figure 4

Indian Island acute 10%
Ambient velocity = 0.03 m/s; Ambient temperature=7.7 C
Wind speed= 6.4 m/s
Effluent flow rate = 58.9 GPM; Discharge excess=2.7 C

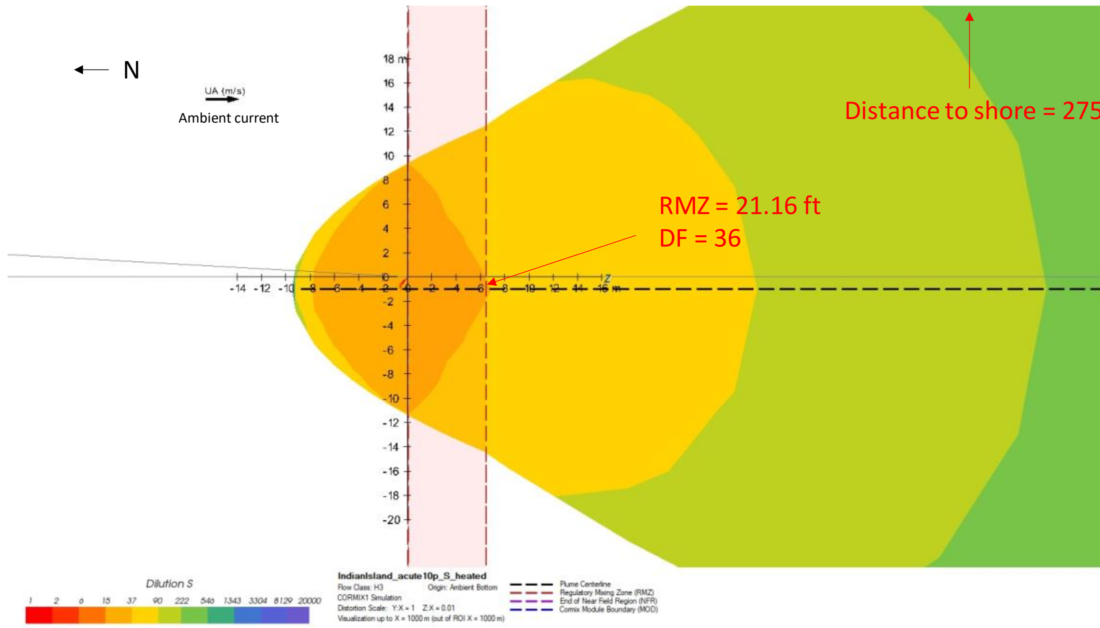


Figure 5

Indian Island acute 10%
Ambient velocity = 0.03 m/s; Ambient temperature=7.7 C
Wind speed= 6.4 m/s
Effluent flow rate = 58.9 GPM; Discharge excess=2.7 C

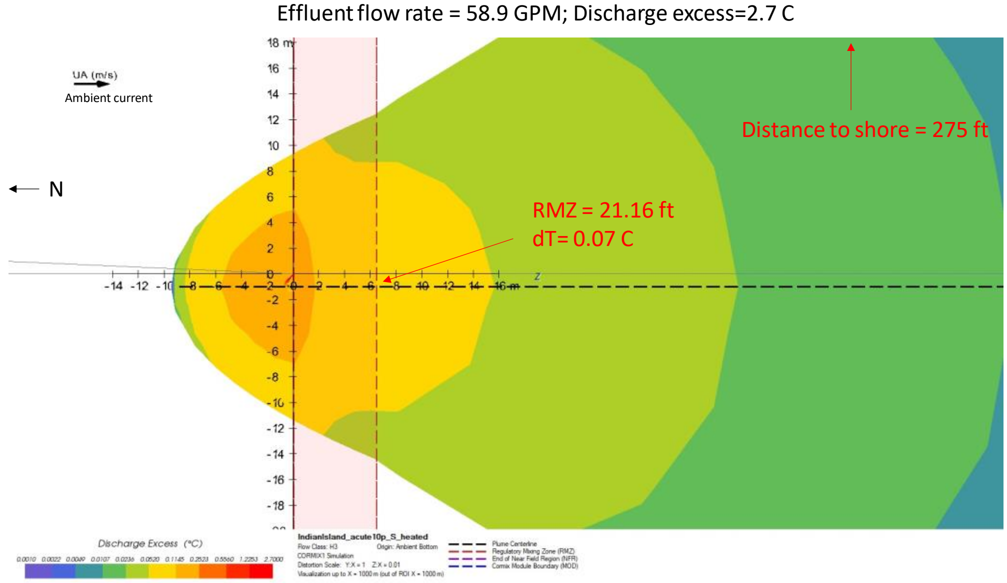


Figure 6

Indian Island acute 90%
Ambient velocity = 0.155 m/s; Ambient temperature= 7.7 C
Wind speed= 6.4 m/s
Effluent flow rate = 58.9 GPM; Discharge excess = 2.7 C

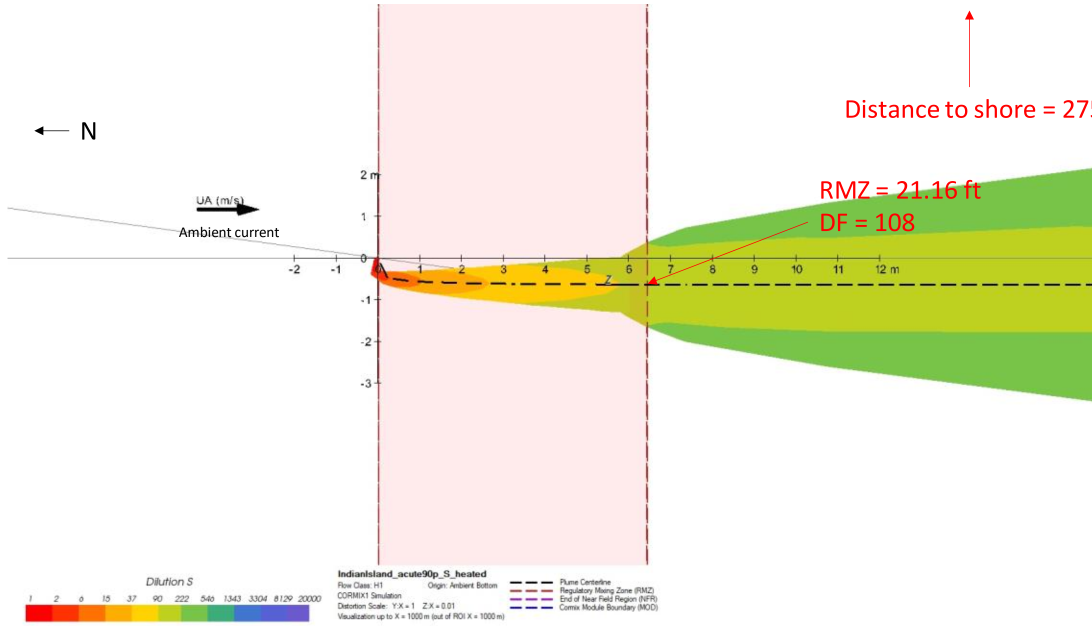


Figure 7

Indian Island acute 90%
Ambient velocity = 0.155 m/s; Ambient temperature= 7.7 C
Wind speed= 6.4 m/s
Effluent flow rate = 58.9 GPM; Discharge excess = 2.7 C

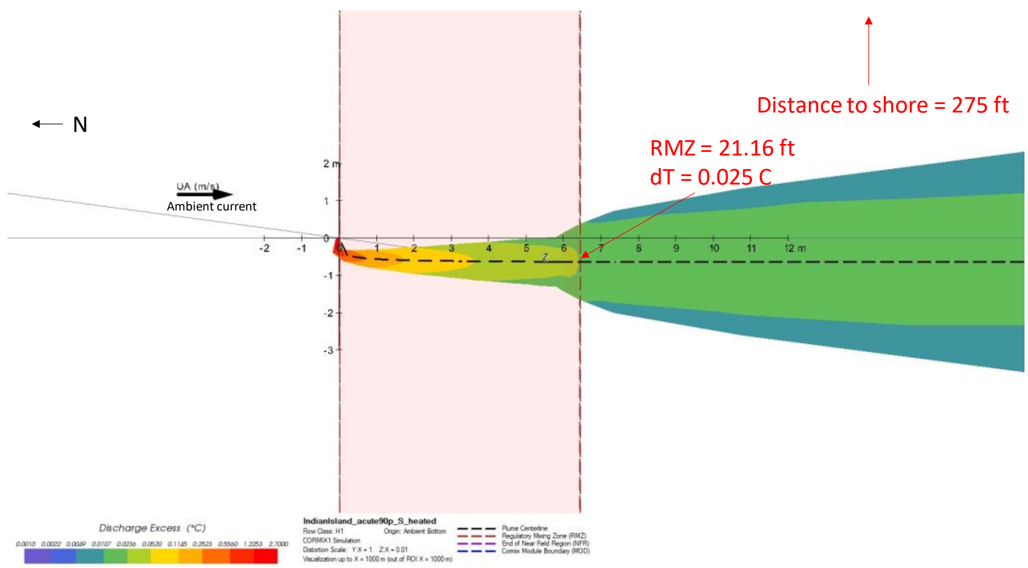


Figure 8

Indian Island chronic 50%
Ambient velocity = 0.08 m/s; Ambient temperature= 7.7 C
Wind speed = 6.4 m/s
Effluent flow rate = 21.13 GPM; Discharge excess = 2.7 C

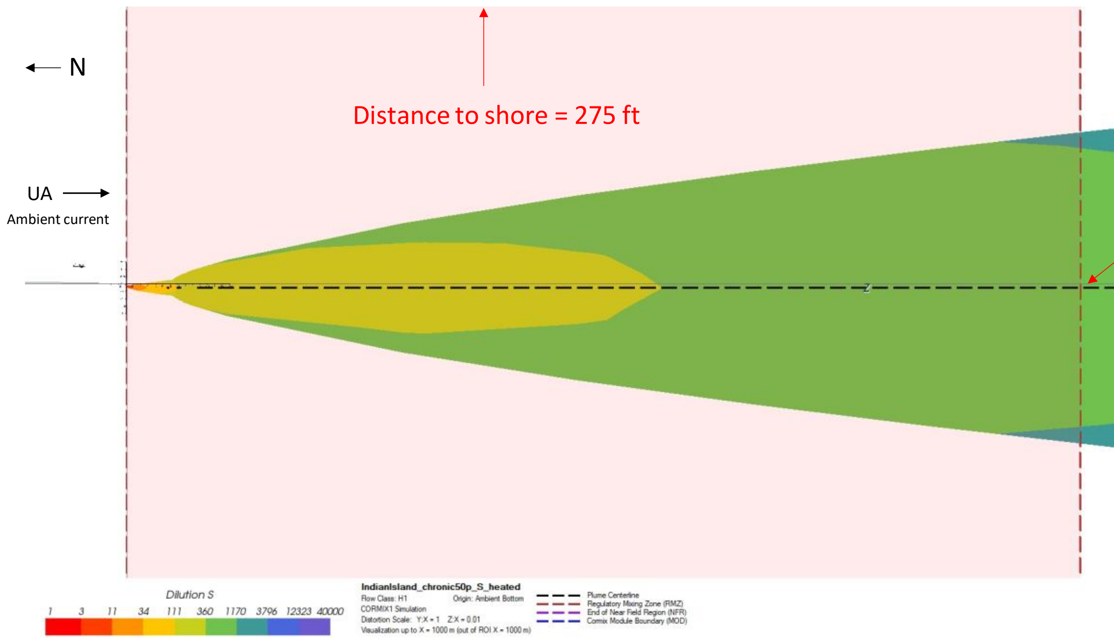
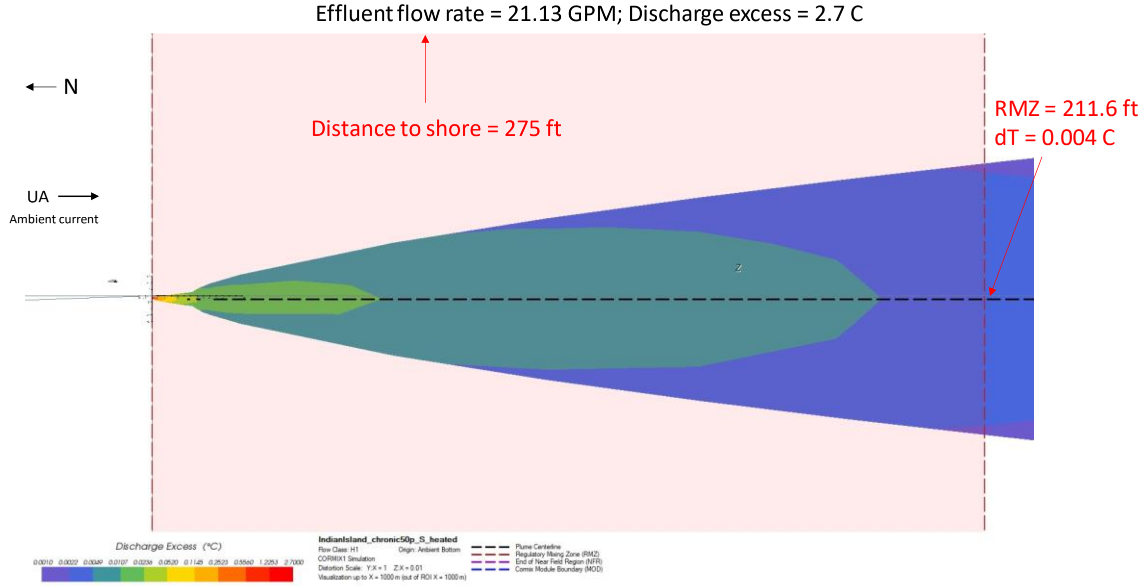


Figure 9

Indian Island chronic 50%
Ambient velocity = 0.08 m/s; Ambient temperature= 7.7 C
Wind speed = 6.4 m/s
Effluent flow rate = 21.13 GPM; Discharge excess = 2.7 C



Appendix E. Endangered Species Act

Section 7 of the Endangered Species Act (ESA) requires federal agencies to evaluate potential effects an action may have on listed endangered species. EPA used the U.S Fish and Wildlife Service's (USFW) online database to determine the services' species list for the area near the discharge. A letter was obtained on August 27th, 2021, from the U.S. Fish and Wildlife's Information for Planning and Consultation (IPaC) data base for the area in the vicinity of the discharge. The letter identified no endangered species. The letter identified 6 threatened species composed of four bird species, one fish species and one plant species shown below. No critical habitat was identified under USFW jurisdiction.

Birds

NAME	STATUS
Marbled Murrelet *Brachyramphus marmoratus* Population: U.S.A. (CA, OR, WA) There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/4467	Threatened
Northern Spotted Owl *Strix occidentalis caurina* There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/1123	Threatened
Streaked Horned Lark *Eremophila alpestris strigata* There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/7268	Threatened
Yellow-billed Cuckoo *Coccyzus americanus* Population: Western U.S. DPS There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/3911	Threatened

Fishes

NAME	STATUS
Bull Trout *Salvelinus confluentus* Population: U.S.A., conterminous, lower 48 states There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/8212	Threatened

Flowering Plants

NAME	STATUS
Golden Paintbrush *Castilleja levisecta*	Threatened

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/7706

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

EPA has determined that the issuance of the draft permit would have no effect on the threatened Northern Spotted Owl *Strix occidentalis caurina*, Streaked Horned Lark *Eremophila alpestris strigata*, Yellow-billed Cuckoo *Coccyzus americanus*, and Golden Paintbrush *Castilleja levisecta* because they are terrestrial species and would not be affected by the proposed discharge.

EPA considered the effluent from Naval Magazine Indian Island for possible impacts to the Marbled Murrelet *Brachyramphus marmoratus*, the Bull Trout *Salvelinus confluentus*, and three NOAA listed threatened species: Chinook Salmon *Oncorhynchus tshawytscha*, Chum Salmon *Oncorhynchus keta*, and Orca whale *Orcinus orca*.

NOAA Fisheries identified the following critical habitiat designations for the following species: Chinook Salmon *Oncorhynchus tshawytscha*, Chum Salmon *Oncorhynchus keta*, and Orca whale *Orcinus orca*.

<u>Marbled Murrelet</u>

The Marbled Murrelet is a small diving seabird that nests mainly in coniferous forests and forages in nearshore marine habitats. Marbled murrelet can occur year-round in Puget Sound, although their flock size, density, and distribution vary by season (Nysewander, et al., 2005; Falxa, et al., 2008). Marbled murrelets use the marine environment for courtship, loafing, and foraging (USFWS, 2010). Murrelets are usually found within 8 km (5 miles) of shore, and in water less than 60 m (197 ft) deep (Burger, 1995; Nelson, 1997; Ainley, et al. 1995). In this region, their nesting season is asynchronous between April 1 and September 23. During the breeding season, marbled murrelet forage near the shoreline in relatively shallow marine waters; there is less risk of being impacted by the discharges during this period. During the post-breeding season molt, marbled murrelet are essentially flightless and must select foraging sites that provide adequate prey resources within swimming distance (Carter, 1984; Carter and Stein, 1995). During the non-breeding season, marbled murrelet typically disperse and are found farther from shore, which is when there is a increased risk of exposure to the discharges (Strachan et al., 1995).

Throughout their range, marbled murrelet are opportunistic feeders and utilize prey of diverse sizes and species. Prey species in Washington coastal and inland waters include sand lance, anchovy, immature Pacific herring, shiner perch, and small crustaceans (especially euphausiids) (Burkett, 1995). Invertebrates are a primary prey source in the non-breeding season, whereas fish are a source year-round. Marbled murrelets have a diverse diet and can shift their target species in response to varying prey availability. Bioaccumulation of toxins in forage fish has been noted as a risk to marbled murrelets (USFWS 2019), however, bioaccumulation of CECs as a result of the discharge is not anticipated. Therefore, changes in marine forage conditions affecting the abundance, distribution, and quality of marbled murrelet prey is not likely to be impacted by the discharge.

Several anthropogenic threats were identified as having caused the dramatic decline in the species when the marbled murrelet was listed under the ESA (57 FR 45328) and in the Recovery Plan (USFWS 1997). These threats include habitat destruction and modification in the terrestrial environment from timber harvest and human development, which caused a severe reduction in the amount of nesting habitat, unnaturally high levels of predation resulting from forest edge effects, the existing regulatory mechanisms, inadequate regulatory mechanisms, and human-caused factors such as mortality from oil spills and entanglement in fishing nets used in gill-net fisheries.

There have been changes in the levels of these threats since the 1992 listing (USFWS 2004, USFWS 2009). The regulatory mechanisms implemented since 1992 that affect land management in Washington, Oregon, and California, and new gill-netting regulations in northern California and Washington, have reduced some threats to the marbled murrelet (USFWS 2004). The levels for the other threats identified in the 1992 listing (57 FR 45328), including the loss of nesting habitat, predation rates, and mortality risks from oil spills and gill net fisheries, have remained unchanged. However, new threats have been identified (USFWS 2009). These new stressors are due to several environmental factors affecting marbled murrelets in the marine environment, including habitat destruction, modification, or curtailment of the marine environmental conditions necessary to support the species due to elevated levels of polychlorinated biphenyls in prey species; changes in prey abundance and availability; changes in prey quality; harmful algal blooms that produce biotoxins leading to mortality; and climate change in the Pacific Northwest.

Human factors that affect the continued existence of the species include derelict fishing gear leading to mortality from entanglement, energy development projects (wave, tidal, and on-shore wind energy projects) leading to mortality, and disturbance in the marine environment primarily from exposures to lethal and sublethal levels of high underwater sound pressures caused by pile-driving, underwater detonations, and potential disturbance from high vessel traffic (USFWS 2009).

Climate change is expected to further exacerbate some existing threats such as the projected potential for increased habitat loss from drought-related fire, mortality, insects and disease, and increases in extreme flooding, landslides and windthrow events in the short term (10 to 30 years) (USFWS 2009). A 2018 population monitoring report found decreasing counts of marbled murrelets in Puget Sound, compared to increases off the coasts of Oregon and California since the report five years previously. Nesting habitat monitoring also shows a net decrease in the Puget Sound region. The cause of murrelet decline in Puget Sound specifically is not certain, however poor quality foraging habitat and greater marine human footprint from vessel traffic, fishing pressure, and pollution, could be to blame (McIver, Pearson et al. In press).

Bull Trout

Core areas currently supporting anadromous populations of bull trout are located within the Puget Sound and Olympic Peninsula regions (USFWS, 2015b). Resident bull trout complete their entire life cycle in or near tributary streams where they spawn and rear. Migratory bull trout spawn in tributary streams where juvenile fish rear for one to four years before migrating to a lake, river (Fraley and Shepard, 1989; Goetz, 1989), or saltwater (Cavender, 1978; McPhail and Baxter, 1996; WDFW et al., 1997). While bull trout are documented in nearshore marine waters near the discharge area, it is anticipated that bull trout will rarely be present in the discharge area and, therefore, are not likely to be directly exposed to the discharges.

The U.S. Fish and Wild Service Species Fact Sheet for the bull trout states: “The following activities or types of land use have contributed to the bull trout’s decline: dams, forest management practices, livestock grazing, agricultural practices, transportation networks, mining, residential development and urbanization, fisheries management activities, and any of a host of general practices as well as some natural events (e.g., fire or flood under certain circumstances) that may contribute to historical and current isolation and habitat fragmentation. Nonnative species, forest management practices, and fish passage issues are the top factors limiting bull trout populations at the range-wide level, both currently and historically.” Recovery Plan for the Coterminous United States Population of Bull Trout, Pacific Region, U.S. Fish and Wildlife Service, Portland Oregon, September 28, 2015, provides a similar list of activities and land use contributions to the bull trout’s decline.

Bull trout are opportunistic feeders. In marine nearshore areas of western Washington, sub-adult and adult bull trout feed on Pacific herring, sand lance, and surf smelt (WDFW, FishPro Inc. et al. 1997, Goetz, Jeanes et al. 2004). As discussed previously in Section 4.3, these forage fish are generally found in waters shallower than the Action Areas where marine vegetation and cover is available. While it is possible that these forage species may travel through the Action Areas and could be exposed to the discharges, these periods of potential exposure are expected to be short-term. Therefore, it is not anticipated that the discharges will impact the abundance, distribution, and quality of the bull trout habitat or prey.

Chinook and Chum Salmon

The larval (alevin) and fry life stages of chinook and chum salmon are not expected to be in the discharge area. Depending on the species and location, these life stages may spend from a few weeks to several years in freshwater before migrating to the estuarian environments to acclimate prior to entering marine waters (NMFS, 2005). Forage fish typically spawn in large aggregations along protected shorelines, thus generating a base of prey for the migrating salmon fry.
The patterns for rearing and outmigration within the life history cycle of Chinook and Chum salmon vary widely. While all waters of Puget Sound can be occupied by salmon, a majority of salmon leave the freshwater environment during their first year, making extensive use of the

protected estuary and nearshore habitats associated with the photic zone (NMFS, 2007b) . Nearshore ecosystems provide areas for the young salmon to hide from predators, are where forage species (e.g. surf smelt and sand lance) reside, and are ideal for supporting the physiological transition to saltwater (NMFS, 2005).. The vegetation, shade and insect production along river mouth deltas and protected shorelines help to provide food, cover and the regulation of temperatures in shallow channels. Juveniles need habitat that offers places to hide from predators, such as under logs, root wads and boulders, and beneath overhanging vegetation, therefore, nearshore shallow waters provide protection from larger fish and other predators. As the juvenile salmon grow and mature, they move out to more exposed shorelines with important marine vegetation (e.g., eelgrass meadows and kelp forests), foraging opportunities, and rocky shorelines before they continue their migratory path to the ocean environment (NMFS 2007).

Marine vegetation surveys generally have not shown an overlap with the discharge area and documented forage fish spawning areas appear to be in waters shallower than the discharge area, corresponding with marine vegetated habitats (Fresh 2006). As a result, the discharge area does not overlap with areas providing the necessary habitat for juvenile salmonids and, therefore, it is not expected that juveniles will be present for any extended periods of time.

Adult salmon may travel through the discharge area while migrating from deeper marine environments to nearshore environments and ultimately to their freshwater spawning areas. It is expected that they will spend some time in the nearshore and estuarian environments prior to returning to their natal rivers/waterbodies as they adjust to freshwater ecosystems (NMFS 2007b). However, as noted above, the discharge area does not overlap with forage species spawning areas nor do they correspond with areas of marine vegetation (where forage species reside), therefore, it seems unlikely that adults would spend extended periods of time in an environment that did not support necessary physiological changes and prove ample foraging opportunities.

EPA has attempted to quantify the potential exposure duration for the species. Unfortunately, data available on swimming speeds in open water is very limited and highly variable, therefore, EPA also considered swimming speed data for Chinook salmon in rivers, which is not necessarily reflective of swimming behavior in open water, tidally influenced environments. Candy et al. (1999) used ultrasonic tracking to characterizing migratory behavior of adult chinook salmon in upper Johnstone Strait (British Columbia) and reported a gross travel (defined as distance moved in 5-minute increments) speed of 1.9 km/hr and a net travel speed (defined as the distance between point of release and track termination) of 0.6 km/hr.

Furthermore, considering the small size of the discharge area relative the size of the overall waterbody, the fact that the discharge area does not impede access to the nearshore environment, and the fact that adult salmonids will be able to avoid the discharge area or will only be present in the discharge area for short periods of time considering a swimming speed of at least 0.5 ft/sec, it is unlikely that adult salmonids will spend any extended periods of time in the discharge area.

Orca Whale

Although ubiquitous within Puget Sound, the orca is not expected to be present within the discharge area for any extended period of time. Therefore, direct exposure to the discharges is not expected, however indirect exposure to pollutants discharged within the discharge area is possible through their food web. Salmon, particularly Chinook, are the primary prey of orcas. However, it is also unlikely that the orca would spend a significant portion of time within the discharge area or consume a significant portion of its prey from the discharge area.

EPA concludes the Naval Magazine Indian Island NPDES permit will have no effect on the above threatened species because of the following:

- Point source discharges such as the Naval Magazine Indian Island are not mentioned in either the *Recovery Plan for the Coterminous United States Population of Bull Trout*, or the *Species Fact Sheet* as causes of the bull trout's or Dolly Varden's decline.
- This permit requires compliance with the State of Washington Surface Water Quality Standards that are protective of aquatic organisms including threatened and endangered species.
- Secondary treatment at the facility is consistently achieving high levels of pollutant removal prior to discharge.
- Relatively rapid mixing rates due to currents and tidal influence result in a high degree of dilution and relatively small mixing zone in the receiving water.
- Few juveniles and adult salmonids will enter the mixing zone because of its small size relative to the receiving water.

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Appendix F. **Essential Fish Habitat Assessment**

Federal agencies are required to comply with the Magnuson-Stevens Fishery Conservation and Management Act, as amended in October 1996, by consulting with NMFS on any proposed action that may adversely affect essential fish habitat (EFH). The objective of this EFH assessment is to determine whether the proposed action "may adversely affect" designated EFH for relevant commercial, federally managed fisheries species within the proposed Action Area. It also describes the conservation measures proposed to avoid, minimize, or otherwise offset potential adverse effects on designated EFH from the proposed action. EFH has been designated in or near the discharge area for Chinook Salmon *Oncorhynchus tshawytscha*, Chum Salmon *Oncorhynchus keta*, and Orca whale *Orcinus orca*. EFH is defined as "those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity" [16 U.S.C 1802(10)]. For the purpose of interpreting this definition of EFH, "waters include aquatic areas (marine waters, intertidal habitats, and freshwater streams) and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and spawning, breeding, feeding, or growth to maturity covers a species' full life cycle" (50 CFR 600.10).

EFH Effects Analysis and Determination

The EFH implementing regulations, 50 CFR § 600.810(a), define the term "adverse effect" as: any impact that reduces quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

The information presented in Appendix E demonstrates the discharge will not have an adverse effect on EFH for any managed species. Effects to EFH from direct exposure to the treated effluent are expected be insignificant due to the minor flow volume and domestic, non-industrial nature of the treated effluent. There are no major industrial sources contributing to the effluent streams and available discharge monitoring data demonstrates the effluents do not contain significant concentrations of toxics. The Naval Magazine Indian Island facility has replaced chlorination disinfection with UV disinfection.

The permit contains conservation measures in the form of effluent limitations and monitoring requirements necessary to ensure the protection of the receiving water and its designated uses. The mixing zones authorized by the Washington State Department of Ecology for the discharges are small in relation to the overall receiving water and designated essential fish habitat areas.

The discharges are not expected to impede the migration of any species due to physical barriers, temperature or other water quality parameters, or the presence of significant quantities of toxic contaminants.

Based on the above conclusions, EPA has determined reissuance of the NPDES permit for Naval Magazine Indian Island WWTP will not adversely affect EFH for any managed species.

CWA § 401 Certification