



## King County

Department of Natural Resources and Parks  
King Street Center, KSC-NR-5700  
201 South Jackson Street  
Seattle, WA 98104-3855

July 28, 2021

Shawn McKone, P.E.  
Municipal Facility Manager  
Washington State Department of Ecology  
Northwest Regional Office  
PO Box 330316  
Shoreline, WA 98133-9716

### **Vashon Wastewater Treatment Plant, Application for Renewal of the NPDES Permit (#WA0022527)**

Dear Mr. McKone:

Enclosed please find the application for renewal of the National Pollutant Discharge Elimination System (NPDES) permit #WA0022527 for King County's Vashon Wastewater Treatment Plant. This application package includes the following materials as required by the federal permit application form, requirements of the currently effective NPDES permit, and supplemental information provided in support of the application:

- Completed Environmental Protection Agency (EPA) NPDES Form 2A Parts with accompanying maps, treatment plant schematics, and supplemental data attachments.
- Supplemental effluent dilution modeling report for the Vashon effluent outfall to Puget Sound.

Additionally, King County requests that Ecology convert the current BOD<sub>5</sub>-based effluent limitations and monitoring requirements to CBOD<sub>5</sub>-based requirements to provide consistency with the other King County wastewater facilities, and because it provides a similar measure of plant performance as the BOD<sub>5</sub>-based measures. Associated with this request, King County would appreciate Ecology's consideration of an attached memorandum and proposed approach to CBOD<sub>5</sub> monitoring to assess loading relative to the plant's design BOD<sub>5</sub> treatment capacity. We also are available to discuss these requests, and any other potential permit modifications that may be considered for the renewal of the NPDES permit.

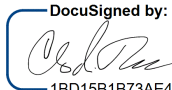
Shawn McKone

July 28, 2021

Page 2

Please contact Wastewater Treatment Division (WTD) Director Kamuron Gurol at 206-263-5767 or [kgurol@kingcounty.gov](mailto:kgurol@kingcounty.gov); or WTD NPDES Permit Administrator Jeff Lafer at 206-477-6315 or [jeff.lafer@kingcounty.gov](mailto:jeff.lafer@kingcounty.gov) if you have any questions regarding the NPDES permit application.

Sincerely,

DocuSigned by:  


1BD15B1B73AE4A0...  
Christie True, Director

King County Department of Natural Resources and Parks

Attachment: (1) July 8, 2021, Memorandum to Ecology

Enclosure: NPDES permit application package

cc: Kamuron Gurol, Division Director, Wastewater Treatment Division (WTD), Department of Natural Resources and Parks (DNRP)  
Robert Waddle, Operations Manager, WTD, DNRP  
Jeff Lafer, NPDES Permit Administrator, WTD, DNRP  
Laura Fricke, Municipal Unit Supervisor, Washington State Department of Ecology, Northwest Regional Office



## King County

Department of Natural Resources and Parks

### Wastewater Treatment Division

South Treatment Plant  
1200 Monster Road SW  
Renton, WA 98057

## MEMORANDUM

Shawn McKone, P.E.  
Municipal Facilities Manager  
Washington State Department of Ecology  
Northwest Regional Office  
PO Box 330316  
Shoreline, WA 98133-9716

July 8, 2021

### Vashon Treatment Plant NPDES Permit (WA0022527) – Proposed Conversion of BOD<sub>5</sub> Effluent Limits to CBOD<sub>5</sub>, and Monitoring Approach

King County proposes to convert the existing monthly and weekly effluent BOD<sub>5</sub> limits, and the monthly 85% BOD<sub>5</sub> removal requirement, for the Vashon NPDES permit to equivalent limits based on CBOD<sub>5</sub> (i.e., weekly 40-mg/L, monthly 25-mg/L). The current NPDES permits for South Plant and West Point are already based on CBOD<sub>5</sub>. King County supports analysis of CBOD<sub>5</sub> because it provides a better indicator of overall removal performance since it is less affected by any potential confounding of the data by recycle streams containing nitrogenous oxygen demand.

Condition S4 of the permit, which addresses the need to plan for maintaining capacity, is based on comparing the influent load to a maximum month capacity rating of 671-lbs/day based on influent BOD<sub>5</sub>. King County understands that Ecology can only change the capacity rating to be based on CBOD<sub>5</sub> through the submittal and approval of an engineering analysis of the treatment plant's capacity based on CBOD<sub>5</sub>. Accordingly, King County expects that concurrent monitoring for both BOD<sub>5</sub> and CBOD<sub>5</sub> would be required in the renewed permit to evaluate compliance with both the effluent limits and S4 requirements.

The current inflow BOD<sub>5</sub> loading to the Vashon treatment plant is stable and below the design capacity, and the service area loading is not expected to approach either of the S4 thresholds of 85% of capacity (570 lbs/day), or design capacity, within the next five years. Therefore, concurrent BOD<sub>5</sub> and CBOD<sub>5</sub> monitoring is unnecessary to evaluate the plant inflow loading status for the foreseeable future. Consequently, King County proposes that instead of performing influent BOD<sub>5</sub> monitoring to address S4, the influent CBOD<sub>5</sub> monitoring data would be sufficient to estimate the BOD<sub>5</sub> loading from the existing empirical influent CBOD:BOD ratio.

Ecology has stated that effluent CBOD<sub>5</sub> is typically approximately 85% of effluent BOD<sub>5</sub> at treatment plants in Washington State and has used this data in other NPDES permits to convert effluent water quality limits from BOD<sub>5</sub> to CBOD<sub>5</sub>. Instead of relying on the 85% effluent ratio for an influent ratio estimate, we tested the Vashon influent for CBOD<sub>5</sub> and BOD<sub>5</sub> from 4/21/2021 to 6/16/2021 (see Table 1 for the data results). The average influent CBOD<sub>5</sub>/BOD<sub>5</sub> ratio for that data was 88%. Therefore, King County proposes to use an 88% CBOD<sub>5</sub>/BOD<sub>5</sub> conversion factor throughout the next permit cycle to estimate the influent BOD<sub>5</sub> loading for evaluation to the S4 requirements.

This proposal would eliminate the need to perform concurrent influent and effluent BOD<sub>5</sub> testing which will help to reduce unnecessary lab work while providing an equivalent level of information on effluent quality and performance. King County would support a permit condition that requires additional evaluation, if the estimated influent Vashon BOD<sub>5</sub> loading and trending indicate that either of the S4 thresholds related to rated capacity are reached. A suitable condition could include additional influent testing for both CBOD<sub>5</sub> and BOD<sub>5</sub> to evaluate how well the 88% ratio reflects the actual conditions, and a commitment to initiate the capacity evaluation and planning process.

Sincerely,

DocuSigned by:  
  
975F3FFC9F7349A...

Rick Butler, Process Control Supervisor  
Wastewater Treatment Division  
King County Department of Natural Resources and Parks

cc: Robert Waddle, Operations Manager, Wastewater Treatment Division (WTD),  
Department of Natural Resources and Parks (DNRP)  
Jeff Lafer, NPDES Permit Administrator, WTD, DNRP  
Mathew Macdonald, Wastewater Process Engineer, WTD, DNRP



Table 1. Vashon Treatment Plant influent CBOD<sub>5</sub> and BOD<sub>5</sub> Data

|           | Influent BOD (mg/l) | Influent CBOD (mg/l) | CBOD/BOD |
|-----------|---------------------|----------------------|----------|
| 4/21/2021 | 393                 | 259                  | 65.9%    |
| 4/22/2021 | 360                 | 340                  | 94.4%    |
| 4/27/2021 | 402                 | 365                  | 90.8%    |
| 4/28/2021 | 352                 | 299                  | 84.9%    |
| 5/4/2021  | 445                 | 406                  | 91.2%    |
| 5/5/2021  | 305                 | 314                  | 103.0%   |
| 5/11/2021 | 510                 | 390                  | 76.5%    |
| 5/12/2021 | 406                 | 390                  | 96.1%    |
| 5/18/2021 | 331                 | 319                  | 96.4%    |
| 5/19/2021 | 394                 | 353                  | 89.6%    |
| 5/25/2021 | 627                 | 508                  | 81.0%    |
| 5/26/2021 | 540                 | 421                  | 78.0%    |
| 6/1/2021  | 431                 | 399                  | 92.6%    |
| 6/2/2021  | 450                 | 419                  | 93.1%    |
| 6/8/2021  | 474                 | 390                  | 82.3%    |
| 6/9/2021  | 460                 | 389                  | 84.6%    |
| 6/15/2021 | 331                 | 353                  | 106.6%   |
| 6/16/2021 | 379                 | 310                  | 81.8%    |
| Average   | 421.7               | 368.0                | 88.3%    |

# Vashon Wastewater Treatment Plant

Application for Renewal of the NPDES Permit (WA0022527)



King County Department of Natural Resources and Parks  
Wastewater Treatment Division

July 2021

**Vashon Wastewater Treatment Plant**  
**Application for Renewal of the NPDES Permit (WA0022527)**  
**July 2021**

**Table of Contents**

1. NPDES Form 2A (including maps, treatment plant schematics, and supplemental data attachments)
2. Effluent Dilution Modeling for Vashon Treatment Plant Outfall

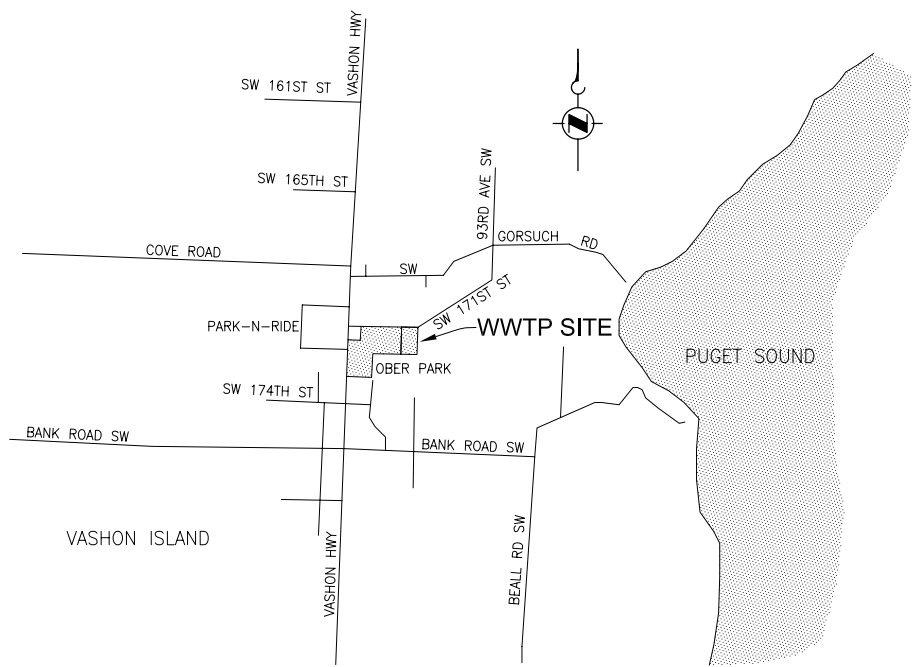
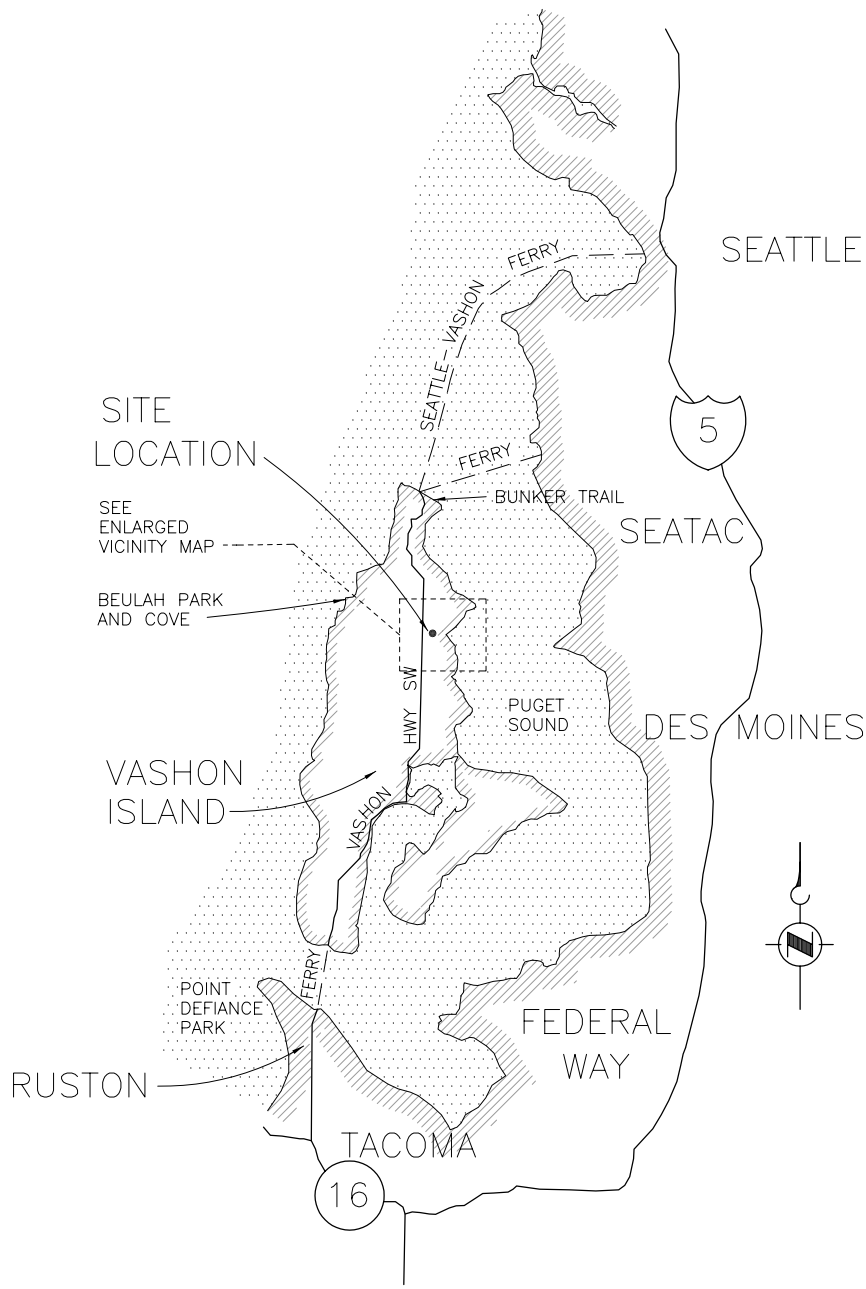
## **Attachment 1**

### **NPDES Form 2A**

**(including maps, treatment plant schematics, and  
supplemental data attachments)**

**Vashon Wastewater Treatment Plant  
Application for Renewal of the NPDES Permit (WA0022527)  
(July 2021)**

Path: \\Kcmsefcp1\data\CADD\2030013\RecordDrawings\VASHON\CONTR  
Xref Filename: | VICMAP | LOC |  
Filename: KAA11G01 Plot date: Jan 10, 2008--03:02:43pm CAD User: jesse.forsythe.



VICINITY MAP

ONE INCH  
↑  
AT FULL SIZE, IF NOT ONE  
INCH SCALE ACCORDINGLY  
LOC. VICMAP

|     |          |    |       |      |
|-----|----------|----|-------|------|
|     |          |    |       |      |
|     |          |    |       |      |
|     |          |    |       |      |
|     |          |    |       |      |
|     |          |    |       |      |
| No. | REVISION | BY | APP'D | DATE |

**Tetra Tech/KCM, Inc.**  
1917 First Avenue  
Seattle, Washington 98101  
206-443-5300 Fax: 206-443-5372



|              |                         |
|--------------|-------------------------|
| DESIGNED:    | CHECKED:                |
| DRAWN:       | SCALE:                  |
| RECOMMENDED: | NO SCALE                |
| APPROVED:    | CONTRACT NO:<br>C43003C |

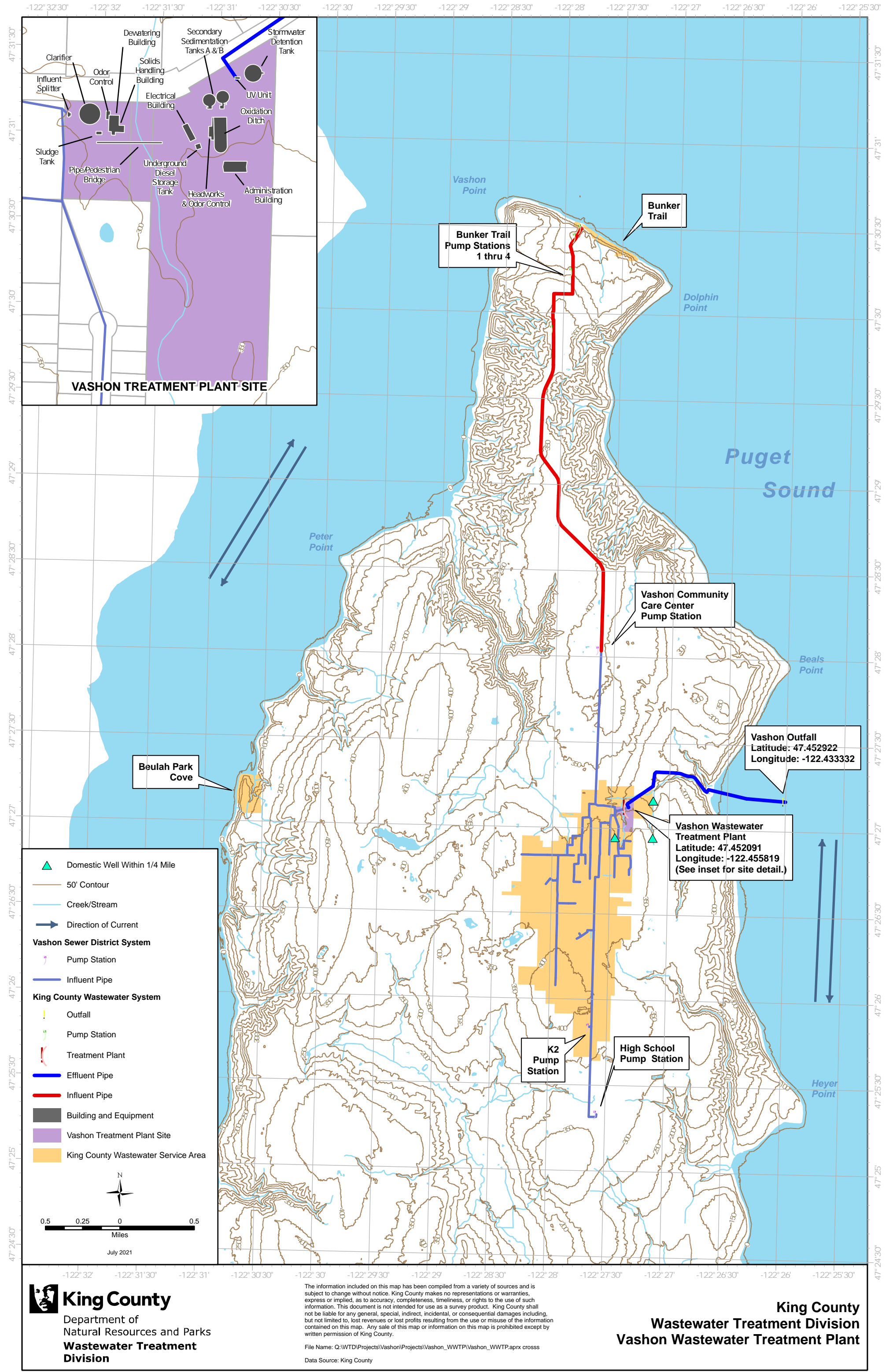


King County

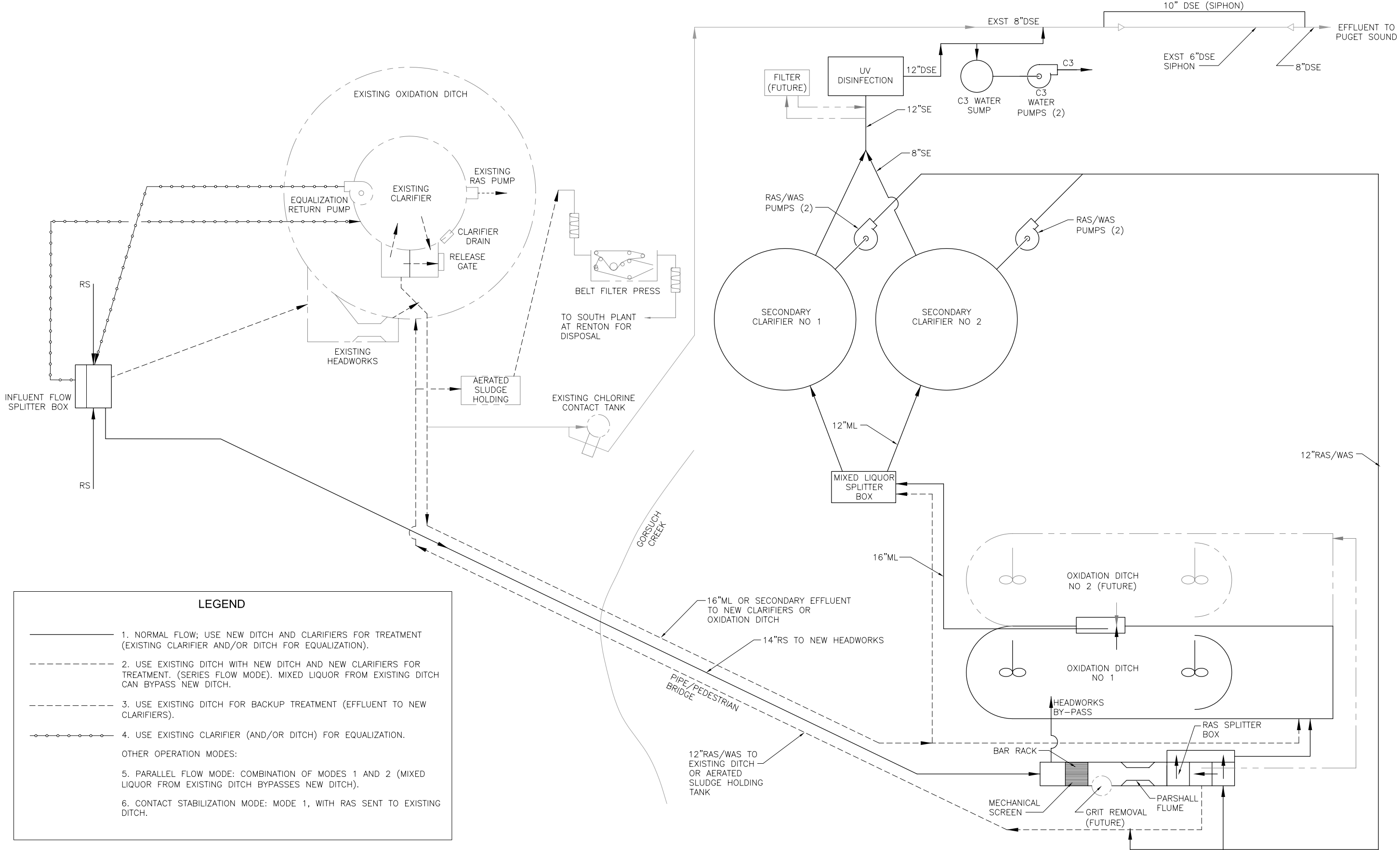
DEPARTMENT OF NATURAL RESOURCES AND PARKS  
VASHON ISLAND  
WASTEWATER TREATMENT PLANT UPGRADE  
**LOCATION MAP  
AND VICINITY MAP**

|                   |
|-------------------|
| DATE:<br>DEC 2003 |
| FILE NO:          |
| DRAWING NO:<br>G1 |
| SHEET NO: OF      |





Path: \\Kcmsefcp1\data\CADD\2030013\RecordDrawings\VASHON\CONTR Filename: KAA11G07 Plot date: Jan 10, 2008--03:18:12pm CAD User: jesse.forsythe.  
Xref Filename:



| No. | REVISION | BY | APP'D | DATE |
|-----|----------|----|-------|------|
|     |          |    |       |      |
|     |          |    |       |      |
|     |          |    |       |      |
|     |          |    |       |      |
|     |          |    |       |      |

**Tetra Tech/KCM, Inc.**  
1917 First Avenue  
Seattle, Washington 98101  
206-443-5300 Fax: 206-443-5372



|              |                      |
|--------------|----------------------|
| DESIGNED:    | CHECKED:             |
| DRAWN:       | SCALE:               |
| RECOMMENDED: | NONE                 |
| APPROVED:    | CONTRACT NO: C43003C |



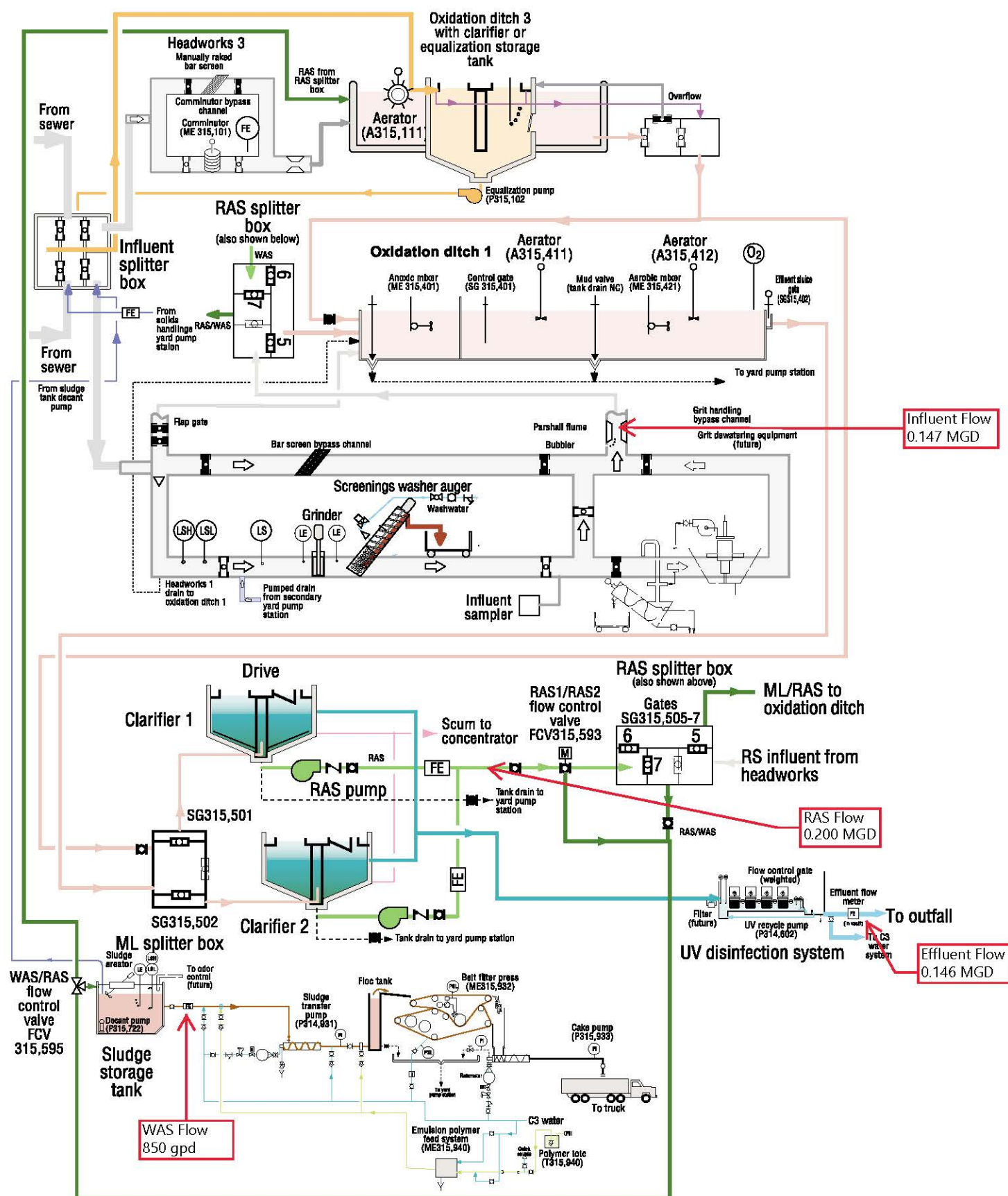
King County

DEPARTMENT OF NATURAL RESOURCES AND PARKS  
VASHON ISLAND  
WASTEWATER TREATMENT PLANT UPGRADE

PROCESS FLOW DIAGRAM

|             |          |
|-------------|----------|
| DATE:       | DEC 2003 |
| FILE NO:    |          |
| DRAWING NO: | G7       |
| SHEET NO:   | OF       |

## Item 2.4 - Vashon Wastewater Treatment Plant Process Flow Diagram





United States  
Environmental Protection Agency

Office of Water  
Washington, D.C.

EPA Form 3510-2A  
Revised March 2019

---

Water Permits Division

---




# **Application Form 2A**

## **New and Existing Publicly Owned Treatment Works**

### **NPDES Permitting Program**

**Note:** Complete this form if your facility is a new or existing publicly owned treatment works.

|  |   |  |  |  |              |   |          |
|--|---|--|--|--|--------------|---|----------|
| EPA Identification Number  |   | NPDES Permit Number  |  | Facility Name  |              | Form Approved 03/05/19<br>OMB No. 2040-0004 |          |
| Form<br>2A<br>NPDES  |  | <b>U.S. Environmental Protection Agency</b><br><b>Application for NPDES Permit to Discharge Wastewater</b><br><b>NEW AND EXISTING PUBLICLY OWNED TREATMENT WORKS</b> |  |  |              |   |          |
| <b>SECTION 1. BASIC APPLICATION INFORMATION FOR ALL APPLICANTS (40 CFR 122.21(j)(1) and (9))</b> |   |  |  |  |              |   |          |
| <b>Facility Information</b>  | 1.1   | Facility name  |  |  |              |   |          |
|  |   | Mailing address (street or P.O. box)   |  |  |              |   |          |
|  |   | City or town   |  |  |              | State                                       | ZIP code |
|  |   | Contact name (first and last)  |  | Title  | Phone number | Email address                               |          |
|  |   | Location address (street, route number, or other specific identifier) <input type="checkbox"/> Same as mailing address   |  |  |              |   |          |
|  |   | City or town   |  |  |              | State                                       | ZIP code |
| <b>Applicant Information</b>   | 1.2   | Is this application for a facility that has yet to commence discharge?   |  |  |              |   |          |
|  |   | <input type="checkbox"/> Yes → See instructions on data submission requirements for new dischargers. <input type="checkbox"/> No                                     |  |  |              |   |          |
|  |   | 1.3 Is applicant different from entity listed under Item 1.1 above?  |  |  |              |   |          |
|  |   | <input type="checkbox"/> Yes <input type="checkbox"/> No → SKIP to Item 1.4.   |  |  |              |   |          |
|  |   | Applicant name   |  |  |              |   |          |
|  |   | Applicant address (street or P.O. box)   |  |  |              |   |          |
| <b>Existing Environmental Permits</b>  | 1.4   | Is the applicant the facility's owner, operator, or both? (Check only one response.)   |  |  |              |   |          |
|  |   | <input type="checkbox"/> Owner <input type="checkbox"/> Operator <input type="checkbox"/> Both   |  |  |              |   |          |
|  |   | 1.5 To which entity should the NPDES permitting authority send correspondence? (Check only one response.)  |  |  |              |   |          |
|  |   | <input type="checkbox"/> Facility <input type="checkbox"/> Applicant <input type="checkbox"/> Facility and applicant (they are one and the same)                     |  |  |              |   |          |
|  |   | 1.6 Indicate below any existing environmental permits. (Check all that apply and print or type the corresponding permit number for each.)                            |  |  |              |   |          |
|  |   | <b>Existing Environmental Permits</b>  |  |  |              |   |          |
| <input type="checkbox"/> NPDES (discharges to surface water)                                     |   | <input type="checkbox"/> RCRA (hazardous waste)  |  | <input type="checkbox"/> UIC (underground injection control) |              |   |          |
| <input type="checkbox"/> PSD (air emissions)   |   | <input type="checkbox"/> Nonattainment program (CAA)   |  | <input type="checkbox"/> NESHAPs (CAA)                       |              |   |          |
| <input type="checkbox"/> Ocean dumping (MPRSA)   |   | <input type="checkbox"/> Dredge or fill (CWA Section 404)  |  | <input type="checkbox"/> Other (specify)                     |              |   |          |

| EPA Identification Number                              |      | NPDES Permit Number   |   | Facility Name  |                                   | Form Approved 03/05/19<br>OMB No. 2040-0004 |  |
|--|------|---|---|--|-----------------------------------|---|--|
| Collection System and Population Served                | 1.7  | Provide the collection system information requested below for the treatment works.  |   |  |                                   |   |  |
|  |      | <b>Municipality Served</b>  | <b>Population Served</b>                  | <b>Collection System Type</b><br>(indicate percentage) |                                   | <b>Ownership Status</b>                     |  |
|  |      |   |   | _____ % separate sanitary sewer                        | <input type="checkbox"/> Own      | <input type="checkbox"/> Maintain           |  |
|  |      |   |   | _____ % combined storm and sanitary sewer              | <input type="checkbox"/> Own      | <input type="checkbox"/> Maintain           |  |
|  |      |   |   | <input type="checkbox"/> Unknown                       | <input type="checkbox"/> Own      | <input type="checkbox"/> Maintain           |  |
|  |      |   |   | _____ % separate sanitary sewer                        | <input type="checkbox"/> Own      | <input type="checkbox"/> Maintain           |  |
|  |      |   |   | _____ % combined storm and sanitary sewer              | <input type="checkbox"/> Own      | <input type="checkbox"/> Maintain           |  |
|  |      |   |   | <input type="checkbox"/> Unknown                       | <input type="checkbox"/> Own      | <input type="checkbox"/> Maintain           |  |
|  |      |   | _____ % separate sanitary sewer           | <input type="checkbox"/> Own                           | <input type="checkbox"/> Maintain |   |  |
|  |      |   | _____ % combined storm and sanitary sewer | <input type="checkbox"/> Own                           | <input type="checkbox"/> Maintain |   |  |
|  |      | <input type="checkbox"/> Unknown  | <input type="checkbox"/> Own              | <input type="checkbox"/> Maintain                      |                                   |   |  |
|  |      | _____ % separate sanitary sewer   | <input type="checkbox"/> Own              | <input type="checkbox"/> Maintain                      |                                   |   |  |
|  |      | _____ % combined storm and sanitary sewer   | <input type="checkbox"/> Own              | <input type="checkbox"/> Maintain                      |                                   |   |  |
|  |      | <input type="checkbox"/> Unknown  | <input type="checkbox"/> Own              | <input type="checkbox"/> Maintain                      |                                   |   |  |
| <b>Total Population Served</b>                         |      |   |   |  |                                   |   |  |
|  |      | <b>Separate Sanitary Sewer System</b>   |   | <b>Combined Storm and Sanitary Sewer</b>               |                                   |   |  |
| Total percentage of each type of sewer line (in miles) |      | %   |   | %  |                                   |   |  |
| Indian Country   | 1.8  | Is the treatment works located in Indian Country?<br><input type="checkbox"/> Yes <input type="checkbox"/> No                                   |   |  |                                   |   |  |
|  | 1.9  | Does the facility discharge to a receiving water that flows through Indian Country?<br><input type="checkbox"/> Yes <input type="checkbox"/> No |   |  |                                   |   |  |
| Design and Actual Flow Rates                           | 1.10 | Provide design <i>and</i> actual flow rates in the designated spaces.   |   |  |                                   | <b>Design Flow Rate</b>                     |  |
|  |      |   |   |  |                                   | mgd   |  |
|  |      | <b>Annual Average Flow Rates (Actual)</b>   |   |  |                                   |   |  |
|  |      | <b>Two Years Ago</b>  |   | <b>Last Year</b>                                       |                                   | <b>This Year</b>                            |  |
|  |      | mgd   |   | mgd  |                                   | mgd   |  |
|  |      | <b>Maximum Daily Flow Rates (Actual)</b>  |   |  |                                   |   |  |
|  |      | <b>Two Years Ago</b>  |   | <b>Last Year</b>                                       |                                   | <b>This Year</b>                            |  |
| mgd  |      | mgd   |   | mgd  |                                   |   |  |
| Discharge Points by Type                               | 1.11 | Provide the total number of effluent discharge points to waters of the United States by type.   |   |  |                                   |   |  |
|  |      | <b>Total Number of Effluent Discharge Points by Type</b>  |   |  |                                   |   |  |
|  |      | <b>Treated Effluent</b>   | <b>Untreated Effluent</b>                 | <b>Combined Sewer Overflows</b>                        | <b>Bypasses</b>                   | <b>Constructed Emergency Overflows</b>      |  |
|  |      |   |   |  |                                   |   |  |

|                           |                     |               |   |
|---------------------------|---------------------|---------------|---|
| EPA Identification Number | NPDES Permit Number | Facility Name | Form Approved 03/05/19<br>OMB No. 2040-0004 |
|---------------------------|---------------------|---------------|---|

|  |   |   |  |  |
|--|---|---|--|--|
| Outfalls and Other Discharge or Disposal Methods | <b>Outfalls Other Than to Waters of the United States</b>   |   |  |  |
|  | 1.12  | Does the POTW discharge wastewater to basins, ponds, or other surface impoundments that do not have outlets for discharge to waters of the United States?<br><input type="checkbox"/> Yes <span style="margin-left: 100px;"><input type="checkbox"/> No → SKIP to Item 1.14.</span> |  |  |
|  | 1.13  | Provide the location of each surface impoundment and associated discharge information in the table below.   |  |  |
|  | <b>Surface Impoundment Location and Discharge Data</b>  |   |  |  |
|  | <b>Location</b>   | <b>Average Daily Volume Discharged to Surface Impoundment</b>   | <b>Continuous or Intermittent (check one)</b>                                |  |
|  |   | gpd   | <input type="checkbox"/> Continuous<br><input type="checkbox"/> Intermittent |  |
|  |   | gpd   | <input type="checkbox"/> Continuous<br><input type="checkbox"/> Intermittent |  |
|  |   | gpd   | <input type="checkbox"/> Continuous<br><input type="checkbox"/> Intermittent |  |
|  | 1.14  | Is wastewater applied to land?<br><input type="checkbox"/> Yes <span style="margin-left: 100px;"><input type="checkbox"/> No → SKIP to Item 1.16.</span>  |  |  |
|  | 1.15  | Provide the land application site and discharge data requested below.   |  |  |
|  | <b>Land Application Site and Discharge Data</b>   |   |  |  |
|  | <b>Location</b>   | <b>Size</b>   | <b>Average Daily Volume Applied</b>  | <b>Continuous or Intermittent (check one)</b>                                |
|  |   | acres   | gpd  | <input type="checkbox"/> Continuous<br><input type="checkbox"/> Intermittent |
|  |   | acres   | gpd  | <input type="checkbox"/> Continuous<br><input type="checkbox"/> Intermittent |
|  |   | acres   | gpd  | <input type="checkbox"/> Continuous<br><input type="checkbox"/> Intermittent |
| 1.16   | Is effluent transported to another facility for treatment prior to discharge?<br><input type="checkbox"/> Yes <span style="margin-left: 100px;"><input type="checkbox"/> No → SKIP to Item 1.21.</span> |   |  |  |
| 1.17   | Describe the means by which the effluent is transported (e.g., tank truck, pipe).   |   |  |  |
| 1.18   | Is the effluent transported by a party other than the applicant?<br><input type="checkbox"/> Yes <span style="margin-left: 100px;"><input type="checkbox"/> No → SKIP to Item 1.20.</span>              |   |  |  |
| 1.19   | Provide information on the transporter below.   |   |  |  |
| <b>Transporter Data</b>                          |   |   |  |  |
| Entity name                                      |   | Mailing address (street or P.O. box)  |  |  |
| City or town                                     | State   | ZIP code  |  |  |
| Contact name (first and last)                    |   | Title   |  |  |
| Phone number                                     |   | Email address   |  |  |

|  |   |  |                              |  |  |   |  |
|--|---|--|------------------------------|--|--|---|--|
| EPA Identification Number                                  |   | NPDES Permit Number  |                              | Facility Name                                |  | Form Approved 03/05/19<br>OMB No. 2040-0004 |  |
| Outfalls and Other Discharge or Disposal Methods Continued | 1.20  | In the table below, indicate the name, address, contact information, NPDES number, and average daily flow rate of the receiving facility.  |                              |  |  |   |  |
|  | <b>Receiving Facility Data</b>  |  |                              |  |  |   |  |
|  | Facility name   |  |                              |  | Mailing address (street or P.O. box)   |   |  |
|  | City or town  |  |                              |  | State  | ZIP code                                    |  |
|  | Contact name (first and last)   |  |                              |  | Title  |   |  |
|  | Phone number  |  |                              |  | Email address  |   |  |
|  | NPDES number of receiving facility (if any) <input type="checkbox"/> None |  |                              |  | Average daily flow rate mgd  |   |  |
|  | 1.21  | Is the wastewater disposed of in a manner other than those already mentioned in Items 1.14 through 1.21 that do not have outlets to waters of the United States (e.g., underground percolation, underground injection)?<br><input type="checkbox"/> Yes <input type="checkbox"/> No → SKIP to Item 1.23.   |                              |  |  |   |  |
|  | 1.22  | Provide information in the table below on these other disposal methods.  |                              |  |  |   |  |
|  | <b>Information on Other Disposal Methods</b>                              |  |                              |  |  |   |  |
|  | <b>Disposal Method Description</b>  | <b>Location of Disposal Site</b>   | <b>Size of Disposal Site</b> | <b>Annual Average Daily Discharge Volume</b> | <b>Continuous or Intermittent (check one)</b>                                |   |  |
|  |   |  | acres                        | gpd  | <input type="checkbox"/> Continuous<br><input type="checkbox"/> Intermittent |   |  |
|  |   |  | acres                        | gpd  | <input type="checkbox"/> Continuous<br><input type="checkbox"/> Intermittent |   |  |
|  |   |  | acres                        | gpd  | <input type="checkbox"/> Continuous<br><input type="checkbox"/> Intermittent |   |  |
| Variance Requests  | 1.23  | Do you intend to request or renew one or more of the variances authorized at 40 CFR 122.21(n)? (Check all that apply. Consult with your NPDES permitting authority to determine what information needs to be submitted and when.)<br><input type="checkbox"/> Discharges into marine waters (CWA Section 301(h)) <input type="checkbox"/> Water quality related effluent limitation (CWA Section 302(b)(2))<br><input type="checkbox"/> Not applicable |                              |  |  |   |  |
|  |   |  |                              |  |  |   |  |
| Contractor Information                                     | 1.24  | Are any operational or maintenance aspects (related to wastewater treatment and effluent quality) of the treatment works the responsibility of a contractor?<br><input type="checkbox"/> Yes <input type="checkbox"/> No → SKIP to Section 2.  |                              |  |  |   |  |
|  | 1.25  | Provide location and contact information for each contractor in addition to a description of the contractor's operational and maintenance responsibilities.  |                              |  |  |   |  |
|  | <b>Contractor Information</b>   |  |                              |  |  |   |  |
|  |   |  | <b>Contractor 1</b>          | <b>Contractor 2</b>                          | <b>Contractor 3</b>  |   |  |
|  |   | Contractor name (company name)   |                              |  |  |   |  |
|  |   | Mailing address (street or P.O. box)   |                              |  |  |   |  |
|  |   | City, state, and ZIP code  |                              |  |  |   |  |
|  |   | Contact name (first and last)  |                              |  |  |   |  |
|  |   | Phone number   |                              |  |  |   |  |
|  |   | Email address  |                              |  |  |   |  |
|  | Operational and maintenance responsibilities of contractor                |  |                              |  |  |   |  |

|  |  |   |  |  |                                      |  |   |
|--|--|---|--|--|--------------------------------------|--|---|
| EPA Identification Number  |  | NPDES Permit Number   |  | Facility Name                          |                                      | Form Approved 03/05/19<br>OMB No. 2040-0004            |   |
| <b>SECTION 2. ADDITIONAL INFORMATION (40 CFR 122.21(j)(1) and (2))</b> |  |   |  |  |                                      |  |   |
| <b>Design Flow</b>   | <b>Outfalls to Waters of the United States</b>   |   |  |  |                                      |  |   |
|  | 2.1  | Does the treatment works have a design flow greater than or equal to 0.1 mgd?<br><input type="checkbox"/> Yes <input type="checkbox"/> No → SKIP to Section 3.  |  |  |                                      |  |   |
| <b>Inflow and Infiltration</b>   | 2.2  | Provide the treatment works' current average daily volume of inflow and infiltration.   |  |  |                                      | <b>Average Daily Volume of Inflow and Infiltration</b> |   |
|  |  |   |  |  | gpd                                  |  |   |
| <b>Topographic Map</b>   | 2.3  | Have you attached a topographic map to this application that contains all the required information? (See instructions for specific requirements.)<br><input type="checkbox"/> Yes <input type="checkbox"/> No                   |  |  |                                      |  |   |
|  |  |   |  |  |                                      |  |   |
| <b>Flow Diagram</b>  | 2.4  | Have you attached a process flow diagram or schematic to this application that contains all the required information? (See instructions for specific requirements.)<br><input type="checkbox"/> Yes <input type="checkbox"/> No |  |  |                                      |  |   |
| <b>Scheduled Improvements and Schedules of Implementation</b>          | 2.5  | Are improvements to the facility scheduled?<br><input type="checkbox"/> Yes <input type="checkbox"/> No → SKIP to Section 3.  |  |  |                                      |  |   |
|  | Briefly list and describe the scheduled improvements.  |   |  |  |                                      |  |   |
|  | 1.   |   |  |  |                                      |  |   |
|  | 2.   |   |  |  |                                      |  |   |
|  | 3.   |   |  |  |                                      |  |   |
|  | 4.   |   |  |  |                                      |  |   |
|  | 2.6  | Provide scheduled or actual dates of completion for improvements.   |  |  |                                      |  |   |
|  | <b>Scheduled or Actual Dates of Completion for Improvements</b>  |   |  |  |                                      |  |   |
|  |  | <b>Scheduled Improvement (from above)</b>   | <b>Affected Outfalls (list outfall number)</b> | <b>Begin Construction (MM/DD/YYYY)</b> | <b>End Construction (MM/DD/YYYY)</b> | <b>Begin Discharge (MM/DD/YYYY)</b>                    | <b>Attainment of Operational Level (MM/DD/YYYY)</b> |
|  |  | 1.  |  |  |                                      |  |   |
|  | 2.   |   |  |  |                                      |  |   |
|  | 3.   |   |  |  |                                      |  |   |
|  | 4.   |   |  |  |                                      |  |   |
| 2.7  | Have appropriate permits/clearances concerning other federal/state requirements been obtained? Briefly explain your response.<br><input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> None required or applicable |   |  |  |                                      |  |   |
| Explanation:   |  |   |  |  |                                      |  |   |

EPA Identification Number

NPDES Permit Number

Facility Name

Form Approved 03/05/19

OMB No. 2040-0004

**SECTION 3. INFORMATION ON EFFLUENT DISCHARGES (40 CFR 122.21(j)(3) to (5))**

|  |  |   |                             |                             |
|--|--|---|-----------------------------|-----------------------------|
| <b>Description of Outfalls</b>             | 3.1  | Provide the following information for each outfall. (Attach additional sheets if you have more than three outfalls.)  |                             |                             |
|  |  | <b>Outfall Number</b> _____   | <b>Outfall Number</b> _____ | <b>Outfall Number</b> _____ |
|  | State  |   |                             |                             |
|  | County   |   |                             |                             |
|  | City or town                                       |   |                             |                             |
|  | Distance from shore                                | ft.   | ft.                         | ft.                         |
|  | Depth below surface                                | ft.   | ft.                         | ft.                         |
|  | Average daily flow rate                            | mgd   | mgd                         | mgd                         |
|  | Latitude   | ° ' "   | ° ' "                       | ° ' "                       |
|  | Longitude  | ° ' "   | ° ' "                       | ° ' "                       |
| <b>Seasonal or Periodic Discharge Data</b> | 3.2  | Do any of the outfalls described under Item 3.1 have seasonal or periodic discharges?<br><input type="checkbox"/> Yes <input type="checkbox"/> No → SKIP to Item 3.4.   |                             |                             |
|  | 3.3  | If so, provide the following information for each applicable outfall.   |                             |                             |
|  |  | <b>Outfall Number</b> _____   | <b>Outfall Number</b> _____ | <b>Outfall Number</b> _____ |
|  | Number of times per year discharge occurs          |   |                             |                             |
|  | Average duration of each discharge (specify units) |   |                             |                             |
|  | Average flow of each discharge                     | mgd   | mgd                         | mgd                         |
| Months in which discharge occurs           |  |   |                             |                             |
| <b>Diffuser Type</b>                       | 3.4  | Are any of the outfalls listed under Item 3.1 equipped with a diffuser?<br><input type="checkbox"/> Yes <input type="checkbox"/> No → SKIP to Item 3.6.   |                             |                             |
|  | 3.5  | Briefly describe the diffuser type at each applicable outfall.  |                             |                             |
|  |  | <b>Outfall Number</b> _____   | <b>Outfall Number</b> _____ | <b>Outfall Number</b> _____ |
|  |  |   |                             |                             |
| <b>Waters of the U.S.</b>                  | 3.6  | Does the treatment works discharge or plan to discharge wastewater to waters of the United States from one or more discharge points?<br><input type="checkbox"/> Yes <input type="checkbox"/> No → SKIP to Section 6. |                             |                             |

|                             |  |   |  |   |  |   |  |
|-----------------------------|--|---|--|---|--|---|--|
| EPA Identification Number   |  | NPDES Permit Number   |  | Facility Name   |  | Form Approved 03/05/19<br>OMB No. 2040-0004   |  |
| 3.7                         |  | Provide the receiving water and related information (if known) for each outfall.  |  |   |  |   |  |
| Receiving Water Description |  | See attachment; dilution modeling of Vashon outfall   |  | Outfall Number _____  |  | Outfall Number _____  |  |
|                             |  | Receiving water name  |  |   |  |   |  |
|                             |  | Name of watershed, river, or stream system  |  |   |  |   |  |
|                             |  | U.S. Soil Conservation Service 14-digit watershed code  |  |   |  |   |  |
|                             |  | Name of state management/river basin  |  |   |  |   |  |
|                             |  | U.S. Geological Survey 8-digit hydrologic cataloging unit code  |  |   |  |   |  |
|                             |  | Critical low flow (acute)   |  | cfs   |  | cfs   |  |
|                             |  | Critical low flow (chronic)   |  | cfs   |  | cfs   |  |
|                             |  | Total hardness at critical low flow   |  | mg/L of CaCO <sub>3</sub>   |  | mg/L of CaCO <sub>3</sub>   |  |
| 3.8                         |  | Provide the following information describing the treatment provided for discharges from each outfall.   |  |   |  |   |  |
| Treatment Description       |  | Outfall Number _____  |  | Outfall Number _____  |  | Outfall Number _____  |  |
|                             |  | <b>Highest Level of Treatment</b> (check all that apply per outfall)<br><input type="checkbox"/> Primary<br><input type="checkbox"/> Equivalent to secondary<br><input type="checkbox"/> Secondary<br><input type="checkbox"/> Advanced<br><input type="checkbox"/> Other (specify) _____ |  | <input type="checkbox"/> Primary<br><input type="checkbox"/> Equivalent to secondary<br><input type="checkbox"/> Secondary<br><input type="checkbox"/> Advanced<br><input type="checkbox"/> Other (specify) _____ |  | <input type="checkbox"/> Primary<br><input type="checkbox"/> Equivalent to secondary<br><input type="checkbox"/> Secondary<br><input type="checkbox"/> Advanced<br><input type="checkbox"/> Other (specify) _____ |  |
|                             |  | <b>Design Removal Rates by Outfall</b>  |  |   |  |   |  |
|                             |  | BOD <sub>5</sub> or CBOD <sub>5</sub>   |  | %   |  | %   |  |
|                             |  | TSS   |  | %   |  | %   |  |
|                             |  | Phosphorus  |  | <input type="checkbox"/> Not applicable<br>%  |  | <input type="checkbox"/> Not applicable<br>%  |  |
|                             |  | Nitrogen  |  | <input type="checkbox"/> Not applicable<br>%  |  | <input type="checkbox"/> Not applicable<br>%  |  |
|                             |  | Other (specify) _____   |  | <input type="checkbox"/> Not applicable<br>%  |  | <input type="checkbox"/> Not applicable<br>%  |  |



|  |   |  |  |  |                             |                             |
|--|---|--|--|--|-----------------------------|-----------------------------|
| EPA Identification Number              |   | NPDES Permit Number  |  | Facility Name  |                             |                             |
| <b>Treatment Description Continued</b> | 3.9   | Describe the type of disinfection used for the effluent from each outfall in the table below. If disinfection varies by season, describe below.  |  |  |                             |                             |
|  |   |  | <b>Outfall Number</b> _____  | <b>Outfall Number</b> _____  | <b>Outfall Number</b> _____ |                             |
|  | Disinfection type   |  |  |  |                             |                             |
|  | Seasons used  |  |  |  |                             |                             |
|  | Dechlorination used?  | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> Yes<br><input type="checkbox"/> No   | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> Yes<br><input type="checkbox"/> No | <input type="checkbox"/> Not applicable<br><input type="checkbox"/> Yes<br><input type="checkbox"/> No |                             |                             |
| <b>Effluent Testing Data</b>           | 3.10  | Have you completed monitoring for all Table A parameters and attached the results to the application package?<br><input type="checkbox"/> Yes <input type="checkbox"/> No  |  |  |                             |                             |
|  | 3.11  | Have you conducted any WET tests during the 4.5 years prior to the date of the application on any of the facility's discharges or on any receiving water near the discharge points?<br><input type="checkbox"/> Yes <input type="checkbox"/> No → SKIP to Item 3.13.   |  |  |                             |                             |
|  | 3.12  | Indicate the number of acute and chronic WET tests conducted since the last permit reissuance of the facility's discharges by outfall number or of the receiving water near the discharge points.  |  |  |                             |                             |
|  |   |  | <b>Outfall Number</b> _____  | <b>Outfall Number</b> _____  | <b>Outfall Number</b> _____ |                             |
|  |   | <b>Acute</b>   | <b>Chronic</b>   | <b>Acute</b>   | <b>Chronic</b>              | <b>Acute</b> <b>Chronic</b> |
|  | Number of tests of discharge water  |  |  |  |                             |                             |
|  | Number of tests of receiving water  |  |  |  |                             |                             |
|  | 3.13  | Does the treatment works have a design flow greater than or equal to 0.1 mgd?<br><input type="checkbox"/> Yes <input type="checkbox"/> No → SKIP to Item 3.16.   |  |  |                             |                             |
|  | 3.14  | Does the POTW use chlorine for disinfection, use chlorine elsewhere in the treatment process, or otherwise have reasonable potential to discharge chlorine in its effluent?<br><input type="checkbox"/> Yes → Complete Table B, including chlorine. <input type="checkbox"/> No → Complete Table B, omitting chlorine. |  |  |                             |                             |
|  | 3.15  | Have you completed monitoring for all applicable Table B pollutants and attached the results to this application package?<br><input type="checkbox"/> Yes <input type="checkbox"/> No  |  |  |                             |                             |
| 3.16                                   | Does one or more of the following conditions apply? <ul style="list-style-type: none"> <li>The facility has a design flow greater than or equal to 1 mgd.</li> <li>The POTW has an approved pretreatment program or is required to develop such a program.</li> <li>The NPDES permitting authority has informed the POTW that it must sample for the parameters in Table C, must sample other additional parameters (Table D), or submit the results of WET tests for acute or chronic toxicity for each of its discharge outfalls (Table E).</li> </ul> <input type="checkbox"/> Yes → Complete Tables C, D, and E as applicable. <input type="checkbox"/> No → SKIP to Section 4. |  |  |  |                             |                             |
| 3.17                                   | Have you completed monitoring for all applicable Table C pollutants and attached the results to this application package?<br><input type="checkbox"/> Yes <input type="checkbox"/> No   |  |  |  |                             |                             |
| 3.18                                   | Have you completed monitoring for all applicable Table D pollutants required by your NPDES permitting authority and attached the results to this application package?<br><input type="checkbox"/> Yes <input type="checkbox"/> No additional sampling required by NPDES permitting authority.   |  |  |  |                             |                             |

|                           |  |                     |  |               |  |
|---------------------------|--|---------------------|--|---------------|--|
| EPA Identification Number |  | NPDES Permit Number |  | Facility Name |  |
|---------------------------|--|---------------------|--|---------------|--|

|  |   |  |  |                           |  |
|--|---|--|--|---------------------------|--|
| <b>Effluent Testing Data Continued</b>   | 3.19  | Has the POTW conducted either (1) minimum of four quarterly WET tests for one year preceding this permit application or (2) at least four annual WET tests in the past 4.5 years?<br><input type="checkbox"/> Yes <input type="checkbox"/> No → Complete tests and Table E and SKIP to Item 3.26.  |  |                           |  |
|  | 3.20  | Have you previously submitted the results of the above tests to your NPDES permitting authority?<br><input type="checkbox"/> Yes <input type="checkbox"/> No → Provide results in Table E and SKIP to Item 3.26.   |  |                           |  |
|  | 3.21  | Indicate the dates the data were submitted to your NPDES permitting authority and provide a summary of the results.  |  |                           |  |
|  |   | <b>Date(s) Submitted</b><br>(MM/DD/YYYY)   |  | <b>Summary of Results</b> |  |
|  |   |  |  |                           |  |
|  | 3.22  | Regardless of how you provided your WET testing data to the NPDES permitting authority, did any of the tests result in toxicity?<br><input type="checkbox"/> Yes <input type="checkbox"/> No → SKIP to Item 3.26.  |  |                           |  |
|  | 3.23  | Describe the cause(s) of the toxicity:   |  |                           |  |
|  | 3.24  | Has the treatment works conducted a toxicity reduction evaluation?<br><input type="checkbox"/> Yes <input type="checkbox"/> No → SKIP to Item 3.26.  |  |                           |  |
| 3.25   | Provide details of any toxicity reduction evaluations conducted.  |  |  |                           |  |
| 3.26   | Have you completed Table E for all applicable outfalls and attached the results to the application package?<br><input type="checkbox"/> Yes <input type="checkbox"/> Not applicable because previously submitted information to the NPDES permitting authority. |  |  |                           |  |
| <b>SECTION 4. INDUSTRIAL DISCHARGES AND HAZARDOUS WASTES (40 CFR 122.21(j)(6) and (7))</b> |   |  |  |                           |  |
| <b>Industrial Discharges and Hazardous Wastes</b>  | 4.1   | Does the POTW receive discharges from SIUs or NSCIUs?<br><input type="checkbox"/> Yes <input type="checkbox"/> No → SKIP to Item 4.7.  |  |                           |  |
|  | 4.2   | Indicate the number of SIUs and NSCIUs that discharge to the POTW.   |  |                           |  |
|  |   | <b>Number of SIUs</b>  |  | <b>Number of NSCIUs</b>   |  |
|  |   |  |  |                           |  |
|  | 4.3   | Does the POTW have an approved pretreatment program?<br><input type="checkbox"/> Yes <input type="checkbox"/> No   |  |                           |  |
|  | 4.4   | Have you submitted either of the following to the NPDES permitting authority that contains information substantially identical to that required in Table F: (1) a pretreatment program annual report submitted within one year of the application or (2) a pretreatment program?<br><input type="checkbox"/> Yes <input type="checkbox"/> No → SKIP to Item 4.6. |  |                           |  |
| 4.5  | Identify the title and date of the annual report or pretreatment program referenced in Item 4.4. SKIP to Item 4.7.  |  |  |                           |  |
| 4.6  | Have you completed and attached Table F to this application package?<br><input type="checkbox"/> Yes <input type="checkbox"/> No  |  |  |                           |  |

|  |  |  |   |   |  |              |
|--|--|--|---|---|--|--------------|
| EPA Identification Number  |  | NPDES Permit Number  |   | Facility Name   |  |              |
| Industrial Discharges and Hazardous Wastes Continued             | 4.7  | Does the POTW receive, or has it been notified that it will receive, by truck, rail, or dedicated pipe, any wastes that are regulated as RCRA hazardous wastes pursuant to 40 CFR 261?<br><input type="checkbox"/> Yes <input type="checkbox"/> No → SKIP to Item 4.9. |   |   |  |              |
|  | 4.8  | If yes, provide the following information:   |   |   |  |              |
|  |  | <b>Hazardous Waste Number</b>  | <b>Waste Transport Method</b><br>(check all that apply)                   |   | <b>Annual Amount of Waste Received</b> | <b>Units</b> |
|  |  |  | <input type="checkbox"/> Truck<br><input type="checkbox"/> Dedicated pipe | <input type="checkbox"/> Rail<br><input type="checkbox"/> Other (specify) _____ |  |              |
|  |  |  | <input type="checkbox"/> Truck<br><input type="checkbox"/> Dedicated pipe | <input type="checkbox"/> Rail<br><input type="checkbox"/> Other (specify) _____ |  |              |
|  |  |  | <input type="checkbox"/> Truck<br><input type="checkbox"/> Dedicated pipe | <input type="checkbox"/> Rail<br><input type="checkbox"/> Other (specify) _____ |  |              |
|  |  |  | <input type="checkbox"/> Truck<br><input type="checkbox"/> Dedicated pipe | <input type="checkbox"/> Rail<br><input type="checkbox"/> Other (specify) _____ |  |              |
| 4.9  | Does the POTW receive, or has it been notified that it will receive, wastewaters that originate from remedial activities, including those undertaken pursuant to CERCLA and Sections 3004(7) or 3008(h) of RCRA?<br><input type="checkbox"/> Yes <input type="checkbox"/> No → SKIP to Section 5.  |  |   |   |  |              |
| 4.10   | Does the POTW receive (or expect to receive) less than 15 kilograms per month of non-acute hazardous wastes as specified in 40 CFR 261.30(d) and 261.33(e)?<br><input type="checkbox"/> Yes → SKIP to Section 5. <input type="checkbox"/> No   |  |   |   |  |              |
| 4.11   | Have you reported the following information in an attachment to this application: identification and description of the site(s) or facility(ies) at which the wastewater originates; the identities of the wastewater's hazardous constituents; and the extent of treatment, if any, the wastewater receives or will receive before entering the POTW?<br><input type="checkbox"/> Yes <input type="checkbox"/> No |  |   |   |  |              |
| <b>SECTION 5. COMBINED SEWER OVERFLOWS (40 CFR 122.21(j)(8))</b> |  |  |   |   |  |              |
| CSO Map and Diagram  | 5.1  | Does the treatment works have a combined sewer system?<br><input type="checkbox"/> Yes <input type="checkbox"/> No → SKIP to Section 6.  |   |   |  |              |
|  | 5.2  | Have you attached a CSO system map to this application? (See instructions for map requirements.)<br><input type="checkbox"/> Yes <input type="checkbox"/> No   |   |   |  |              |
|  | 5.3  | Have you attached a CSO system diagram to this application? (See instructions for diagram requirements.)<br><input type="checkbox"/> Yes <input type="checkbox"/> No   |   |   |  |              |

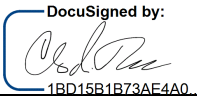
|                           |   |   |   |   |  |
|---------------------------|---|---|---|---|--|
| EPA Identification Number |   | NPDES Permit Number   |   | Facility Name   |  |
| CSO Outfall Description   | 5.4   | For each CSO outfall, provide the following information. (Attach additional sheets as necessary.) |   |   |  |
|                           |   | CSO Outfall Number ____   | CSO Outfall Number ____   | CSO Outfall Number ____   |  |
|                           | City or town                                      |   |   |   |  |
|                           | State and ZIP code                                |   |   |   |  |
|                           | County  |   |   |   |  |
|                           | Latitude  | ° ' "   | ° ' "   | ° ' "   |  |
|                           | Longitude   | ° ' "   | ° ' "   | ° ' "   |  |
|                           | Distance from shore                               | ft.   | ft.   | ft.   |  |
|                           | Depth below surface                               | ft.   | ft.   | ft.   |  |
| CSO Monitoring            | 5.5   | Did the POTW monitor any of the following items in the past year for its CSO outfalls?            |   |   |  |
|                           |   | CSO Outfall Number ____   | CSO Outfall Number ____   | CSO Outfall Number ____   |  |
|                           | Rainfall  | <input type="checkbox"/> Yes <input type="checkbox"/> No  | <input type="checkbox"/> Yes <input type="checkbox"/> No                                    | <input type="checkbox"/> Yes <input type="checkbox"/> No                                    |  |
|                           | CSO flow volume                                   | <input type="checkbox"/> Yes <input type="checkbox"/> No  | <input type="checkbox"/> Yes <input type="checkbox"/> No                                    | <input type="checkbox"/> Yes <input type="checkbox"/> No                                    |  |
|                           | CSO pollutant concentrations                      | <input type="checkbox"/> Yes <input type="checkbox"/> No  | <input type="checkbox"/> Yes <input type="checkbox"/> No                                    | <input type="checkbox"/> Yes <input type="checkbox"/> No                                    |  |
|                           | Receiving water quality                           | <input type="checkbox"/> Yes <input type="checkbox"/> No  | <input type="checkbox"/> Yes <input type="checkbox"/> No                                    | <input type="checkbox"/> Yes <input type="checkbox"/> No                                    |  |
|                           | CSO frequency                                     | <input type="checkbox"/> Yes <input type="checkbox"/> No  | <input type="checkbox"/> Yes <input type="checkbox"/> No                                    | <input type="checkbox"/> Yes <input type="checkbox"/> No                                    |  |
|                           | Number of storm events                            | <input type="checkbox"/> Yes <input type="checkbox"/> No  | <input type="checkbox"/> Yes <input type="checkbox"/> No                                    | <input type="checkbox"/> Yes <input type="checkbox"/> No                                    |  |
| CSO Events in Past Year   | 5.6   | Provide the following information for each of your CSO outfalls.                                  |   |   |  |
|                           |   | CSO Outfall Number ____   | CSO Outfall Number ____   | CSO Outfall Number ____   |  |
|                           | Number of CSO events in the past year             | events  | events  | events  |  |
|                           | Average duration per event                        | hours<br><input type="checkbox"/> Actual or <input type="checkbox"/> Estimated                    | hours<br><input type="checkbox"/> Actual or <input type="checkbox"/> Estimated              | hours<br><input type="checkbox"/> Actual or <input type="checkbox"/> Estimated              |  |
|                           | Average volume per event                          | million gallons<br><input type="checkbox"/> Actual or <input type="checkbox"/> Estimated          | million gallons<br><input type="checkbox"/> Actual or <input type="checkbox"/> Estimated    | million gallons<br><input type="checkbox"/> Actual or <input type="checkbox"/> Estimated    |  |
|                           | Minimum rainfall causing a CSO event in last year | inches of rainfall<br><input type="checkbox"/> Actual or <input type="checkbox"/> Estimated       | inches of rainfall<br><input type="checkbox"/> Actual or <input type="checkbox"/> Estimated | inches of rainfall<br><input type="checkbox"/> Actual or <input type="checkbox"/> Estimated |  |

|                           |                     |               |   |
|---------------------------|---------------------|---------------|---|
| EPA Identification Number | NPDES Permit Number | Facility Name | Form Approved 03/05/19<br>OMB No. 2040-0004 |
|---------------------------|---------------------|---------------|---|

|                             |   |   |                                  |                                  |
|-----------------------------|---|---|----------------------------------|----------------------------------|
| <b>CSO Receiving Waters</b> | <b>5.7</b>  | Provide the information in the table below for each of your CSO outfalls. |                                  |                                  |
|                             |   | <b>CSO Outfall Number</b> ____  | <b>CSO Outfall Number</b> ____   | <b>CSO Outfall Number</b> ____   |
|                             | Receiving water name  |   |                                  |                                  |
|                             | Name of watershed/<br>stream system   |   |                                  |                                  |
|                             | U.S. Soil Conservation<br>Service 14-digit<br>watershed code<br>(if known)  | <input type="checkbox"/> Unknown  | <input type="checkbox"/> Unknown | <input type="checkbox"/> Unknown |
|                             | Name of state<br>management/river basin   |   |                                  |                                  |
|                             | U.S. Geological Survey<br>8-Digit Hydrologic Unit<br>Code (if known)  | <input type="checkbox"/> Unknown  | <input type="checkbox"/> Unknown | <input type="checkbox"/> Unknown |
|                             | Description of known<br>water quality impacts on<br>receiving stream by CSO<br>(see instructions for<br>examples) |   |                                  |                                  |

|  |   |  |  |
|--|---|--|--|
| <b>SECTION 6. CHECKLIST AND CERTIFICATION STATEMENT (40 CFR 122.22(a) and (d))</b> |   |  |  |
| <b>Checklist and Certification Statement</b>                                       | <b>6.1</b>  | In Column 1 below, mark the sections of Form 2A that you have completed and are submitting with your application. For each section, specify in Column 2 any attachments that you are enclosing to alert the permitting authority. Note that not all applicants are required to provide attachments.  |  |
|  |   | <b>Column 1</b>  | <b>Column 2</b>  |
|  | <input type="checkbox"/>  | Section 1: Basic Application Information for All Applicants  | <input type="checkbox"/> w/ variance request(s) <input type="checkbox"/> w/ additional attachments   |
|  | <input type="checkbox"/>  | Section 2: Additional Information  | <input type="checkbox"/> w/ topographic map <input type="checkbox"/> w/ process flow diagram<br><input type="checkbox"/> w/ additional attachments   |
|  | <input type="checkbox"/>  | Section 3: Information on Effluent Discharges  | <input type="checkbox"/> w/ Table A <input type="checkbox"/> w/ Table D<br><input type="checkbox"/> w/ Table B <input type="checkbox"/> w/ Table E<br><input type="checkbox"/> w/ Table C <input type="checkbox"/> w/ additional attachments |
|  | <input type="checkbox"/>  | Section 4: Industrial Discharges and Hazardous Wastes  | <input type="checkbox"/> w/ SIU and NSCIU attachments <input type="checkbox"/> w/ Table F<br><input type="checkbox"/> w/ additional attachments  |
|  | <input type="checkbox"/>  | Section 5: Combined Sewer Overflows  | <input type="checkbox"/> w/ CSO map <input type="checkbox"/> w/ additional attachments<br><input type="checkbox"/> w/ CSO system diagram   |
|  | <input type="checkbox"/>  | Section 6: Checklist and Certification Statement   | <input type="checkbox"/> w/ attachments  |
|  | <b>6.2</b>  | <b>Certification Statement</b><br><br><i>I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.</i> |  |
|  |   | Name (print or type first and last name)   | Official title   |
|  | Signature  | Date signed<br>7/28/2021   |  |

|                           |                     |               |                |
|---------------------------|---------------------|---------------|----------------|
| EPA Identification Number | NPDES Permit Number | Facility Name | Outfall Number |
|---------------------------|---------------------|---------------|----------------|

Form Approved 03/05/19  
OMB No. 2040-0004

**TABLE A. EFFLUENT PARAMETERS FOR ALL POTWS**

| Pollutant  | Maximum Daily Discharge |       | Average Daily Discharge |       |                   | Analytical Method <sup>1</sup> | ML or MDL<br>(include units)                                |
|--|-------------------------|-------|-------------------------|-------|-------------------|--------------------------------|---|
|  | Value                   | Units | Value                   | Units | Number of Samples |                                |   |
| Biochemical oxygen demand<br><input type="checkbox"/> BOD <sub>5</sub> or <input type="checkbox"/> CBOD <sub>5</sub><br>(report one) |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Fecal coliform   |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Design flow rate   |                         |       |                         |       |                   |                                |   |
| pH (minimum)   |                         |       |                         |       |                   |                                |   |
| pH (maximum)   |                         |       |                         |       |                   |                                |   |
| Temperature (winter)   |                         |       |                         |       |                   |                                |   |
| Temperature (summer)   |                         |       |                         |       |                   |                                |   |
| Total suspended solids (TSS)   |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |

<sup>1</sup> Sampling shall be conducted according to sufficiently sensitive test procedures (i.e., methods) approved under 40 CFR 136 for the analysis of pollutants or pollutant parameters or required under 40 CFR chapter I, subchapter N or O. See instructions and 40 CFR 122.21(e)(3).

This page intentionally left blank.

|                           |                     |               |                |
|---------------------------|---------------------|---------------|----------------|
| EPA Identification Number | NPDES Permit Number | Facility Name | Outfall Number |
|---------------------------|---------------------|---------------|----------------|

Form Approved 03/05/19  
OMB No. 2040-0004

**TABLE B. EFFLUENT PARAMETERS FOR ALL POTWS WITH A FLOW EQUAL TO OR GREATER THAN 0.1 MGD**

| Pollutant                                      | Maximum Daily Discharge |       | Average Daily Discharge |       |                   | Analytical Method <sup>1</sup> | ML or MDL<br>(include units)                                |
|--|-------------------------|-------|-------------------------|-------|-------------------|--------------------------------|---|
|  | Value                   | Units | Value                   | Units | Number of Samples |                                |   |
| Ammonia (as N)                                 |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Chlorine<br>(total residual, TRC) <sup>2</sup> |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Dissolved oxygen                               |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Nitrate/nitrite                                |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Kjeldahl nitrogen                              |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Oil and grease                                 |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Phosphorus                                     |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Total dissolved solids                         |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |

<sup>1</sup> Sampling shall be conducted according to sufficiently sensitive test procedures (i.e., methods) approved under 40 CFR 136 for the analysis of pollutants or pollutant parameters or required under 40 CFR chapter I, subchapter N or O. See instructions and 40 CFR 122.21(e)(3).

<sup>2</sup> Facilities that do not use chlorine for disinfection, do not use chlorine elsewhere in the treatment process, and have no reasonable potential to discharge chlorine in their effluent are not required to report data for chlorine.



This page intentionally left blank.

|                           |                     |               |                |
|---------------------------|---------------------|---------------|----------------|
| EPA Identification Number | NPDES Permit Number | Facility Name | Outfall Number |
|---------------------------|---------------------|---------------|----------------|

Form Approved 03/05/19  
OMB No. 2040-0004**TABLE C. EFFLUENT PARAMETERS FOR SELECTED POTWS**

| Pollutant                                 | Maximum Daily Discharge                                      |       | Average Daily Discharge |       |                   | Analytical Method <sup>1</sup> | ML or MDL<br>(include units)                                |
|---|--|-------|-------------------------|-------|-------------------|--------------------------------|---|
|   | Value  | Units | Value                   | Units | Number of Samples |                                |   |
| <b>Metals, Cyanide, and Total Phenols</b> |  |       |                         |       |                   |                                |   |
| Hardness (as CaCO <sub>3</sub> )          |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Antimony, total recoverable               |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Arsenic, total recoverable                |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Beryllium, total recoverable              |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Cadmium, total recoverable                |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Chromium, total recoverable               |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Copper, total recoverable                 |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Lead, total recoverable                   |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Mercury, total recoverable                |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Nickel, total recoverable                 |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Selenium, total recoverable               |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Silver, total recoverable                 |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Thallium, total recoverable               |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Zinc, total recoverable                   |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Cyanide                                   |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Total phenolic compounds                  |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| <b>Volatile Organic Compounds</b>         | Monitoring of organics not required in previous permit cycle |       |                         |       |                   |                                |   |
| Acrolein                                  |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Acrylonitrile                             |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Benzene                                   |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Bromoform                                 |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |

|                           |                     |               |                |
|---------------------------|---------------------|---------------|----------------|
| EPA Identification Number | NPDES Permit Number | Facility Name | Outfall Number |
|---------------------------|---------------------|---------------|----------------|

Form Approved 03/05/19  
OMB No. 2040-0004

**TABLE C. EFFLUENT PARAMETERS FOR SELECTED POTWS**

| Pollutant                  | Maximum Daily Discharge |       | Average Daily Discharge |       |                   | Analytical Method <sup>1</sup> | ML or MDL<br>(include units)                                |
|----------------------------|-------------------------|-------|-------------------------|-------|-------------------|--------------------------------|---|
|                            | Value                   | Units | Value                   | Units | Number of Samples |                                |   |
| Carbon tetrachloride       |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Chlorobenzene              |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Chlorodibromomethane       |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Chloroethane               |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| 2-chloroethylvinyl ether   |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Chloroform                 |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Dichlorobromomethane       |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| 1,1-dichloroethane         |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| 1,2-dichloroethane         |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| trans-1,2-dichloroethylene |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| 1,1-dichloroethylene       |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| 1,2-dichloropropane        |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| 1,3-dichloropropylene      |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Ethylbenzene               |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Methyl bromide             |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Methyl chloride            |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Methylene chloride         |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| 1,1,2,2-tetrachloroethane  |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Tetrachloroethylene        |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Toluene                    |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| 1,1,1-trichloroethane      |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| 1,1,2-trichloroethane      |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |

|                           |                     |               |                |
|---------------------------|---------------------|---------------|----------------|
| EPA Identification Number | NPDES Permit Number | Facility Name | Outfall Number |
|---------------------------|---------------------|---------------|----------------|

Form Approved 03/05/19  
OMB No. 2040-0004**TABLE C. EFFLUENT PARAMETERS FOR SELECTED POTWS**

| Pollutant                         | Maximum Daily Discharge                                      |       | Average Daily Discharge |       |                   | Analytical Method <sup>1</sup> | ML or MDL<br>(include units)                                |
|-----------------------------------|--|-------|-------------------------|-------|-------------------|--------------------------------|---|
|                                   | Value  | Units | Value                   | Units | Number of Samples |                                |   |
| Trichloroethylene                 |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Vinyl chloride                    |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| <b>Acid-Extractable Compounds</b> | Monitoring of organics not required in previous permit cycle |       |                         |       |                   |                                |   |
| p-chloro-m-cresol                 |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| 2-chlorophenol                    |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| 2,4-dichlorophenol                |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| 2,4-dimethylphenol                |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| 4,6-dinitro-o-cresol              |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| 2,4-dinitrophenol                 |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| 2-nitrophenol                     |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| 4-nitrophenol                     |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Pentachlorophenol                 |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Phenol                            |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| 2,4,6-trichlorophenol             |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| <b>Base-Neutral Compounds</b>     | Monitoring of organics not required in previous permit cycle |       |                         |       |                   |                                |   |
| Acenaphthene                      |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Acenaphthylene                    |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Anthracene                        |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Benzidine                         |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Benzo(a)anthracene                |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Benzo(a)pyrene                    |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| 3,4-benzofluoranthene             |  |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |

|                           |                     |               |                |
|---------------------------|---------------------|---------------|----------------|
| EPA Identification Number | NPDES Permit Number | Facility Name | Outfall Number |
|---------------------------|---------------------|---------------|----------------|

Form Approved 03/05/19  
OMB No. 2040-0004

**TABLE C. EFFLUENT PARAMETERS FOR SELECTED POTWS**

| Pollutant                     | Maximum Daily Discharge |       | Average Daily Discharge |       |                   | Analytical Method <sup>1</sup> | ML or MDL<br>(include units)                                |
|-------------------------------|-------------------------|-------|-------------------------|-------|-------------------|--------------------------------|---|
|                               | Value                   | Units | Value                   | Units | Number of Samples |                                |   |
| Benzo(ghi)perylene            |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Benzo(k)fluoranthene          |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Bis (2-chloroethoxy) methane  |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Bis (2-chloroethyl) ether     |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Bis (2-chloroisopropyl) ether |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Bis (2-ethylhexyl) phthalate  |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| 4-bromophenyl phenyl ether    |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Butyl benzyl phthalate        |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| 2-chloronaphthalene           |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| 4-chlorophenyl phenyl ether   |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Chrysene                      |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| di-n-butyl phthalate          |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| di-n-octyl phthalate          |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Dibenzo(a,h)anthracene        |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| 1,2-dichlorobenzene           |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| 1,3-dichlorobenzene           |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| 1,4-dichlorobenzene           |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| 3,3-dichlorobenzidine         |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Diethyl phthalate             |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Dimethyl phthalate            |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| 2,4-dinitrotoluene            |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| 2,6-dinitrotoluene            |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |

|                           |                     |               |                |
|---------------------------|---------------------|---------------|----------------|
| EPA Identification Number | NPDES Permit Number | Facility Name | Outfall Number |
|---------------------------|---------------------|---------------|----------------|

Form Approved 03/05/19  
OMB No. 2040-0004

**TABLE C. EFFLUENT PARAMETERS FOR SELECTED POTWS**

| Pollutant                  | Maximum Daily Discharge |       | Average Daily Discharge |       |                   | Analytical Method <sup>1</sup> | ML or MDL<br>(include units)                                |
|----------------------------|-------------------------|-------|-------------------------|-------|-------------------|--------------------------------|---|
|                            | Value                   | Units | Value                   | Units | Number of Samples |                                |   |
| 1,2-diphenylhydrazine      |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Fluoranthene               |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Fluorene                   |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Hexachlorobenzene          |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Hexachlorobutadiene        |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Hexachlorocyclo-pentadiene |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Hexachloroethane           |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Indeno(1,2,3-cd)pyrene     |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Isophorone                 |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Naphthalene                |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Nitrobenzene               |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| N-nitrosodi-n-propylamine  |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| N-nitrosodimethylamine     |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| N-nitrosodiphenylamine     |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Phenanthrene               |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| Pyrene                     |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |
| 1,2,4-trichlorobenzene     |                         |       |                         |       |                   |                                | <input type="checkbox"/> ML<br><input type="checkbox"/> MDL |

<sup>1</sup> Sampling shall be conducted according to sufficiently sensitive test procedures (i.e., methods) approved under 40 CFR 136 for the analysis of pollutants or pollutant parameters or required under 40 CFR Chapter I, Subchapter N or O. See instructions and 40 CFR 122.21(e)(3).

This page intentionally left blank.

<sup>1</sup> Sampling shall be conducted according to sufficiently sensitive test procedures (i.e., methods) approved under 40 CFR 136 for the analysis of pollutants or pollutant parameters or required under 40 CFR chapter I, subchapter N or O. See instructions and 40 CFR 122.21(e)(3).



This page intentionally left blank.

|                           |                     |               |                |
|---------------------------|---------------------|---------------|----------------|
| EPA Identification Number | NPDES Permit Number | Facility Name | Outfall Number |
|---------------------------|---------------------|---------------|----------------|

**TABLE E. EFFLUENT MONITORING FOR WHOLE EFFLUENT TOXICITY**

The table provides response space for one whole effluent toxicity sample. Copy the table to report additional test results.

See attached pages of other tests-results

**Test Information**

|                           | Test Number ____ | Test Number ____ | Test Number ____ |
|---------------------------|------------------|------------------|------------------|
| Test species              |                  |                  |                  |
| Age at initiation of test |                  |                  |                  |
| Outfall number            |                  |                  |                  |
| Date sample collected     |                  |                  |                  |
| Date test started         |                  |                  |                  |
| Duration                  |                  |                  |                  |

**Toxicity Test Methods**

|  |  |  |  |
|--|--|--|--|
| Test method number                     |  |  |  |
| Manual title                           |  |  |  |
| Edition number and year of publication |  |  |  |
| Page number(s)                         |  |  |  |

**Sample Type**

|            |   |   |   |
|------------|---|---|---|
| Check one: | <input type="checkbox"/> Grab<br><input type="checkbox"/> 24-hour composite | <input type="checkbox"/> Grab<br><input type="checkbox"/> 24-hour composite | <input type="checkbox"/> Grab<br><input type="checkbox"/> 24-hour composite |
|------------|---|---|---|

**Sample Location**

|            |  |  |  |
|------------|--|--|--|
| Check one: | <input type="checkbox"/> Before Disinfection<br><input type="checkbox"/> After Disinfection<br><input type="checkbox"/> After Dechlorination | <input type="checkbox"/> Before Disinfection<br><input type="checkbox"/> After Disinfection<br><input type="checkbox"/> After Dechlorination | <input type="checkbox"/> Before disinfection<br><input type="checkbox"/> After disinfection<br><input type="checkbox"/> After dechlorination |
|------------|--|--|--|

**Point in Treatment Process**

|  |  |  |  |
|--|--|--|--|
| Describe the point in the treatment process at which the sample was collected for each test. |  |  |  |
|--|--|--|--|

**Toxicity Type**

|   |   |   |   |
|---|---|---|---|
| Indicate for each test whether the test was performed to assess acute or chronic toxicity, or both. (Check one response.) | <input type="checkbox"/> Acute<br><input type="checkbox"/> Chronic<br><input type="checkbox"/> Both | <input type="checkbox"/> Acute<br><input type="checkbox"/> Chronic<br><input type="checkbox"/> Both | <input type="checkbox"/> Acute<br><input type="checkbox"/> Chronic<br><input type="checkbox"/> Both |
|---|---|---|---|

|                           |                     |               |                |   |  |
|---------------------------|---------------------|---------------|----------------|---|--|
| EPA Identification Number | NPDES Permit Number | Facility Name | Outfall Number | Form Approved 03/05/19<br>OMB No. 2040-0004 |  |
|---------------------------|---------------------|---------------|----------------|---|--|

| TABLE E. EFFLUENT MONITORING FOR WHOLE EFFLUENT TOXICITY  |   |   |   |   |   |   |
|---|---|---|---|---|---|---|
| The table provides response space for one whole effluent toxicity sample. Copy the table to report additional test results. |   |   |   |   |   |   |
|   | Test Number _____   | Test Number _____   | Test Number _____   | Test Number _____   | Test Number _____   | Test Number _____   |
| <b>Test Type</b>  |   |   |   |   |   |   |
| Indicate the type of test performed. (Check one response.)  | <input type="checkbox"/> Static<br><input type="checkbox"/> Static-renewal<br><input type="checkbox"/> Flow-through | <input type="checkbox"/> Static<br><input type="checkbox"/> Static-renewal<br><input type="checkbox"/> Flow-through | <input type="checkbox"/> Static<br><input type="checkbox"/> Static-renewal<br><input type="checkbox"/> Flow-through | <input type="checkbox"/> Static<br><input type="checkbox"/> Static-renewal<br><input type="checkbox"/> Flow-through | <input type="checkbox"/> Static<br><input type="checkbox"/> Static-renewal<br><input type="checkbox"/> Flow-through | <input type="checkbox"/> Static<br><input type="checkbox"/> Static-renewal<br><input type="checkbox"/> Flow-through |
| <b>Source of Dilution Water</b>   |   |   |   |   |   |   |
| Indicate the source of dilution water. (Check one response.)  | <input type="checkbox"/> Laboratory water<br><input type="checkbox"/> Receiving water                               | <input type="checkbox"/> Laboratory water<br><input type="checkbox"/> Receiving water                               | <input type="checkbox"/> Laboratory water<br><input type="checkbox"/> Receiving water                               | <input type="checkbox"/> Laboratory water<br><input type="checkbox"/> Receiving water                               | <input type="checkbox"/> Laboratory water<br><input type="checkbox"/> Receiving water                               | <input type="checkbox"/> Laboratory water<br><input type="checkbox"/> Receiving water                               |
| If laboratory water, specify type.  |   |   |   |   |   |   |
| If receiving water, specify source.   |   |   |   |   |   |   |
| <b>Type of Dilution Water</b>   |   |   |   |   |   |   |
| Indicate the type of dilution water. If salt water, specify "natural" or type of artificial sea salts or brine used.        | <input type="checkbox"/> Fresh water<br><input type="checkbox"/> Salt water (specify)                               | <input type="checkbox"/> Fresh water<br><input type="checkbox"/> Salt water (specify)                               | <input type="checkbox"/> Fresh water<br><input type="checkbox"/> Salt water (specify)                               | <input type="checkbox"/> Fresh water<br><input type="checkbox"/> Salt water (specify)                               | <input type="checkbox"/> Fresh water<br><input type="checkbox"/> Salt water (specify)                               | <input type="checkbox"/> Fresh water<br><input type="checkbox"/> Salt water (specify)                               |
| <b>Percentage Effluent Used</b>   |   |   |   |   |   |   |
| Specify the percentage effluent used for all concentrations in the test series.   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |
| <b>Parameters Tested</b>  |   |   |   |   |   |   |
| Check the parameters tested.  | <input type="checkbox"/> pH<br><input type="checkbox"/> Salinity<br><input checked="" type="checkbox"/> Temperature | <input checked="" type="checkbox"/> Ammonia<br><input checked="" type="checkbox"/> Dissolved oxygen                 | <input type="checkbox"/> pH<br><input type="checkbox"/> Salinity<br><input checked="" type="checkbox"/> Temperature | <input checked="" type="checkbox"/> Ammonia<br><input checked="" type="checkbox"/> Dissolved oxygen                 | <input type="checkbox"/> pH<br><input type="checkbox"/> Salinity<br><input type="checkbox"/> Temperature            | <input type="checkbox"/> Ammonia<br><input type="checkbox"/> Dissolved oxygen                                       |
| <b>Acute Test Results</b>   |   |   |   |   |   |   |
| Percent survival in 100% effluent   |   | %   |   | %   |   | %   |
| LC <sub>50</sub>  |   |   |   |   |   |   |
| 95% confidence interval   |   | %   |   | %   |   | %   |
| Control percent survival  |   | %   |   | %   |   | %   |

|                           |                     |               |                |
|---------------------------|---------------------|---------------|----------------|
| EPA Identification Number | NPDES Permit Number | Facility Name | Outfall Number |
|---------------------------|---------------------|---------------|----------------|

Form Approved 03/05/19  
OMB No. 2040-0004

### TABLE E. EFFLUENT MONITORING FOR WHOLE EFFLUENT TOXICITY

The table provides response space for one whole effluent toxicity sample. Copy the table to report additional test results.

|   | Test Number _____            | Test Number _____           | Test Number _____  |
|---|------------------------------|-----------------------------|--|
| <b>Acute Test Results Continued</b>                     |                              |                             |  |
| Other (describe)  |                              |                             |  |
| <b>Chronic Test Results</b>                             |                              |                             |  |
| NOEC  | %                            | %                           | %  |
| IC <sub>25</sub>  | %                            | %                           | %  |
| Control percent survival                                | %                            | %                           | %  |
| Other (describe)  |                              |                             |  |
| <b>Quality Control/Quality Assurance</b>                |                              |                             |  |
| Is reference toxicant data available?                   | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Was reference toxicant test within acceptable bounds?   | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| What date was reference toxicant test run (MM/DD/YYYY)? |                              |                             |  |
| Other (describe)  |                              |                             |  |

Acute #2 FS

Form Approved 03/05/19  
OMB No. 2040-0004

|                           |                                  |                         |                |
|---------------------------|----------------------------------|-------------------------|----------------|
| EPA Identification Number | NPDES Permit Number<br>WA0022527 | Facility Name<br>VASHON | Outfall Number |
|---------------------------|----------------------------------|-------------------------|----------------|

**TABLE E. EFFLUENT MONITORING FOR WHOLE EFFLUENT TOXICITY**

The table provides response space for one whole effluent toxicity sample. Copy the table to report additional test results.

**Test Information**

|                           | Test Number <u>9423</u> | Test Number <u>9424</u> | Test Number _____ |
|---------------------------|-------------------------|-------------------------|-------------------|
| Test species              | Fathead minnow          | Daphnia pulex           |                   |
| Age at initiation of test | 10 days                 | < 24 hours              |                   |
| Outfall number            | Vashon                  | Vashon                  |                   |
| Date sample collected     | 01/29/2020              | 01/29/2020              |                   |
| Date test started         | 01/29/2020              | 01/29/2020              |                   |
| Duration                  | 96 hours                | 48 hours                |                   |

**Toxicity Test Methods**

|  |                   |                   |  |
|--|-------------------|-------------------|--|
| Test method number                     | 2000.00           | 2021.0            |  |
| Manual title                           | EPA 821-02-012    | EPA 821-02-012    |  |
| Edition number and year of publication | 5th, October 2002 | 5th, October 2002 |  |
| Page number(s)                         | Table 14, p 55    | Table 13, p 53    |  |

**Sample Type**

|            |  |  |   |
|------------|--|--|---|
| Check one: | <input type="checkbox"/> Grab<br><input checked="" type="checkbox"/> 24-hour composite | <input type="checkbox"/> Grab<br><input checked="" type="checkbox"/> 24-hour composite | <input type="checkbox"/> Grab<br><input type="checkbox"/> 24-hour composite |
|------------|--|--|---|

**Sample Location**

|            |   |   |  |
|------------|---|---|--|
| Check one: | <input type="checkbox"/> Before Disinfection<br><input checked="" type="checkbox"/> After Disinfection<br><input type="checkbox"/> After Dechlorination | <input type="checkbox"/> Before Disinfection<br><input checked="" type="checkbox"/> After Disinfection<br><input type="checkbox"/> After Dechlorination | <input type="checkbox"/> Before disinfection<br><input type="checkbox"/> After disinfection<br><input type="checkbox"/> After dechlorination |
|------------|---|---|--|

**Point in Treatment Process**

|  |                      |                      |  |
|--|----------------------|----------------------|--|
| Describe the point in the treatment process at which the sample was collected for each test. | UV treated secondary | UV treated secondary |  |
|--|----------------------|----------------------|--|

**Toxicity Type**

|   |  |  |   |
|---|--|--|---|
| Indicate for each test whether the test was performed to assess acute or chronic toxicity, or both. (Check one response.) | <input checked="" type="checkbox"/> Acute<br><input type="checkbox"/> Chronic<br><input type="checkbox"/> Both | <input checked="" type="checkbox"/> Acute<br><input type="checkbox"/> Chronic<br><input type="checkbox"/> Both | <input type="checkbox"/> Acute<br><input type="checkbox"/> Chronic<br><input type="checkbox"/> Both |
|---|--|--|---|

|                           |                                  |                         |                |
|---------------------------|----------------------------------|-------------------------|----------------|
| EPA Identification Number | NPDES Permit Number<br>WA0022527 | Facility Name<br>VASHON | Outfall Number |
|---------------------------|----------------------------------|-------------------------|----------------|

Form Approved 03/05/19  
OMB No. 2040-0004**TABLE E. EFFLUENT MONITORING FOR WHOLE EFFLUENT TOXICITY**

The table provides response space for one whole effluent toxicity sample. Copy the table to report additional test results.

|  | Test Number <u>9423</u>  | Test Number <u>9424</u>  | Test Number _____   |
|--|--|--|---|
| <b>Test Type</b>   |  |  |   |
| Indicate the type of test performed. (Check one response.)   | <input type="checkbox"/> Static<br><input checked="" type="checkbox"/> Static-renewal<br><input type="checkbox"/> Flow-through | <input checked="" type="checkbox"/> Static<br><input type="checkbox"/> Static-renewal<br><input type="checkbox"/> Flow-through                         | <input type="checkbox"/> Static<br><input type="checkbox"/> Static-renewal<br><input type="checkbox"/> Flow-through |
| <b>Source of Dilution Water</b>  |  |  |   |
| Indicate the source of dilution water. (Check one response.)   | <input checked="" type="checkbox"/> Laboratory water<br><input type="checkbox"/> Receiving water                               | <input checked="" type="checkbox"/> Laboratory water<br><input type="checkbox"/> Receiving water   | <input type="checkbox"/> Laboratory water<br><input type="checkbox"/> Receiving water                               |
| If laboratory water, specify type.   | on-site well   | on-site well   |   |
| If receiving water, specify source.  |  |  |   |
| <b>Type of Dilution Water</b>  |  |  |   |
| Indicate the type of dilution water. If salt water, specify "natural" or type of artificial sea salts or brine used. | <input checked="" type="checkbox"/> Fresh water<br><input type="checkbox"/> Salt water (specify)                               | <input checked="" type="checkbox"/> Fresh water<br><input type="checkbox"/> Salt water (specify)   | <input type="checkbox"/> Fresh water<br><input type="checkbox"/> Salt water (specify)                               |
| <b>Percentage Effluent Used</b>  |  |  |   |
| Specify the percentage effluent used for all concentrations in the test series.                                      | 0, 1.12 (ACEC), 6.25, 12.5, 25, 50, 100  | 0, 1.12 (ACEC), 6.25, 12.5, 25, 50, 100  |   |
|  |  |  |   |
|  |  |  |   |
| <b>Parameters Tested</b>   |  |  |   |
| Check the parameters tested.   | <input checked="" type="checkbox"/> pH<br><input type="checkbox"/> Salinity<br><input checked="" type="checkbox"/> Temperature | <input checked="" type="checkbox"/> Ammonia<br><input checked="" type="checkbox"/> Dissolved oxygen<br><input checked="" type="checkbox"/> Temperature | <input checked="" type="checkbox"/> pH<br><input type="checkbox"/> Salinity<br><input type="checkbox"/> Temperature |
|  |  |  | <input type="checkbox"/> Ammonia<br><input type="checkbox"/> Dissolved oxygen                                       |
| <b>Acute Test Results</b>  |  |  |   |
| Percent survival in 100% effluent  | 100 %  | 100 %  | %   |
| LC50   | NA   | NA   |   |
| 95% confidence interval  | NA %   | NA %   | %   |
| Control percent survival   | 100 %  | 100 %  | %   |

|                           |                                  |                         |                |
|---------------------------|----------------------------------|-------------------------|----------------|
| EPA Identification Number | NPDES Permit Number<br>WA0022527 | Facility Name<br>VASHON | Outfall Number |
|---------------------------|----------------------------------|-------------------------|----------------|

Form Approved 03/05/19  
OMB No. 2040-0004

### TABLE E. EFFLUENT MONITORING FOR WHOLE EFFLUENT TOXICITY

The table provides response space for one whole effluent toxicity sample. Copy the table to report additional test results.

|   | Test Number <u>9423</u>   | Test Number <u>9424</u>   | Test Number _____  |
|---|---|---|--|
| <b>Acute Test Results Continued</b>                     |   |   |  |
| Other (describe)  |   |   |  |
| <b>Chronic Test Results</b>                             |   |   |  |
| NOEC  | %   | %   | %  |
| IC <sub>25</sub>  | %   | %   | %  |
| Control percent survival                                | %   | %   | %  |
| Other (describe)  |   |   |  |
| <b>Quality Control/Quality Assurance</b>                |   |   |  |
| Is reference toxicant data available?                   | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Was reference toxicant test within acceptable bounds?   | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| What date was reference toxicant test run (MM/DD/YYYY)? | 01/29/2020  | 01/28/2020  |  |
| Other (describe)  |   |   |  |

Chronic #1

Form Approved 03/05/19  
OMB No. 2040-0004

|                           |                                  |                         |                |
|---------------------------|----------------------------------|-------------------------|----------------|
| EPA Identification Number | NPDES Permit Number<br>WA0022527 | Facility Name<br>VASHON | Outfall Number |
|---------------------------|----------------------------------|-------------------------|----------------|

**TABLE E. EFFLUENT MONITORING FOR WHOLE EFFLUENT TOXICITY**

The table provides response space for one whole effluent toxicity sample. Copy the table to report additional test results.

**Test Information**

|                           | Test Number <u>9311</u> | Test Number <u>9312</u> | Test Number _____ |
|---------------------------|-------------------------|-------------------------|-------------------|
| Test species              | Mysid                   | Topsmelt                |                   |
| Age at initiation of test | 7 days                  | 10 days                 |                   |
| Outfall number            | Vashon                  | Vashon                  |                   |
| Date sample collected     | 10/02/2019              | 10/02/2019              |                   |
| Date test started         | 10/02/2019              | 10/02/2019              |                   |
| Duration                  | 7 days                  | 7 days                  |                   |

**Toxicity Test Methods**

|  |                   |                  |  |
|--|-------------------|------------------|--|
| Test method number                     | 1007.0            | 1006.0           |  |
| Manual title                           | EPA 821-R-02-014  | EPA 600-R-95-136 |  |
| Edition number and year of publication | 3rd, October 2002 | 1st, August 1995 |  |
| Page number(s)                         | 214               | 72               |  |

**Sample Type**

|            |  |  |   |
|------------|--|--|---|
| Check one: | <input type="checkbox"/> Grab<br><input checked="" type="checkbox"/> 24-hour composite | <input type="checkbox"/> Grab<br><input checked="" type="checkbox"/> 24-hour composite | <input type="checkbox"/> Grab<br><input type="checkbox"/> 24-hour composite |
|------------|--|--|---|

**Sample Location**

|            |   |   |  |
|------------|---|---|--|
| Check one: | <input type="checkbox"/> Before Disinfection<br><input checked="" type="checkbox"/> After Disinfection<br><input type="checkbox"/> After Dechlorination | <input type="checkbox"/> Before Disinfection<br><input checked="" type="checkbox"/> After Disinfection<br><input type="checkbox"/> After Dechlorination | <input type="checkbox"/> Before disinfection<br><input type="checkbox"/> After disinfection<br><input type="checkbox"/> After dechlorination |
|------------|---|---|--|

**Point in Treatment Process**

|  |                      |                      |  |
|--|----------------------|----------------------|--|
| Describe the point in the treatment process at which the sample was collected for each test. | UV treated secondary | UV treated secondary |  |
|--|----------------------|----------------------|--|

**Toxicity Type**

|   |  |  |   |
|---|--|--|---|
| Indicate for each test whether the test was performed to assess acute or chronic toxicity, or both. (Check one response.) | <input type="checkbox"/> Acute<br><input checked="" type="checkbox"/> Chronic<br><input type="checkbox"/> Both | <input type="checkbox"/> Acute<br><input checked="" type="checkbox"/> Chronic<br><input type="checkbox"/> Both | <input type="checkbox"/> Acute<br><input type="checkbox"/> Chronic<br><input type="checkbox"/> Both |
|---|--|--|---|



|                           |                                  |                         |                |
|---------------------------|----------------------------------|-------------------------|----------------|
| EPA Identification Number | NPDES Permit Number<br>WA0022527 | Facility Name<br>VASHON | Outfall Number |
|---------------------------|----------------------------------|-------------------------|----------------|

Form Approved 03/05/19  
OMB No. 2040-0004**TABLE E. EFFLUENT MONITORING FOR WHOLE EFFLUENT TOXICITY**

The table provides response space for one whole effluent toxicity sample. Copy the table to report additional test results.

|  | Test Number <u>9311</u>   | Test Number <u>9312</u>  | Test Number _____   |
|--|---|--|---|
| <b>Test Type</b>   |   |  |   |
| Indicate the type of test performed. (Check one response.)   | <input type="checkbox"/> Static<br><input checked="" type="checkbox"/> Static-renewal<br><input type="checkbox"/> Flow-through                      | <input type="checkbox"/> Static<br><input checked="" type="checkbox"/> Static-renewal<br><input type="checkbox"/> Flow-through | <input type="checkbox"/> Static<br><input type="checkbox"/> Static-renewal<br><input type="checkbox"/> Flow-through                                 |
| <b>Source of Dilution Water</b>  |   |  |   |
| Indicate the source of dilution water. (Check one response.)   | <input checked="" type="checkbox"/> Laboratory water<br><input type="checkbox"/> Receiving water  | <input checked="" type="checkbox"/> Laboratory water<br><input type="checkbox"/> Receiving water                               | <input type="checkbox"/> Laboratory water<br><input type="checkbox"/> Receiving water   |
| If laboratory water, specify type.   | RO and Hawaiian Marine Mix  | RO and Hawaiian Marine Mix   |   |
| If receiving water, specify source.  |   |  |   |
| <b>Type of Dilution Water</b>  |   |  |   |
| Indicate the type of dilution water. If salt water, specify "natural" or type of artificial sea salts or brine used. | <input type="checkbox"/> Fresh water<br><input checked="" type="checkbox"/> Salt water (specify)  | <input type="checkbox"/> Fresh water<br><input checked="" type="checkbox"/> Salt water (specify)                               | <input type="checkbox"/> Fresh water<br><input type="checkbox"/> Salt water (specify)   |
| <b>Percentage Effluent Used</b>  |   |  |   |
| Specify the percentage effluent used for all concentrations in the test series.                                      | 0, 0.15 (CCEC), 1.12 (ACEC), 12.5, 25, 50, 100  | 0, 0.15 (CCEC), 1.12 (ACEC), 12.5, 25, 50, 100   |   |
|  |   |  |   |
|  |   |  |   |
| <b>Parameters Tested</b>   |   |  |   |
| Check the parameters tested.   | <input checked="" type="checkbox"/> pH <i>FS</i><br><input checked="" type="checkbox"/> Salinity<br><input checked="" type="checkbox"/> Temperature | <input checked="" type="checkbox"/> Ammonia<br><input checked="" type="checkbox"/> Dissolved oxygen                            | <input checked="" type="checkbox"/> pH <i>FS</i><br><input checked="" type="checkbox"/> Salinity<br><input checked="" type="checkbox"/> Temperature |
|  |   |  | <input type="checkbox"/> Ammonia<br><input type="checkbox"/> Dissolved oxygen   |
| <b>Acute Test Results</b>  |   |  |   |
| Percent survival in 100% effluent  | %   | %  | %   |
| LC <sub>50</sub>   |   |  |   |
| 95% confidence interval  | %   | %  | %   |
| Control percent survival   | %   | %  | %   |

|                           |                                  |                         |                |
|---------------------------|----------------------------------|-------------------------|----------------|
| EPA Identification Number | NPDES Permit Number<br>WA0022527 | Facility Name<br>VASHON | Outfall Number |
|---------------------------|----------------------------------|-------------------------|----------------|

Form Approved 03/05/19  
OMB No. 2040-0004**TABLE E. EFFLUENT MONITORING FOR WHOLE EFFLUENT TOXICITY**

The table provides response space for one whole effluent toxicity sample. Copy the table to report additional test results.

|   | Test Number <u>9311</u>   | Test Number <u>9312</u>  | Test Number _____  |
|---|---|--|--|
| <b>Acute Test Results Continued</b>                     |   |  |  |
| Other (describe)  |   |  |  |
| <b>Chronic Test Results</b>                             |   |  |  |
| NOEC  | 100 %   | 100 %  | %  |
| IC <sub>25</sub>  | >100 %  | >100 %   | %  |
| Control percent survival                                | 95 %  | 96 %   | %  |
| Other (describe)  |   |  |  |
| <b>Quality Control/Quality Assurance</b>                |   |  |  |
| Is reference toxicant data available?                   | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Was reference toxicant test within acceptable bounds?   | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| What date was reference toxicant test run (MM/DD/YYYY)? | 10/02/2019  | 10/02/2019   |  |
| Other (describe)  |   | Reference toxicant IC <sub>25</sub> slightly exceeded upper control limit. All other QC acceptable and no sample toxicity. |  |

|                           |                                  |                         |                |
|---------------------------|----------------------------------|-------------------------|----------------|
| EPA Identification Number | NPDES Permit Number<br>WA0022527 | Facility Name<br>VASHON | Outfall Number |
|---------------------------|----------------------------------|-------------------------|----------------|

Form Approved 03/05/19  
OMB No. 2040-0004**TABLE E. EFFLUENT MONITORING FOR WHOLE EFFLUENT TOXICITY**

The table provides response space for one whole effluent toxicity sample. Copy the table to report additional test results.

**Test Information**

|                           | Test Number <u>9491</u> | Test Number <u>9490</u> | Test Number _____ |
|---------------------------|-------------------------|-------------------------|-------------------|
| Test species              | Mysid                   | Topsmelt                |                   |
| Age at initiation of test | 7 days                  | 10 days                 |                   |
| Outfall number            | Vashon                  | Vashon                  |                   |
| Date sample collected     | 06/24/2020              | 06/24/2020              |                   |
| Date test started         | 06/24/2020              | 06/24/2020              |                   |
| Duration                  | 7 days                  | 7 days                  |                   |

**Toxicity Test Methods**

|  |                   |                  |  |
|--|-------------------|------------------|--|
| Test method number                     | 1007.0            | 1006.0           |  |
| Manual title                           | EPA 821-R-02-014  | EPA 600-R-95-136 |  |
| Edition number and year of publication | 3rd, October 2002 | 1st, August 1995 |  |
| Page number(s)                         | 214               | 72               |  |

**Sample Type**

|            |  |  |   |
|------------|--|--|---|
| Check one: | <input type="checkbox"/> Grab<br><input checked="" type="checkbox"/> 24-hour composite | <input type="checkbox"/> Grab<br><input checked="" type="checkbox"/> 24-hour composite | <input type="checkbox"/> Grab<br><input type="checkbox"/> 24-hour composite |
|------------|--|--|---|

**Sample Location**

|            |   |   |  |
|------------|---|---|--|
| Check one: | <input type="checkbox"/> Before Disinfection<br><input checked="" type="checkbox"/> After Disinfection<br><input type="checkbox"/> After Dechlorination | <input type="checkbox"/> Before Disinfection<br><input checked="" type="checkbox"/> After Disinfection<br><input type="checkbox"/> After Dechlorination | <input type="checkbox"/> Before disinfection<br><input type="checkbox"/> After disinfection<br><input type="checkbox"/> After dechlorination |
|------------|---|---|--|

**Point in Treatment Process**

|  |                      |                      |  |
|--|----------------------|----------------------|--|
| Describe the point in the treatment process at which the sample was collected for each test. | UV treated secondary | UV treated secondary |  |
|--|----------------------|----------------------|--|

**Toxicity Type**

|   |  |  |   |
|---|--|--|---|
| Indicate for each test whether the test was performed to assess acute or chronic toxicity, or both. (Check one response.) | <input type="checkbox"/> Acute<br><input checked="" type="checkbox"/> Chronic<br><input type="checkbox"/> Both | <input type="checkbox"/> Acute<br><input checked="" type="checkbox"/> Chronic<br><input type="checkbox"/> Both | <input type="checkbox"/> Acute<br><input type="checkbox"/> Chronic<br><input type="checkbox"/> Both |
|---|--|--|---|

|                           |                                  |                         |                |
|---------------------------|----------------------------------|-------------------------|----------------|
| EPA Identification Number | NPDES Permit Number<br>WA0022527 | Facility Name<br>VASHON | Outfall Number |
|---------------------------|----------------------------------|-------------------------|----------------|

Form Approved 03/05/19  
OMB No. 2040-0004**TABLE E. EFFLUENT MONITORING FOR WHOLE EFFLUENT TOXICITY**

The table provides response space for one whole effluent toxicity sample. Copy the table to report additional test results.

|  | Test Number <u>9491</u>   | Test Number <u>9490</u>  | Test Number _____   |
|--|---|--|---|
| <b>Test Type</b>   |   |  |   |
| Indicate the type of test performed. (Check one response.)   | <input type="checkbox"/> Static<br><input checked="" type="checkbox"/> Static-renewal<br><input type="checkbox"/> Flow-through            | <input type="checkbox"/> Static<br><input checked="" type="checkbox"/> Static-renewal<br><input type="checkbox"/> Flow-through | <input type="checkbox"/> Static<br><input type="checkbox"/> Static-renewal<br><input type="checkbox"/> Flow-through                       |
| <b>Source of Dilution Water</b>  |   |  |   |
| Indicate the source of dilution water. (Check one response.)   | <input checked="" type="checkbox"/> Laboratory water<br><input type="checkbox"/> Receiving water  | <input checked="" type="checkbox"/> Laboratory water<br><input type="checkbox"/> Receiving water                               | <input type="checkbox"/> Laboratory water<br><input type="checkbox"/> Receiving water   |
| If laboratory water, specify type.   | RO and Hawaiian Marine Mix  | RO and Hawaiian Marine Mix   |   |
| If receiving water, specify source.  |   |  |   |
| <b>Type of Dilution Water</b>  |   |  |   |
| Indicate the type of dilution water. If salt water, specify "natural" or type of artificial sea salts or brine used. | <input type="checkbox"/> Fresh water<br><input checked="" type="checkbox"/> Salt water (specify)  | <input type="checkbox"/> Fresh water<br><input checked="" type="checkbox"/> Salt water (specify)                               | <input type="checkbox"/> Fresh water<br><input type="checkbox"/> Salt water (specify)   |
| <b>Percentage Effluent Used</b>  |   |  |   |
| Specify the percentage effluent used for all concentrations in the test series.                                      | 0, 0.15 (CCEC), 1.12 (ACEC), 12.5, 25, 50, 100  | 0, 0.15 (CCEC), 1.12 (ACEC), 12.5, 25, 50, 100   |   |
|  |   |  |   |
|  |   |  |   |
| <b>Parameters Tested</b>   |   |  |   |
| Check the parameters tested.   | <input checked="" type="checkbox"/> pH<br><input checked="" type="checkbox"/> Salinity<br><input checked="" type="checkbox"/> Temperature | <input checked="" type="checkbox"/> Ammonia<br><input checked="" type="checkbox"/> Dissolved oxygen                            | <input checked="" type="checkbox"/> pH<br><input checked="" type="checkbox"/> Salinity<br><input checked="" type="checkbox"/> Temperature |
|  |   | <input checked="" type="checkbox"/> Ammonia<br><input checked="" type="checkbox"/> Dissolved oxygen                            | <input type="checkbox"/> pH<br><input type="checkbox"/> Salinity<br><input type="checkbox"/> Temperature                                  |
|  |   |  | <input type="checkbox"/> Ammonia<br><input type="checkbox"/> Dissolved oxygen   |
| <b>Acute Test Results</b>  |   |  |   |
| Percent survival in 100% effluent  | %   | %  | %   |
| LC <sub>50</sub>   |   |  |   |
| 95% confidence interval  | %   | %  | %   |
| Control percent survival   | %   | %  | %   |

|                           |                                  |                         |                |
|---------------------------|----------------------------------|-------------------------|----------------|
| EPA Identification Number | NPDES Permit Number<br>WA0022527 | Facility Name<br>VASHON | Outfall Number |
|---------------------------|----------------------------------|-------------------------|----------------|

Form Approved 03/05/19  
OMB No. 2040-0004**TABLE E. EFFLUENT MONITORING FOR WHOLE EFFLUENT TOXICITY**

The table provides response space for one whole effluent toxicity sample. Copy the table to report additional test results.

|   | Test Number <u>9491</u>   | Test Number <u>9490</u>   | Test Number _____  |
|---|---|---|--|
| <b>Acute Test Results Continued</b>                     |   |   |  |
| Other (describe)  |   |   |  |
| <b>Chronic Test Results</b>                             |   |   |  |
| NOEC  | 100 %   | 100 %   | %  |
| IC <sub>25</sub>  | >100 %  | >100 %  | %  |
| Control percent survival                                | 85 %  | 100 %   | %  |
| Other (describe)  |   |   |  |
| <b>Quality Control/Quality Assurance</b>                |   |   |  |
| Is reference toxicant data available?                   | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Was reference toxicant test within acceptable bounds?   | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| What date was reference toxicant test run (MM/DD/YYYY)? | 06/24/2020  | 06/24/2020  |  |
| Other (describe)  |   |   |  |

This page intentionally left blank.

EPA Identification Number

NPDES Permit Number

Facility Name

Form Approved 03/05/19

OMB No. 2040-0004

**TABLE F. INDUSTRIAL DISCHARGE INFORMATION**

Response space is provided for three SIUs. Copy the table to report information for additional SIUs.

|   | SIU ____   | SIU ____   | SIU ____   |
|---|--|--|--|
| Name of SIU   |  |  |  |
| Mailing address (street or P.O. box)  |  |  |  |
| City, state, and ZIP code   |  |  |  |
| Description of all industrial processes that affect or contribute to the discharge.             |  |  |  |
| List the principal products and raw materials that affect or contribute to the SIU's discharge. |  |  |  |
| Indicate the average daily volume of wastewater discharged by the SIU.                          | gpd  | gpd  | gpd  |
| How much of the average daily volume is attributable to process flow?                           | gpd  | gpd  | gpd  |
| How much of the average daily volume is attributable to non-process flow?                       | gpd  | gpd  | gpd  |
| Is the SIU subject to local limits?   | <input type="checkbox"/> Yes <input type="checkbox"/> No | <input type="checkbox"/> Yes <input type="checkbox"/> No | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Is the SIU subject to categorical standards?  | <input type="checkbox"/> Yes <input type="checkbox"/> No | <input type="checkbox"/> Yes <input type="checkbox"/> No | <input type="checkbox"/> Yes <input type="checkbox"/> No |

EPA Identification Number

NPDES Permit Number

Facility Name

Form Approved 03/05/19

OMB No. 2040-0004

**TABLE F. INDUSTRIAL DISCHARGE INFORMATION**

Response space is provided for three SIUs. Copy the table to report information for additional SIUs.

|  | SIU ____   | SIU ____   | SIU ____   |
|--|--|--|--|
| Under what categories and subcategories is the SIU subject?  |  |  |  |
| Has the POTW experienced problems (e.g., upsets, pass-through interferences) in the past 4.5 years that are attributable to the SIU? | <input type="checkbox"/> Yes <input type="checkbox"/> No | <input type="checkbox"/> Yes <input type="checkbox"/> No | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| If yes, describe.  |  |  |  |





## **Attachment 2**

# **Effluent Dilution Modeling for Vashon Treatment Plant Outfall**

Vashon Wastewater Treatment Plant  
Application for Renewal of the NPDES Permit (WA0022527)  
(July 2021)

## **Effluent Dilution Modeling for Vashon Treatment Plant Outfall**

**NPDES Permit: WA-0022527**

**King County Department of Natural Resources and Parks**  
Wastewater Treatment Division  
201 South Jackson Street  
Seattle, WA 98104

---

## **Effluent Dilution Modeling-Vashon Wastewater Treatment Facility Marine Outfall**

### **Model**

#### **PLUMES Edition 3/UM**

The UM model component of PLUMES was used for this modeling effort. This model was chosen because the Vashon Wastewater Treatment Facility outfall conforms to the conditions specified for the suggested use the UM model in Dilution Models for Effluent Discharges, 3rd Edition, EPA/600/R-94/086. In summary these conditions include a buoyant plume discharging into a saline water column with a non-linear stratification profile, the predominant current normal to the axis of the outfall, a single port discharge, and finally the ability to introduce ambient pollutant concentrations and pollutant decay. The farfield predictions were used to model dilutions at the chronic mixing zone boundary, for this purpose the assumptions of a constant eddy diffusivity were used, this was the more conservative assumption as opposed to the assumption that the dispersion coefficient is increasing according to the  $4/3$  power law, the other farfield option offered by the model.

#### **ZACE Estimation**

The estimation of the dilution at the ZACE is made by using a linear regression for the nearfield dilutions at locations on either side of the ZACE. The distance of the plume centerline from the outfall is calculated from the horizontal and vertical components of the plume position as given by UM.

### **Modeling Conditions**

#### **Density Structure**

King County measures density stratification at the Vashon WWTP outfall, at ambient monitoring station MSJN02. Monthly data has been collected at this monitoring station since 2005.

#### **Ambient Currents**

The data set chosen for ambient currents was taken from two series of Drogue releases conducted in the immediate area of the outfall by Cosmopolitan Engineering Group during April and July 2000. Drogue locations were obtained every 30 minutes and

the corresponding water velocity calculated from the drogue trajectories. A histogram (Figure 2) was constructed from the 137 drogue vector observations and used to evaluate the 10<sup>th</sup>, 50<sup>th</sup>, and 90<sup>th</sup> percentile currents as 22.7 cm/s, 8.4 cm/s, and 2.9 cm/s respectively. The current direction was assumed to be perpendicular to the outfall discharge. The 90<sup>th</sup> percentile current was determined to correspond to the least dilution, and was selected as the critical condition.

## Plant Flows

Ecology's guidance for Conducting Mixing Zone Analysis recommends an effluent flow rate be selected based on the dry weather design flow and a peaking factor, or the highest daily effluent flow rate, depending on how close the plant is operating to the dry weather design flow (Permit Writer's Manual, Table 12). As the critical condition for the Vashon WWTP occurs during winter months, the Vashon WWTP currently operates at greater than 85% of its dry weather design flow during the critical period. The Vashon WWTP Design Flows and recent flow statistics are summarized in

**Table 1. Vashon WWTP Historic and Design Flows**

|                | Design Condition | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | through 3/31/2021 | % of Design |
|----------------|------------------|------|------|------|------|------|------|-------------------|-------------|
| Annual Average | 0.18             | 0.14 | 0.17 | 0.17 | 0.15 | 0.13 | 0.15 | NA                | 97%         |
| Maximum Month  | 0.52             | 0.3  | 0.28 | 0.32 | 0.31 | 0.23 | 0.31 | 0.31              | 62%         |
| Maximum Day    | 1.14             | 0.74 | 0.6  | 0.64 | 0.67 | 0.57 | 0.65 | 0.80              | 71%         |

Ecology's guidance suggests using an acute flow rate calculated from the DWDF and a peaking factor, where the peaking factor is the ratio of daily maximum to monthly average flows. As the maximum daily plant flow is higher than this calculation, the maximum daily plant flow was used for this analysis. The max day from 1/2015 through 3/2021 was 0.8048 MG on 1/12/2021. This is slightly higher than the previous maximum daily flow of 0.75 mgd, recorded on 3/18/97. The higher flow of 0.80 mgd was used for modeling dilution at the acute mixing zone.

Ecology's guidance suggests using a chronic flow rate equal to the DWDF if the facility is operating between 85 and 100% of design during the critical period. The maximum monthly flow in the period from 1/2015 through 3/2021 was 0.3235 MGD in Feb 2017. Again, this is higher than the previous peak monthly flow of 0.272 mgd (February 2000) used in the previous analysis. The higher flow of 0.324 mgd was used as the critical chronic flow for modeling dilutions at the chronic mixing zone as it is higher than the DWDF.

---

## Diffuser Configuration

The Vashon WWTP outfall terminates in a single 8" port at a depth of -200 ft MLLW, orientated normal to the shoreline.

## Critical Conditions-Selected Cases-Decision Path and Ecology Guidance

### Zone of Acute Criteria Exceedance (ZACE) 20 ft or 6.1 m

Ecology guidance recommends that the critical receiving water condition be determined. At this location, the seasonal changes in the receiving water density structure have little effect upon the predicted effluent dilution. The peak one day flow used for determining the ZACE dilution for the Vashon facility. Ecology guidance also required modeling to be performed using the 10<sup>th</sup> and 90<sup>th</sup> percentile current values. These current conditions yielded a velocity of 2.9 cm/sec and 22.7 cm/s. A flow of 0.80 MGD was used for modeling and showed a dilution of approximately 92:1 at the acute mixing zone boundary.

Acute dilution factors varied from 92 to 97 with the 90<sup>th</sup> percentile currents, illustrating that seasonal changes in the receiving water density structure have little effect upon the predicted effluent dilution.

### Chronic Mixing Zone: 200 ft. or 61 m. at Vashon

The historic maximum monthly flow of 0.325 MGD was used to model the dilution at the chronic mixing zone. The 50<sup>th</sup> percentile current (8.4 cm/sec) resulted in the lowest predicted dilution at the chronic mixing zone boundary of approximately 694:1.

## Summary

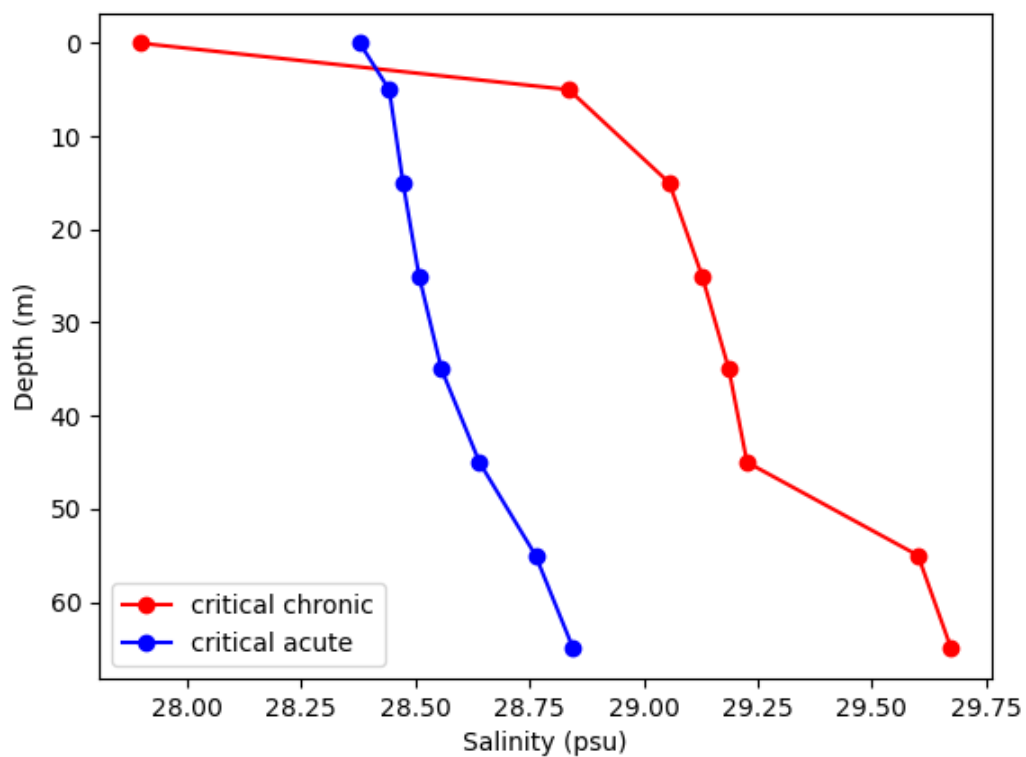
### ZACE

The dilution at the ZACE for the critical conditions detailed above yielded a dilution at the ZACE (6.1 m) of **92:1** for the plume discharging perpendicular to the direction of the 90<sup>th</sup> percentile current speed.

### Chronic Mixing Zone

The dilution at the chronic mixing zone (61 m) for the critical conditions described above yielded a dilution of **694:1** for the plume discharging perpendicular to the direction of the 50<sup>th</sup> percentile current speed.





**Figure 1. Salinity profiles for acute (20-Jun-2017) and chronic (18-Mar-2014) critical dilution conditions at locator MSJN02**



**Table 1.**

Vashon Island Potential Density Profiles (MSJN02)

| Date      | Depth  |        |        |        |
|-----------|--------|--------|--------|--------|
|           | 0 m    | 15 m   | 35 m   | 55 m   |
| 25-Jan-05 | 22.443 | 22.928 | 23.07  | 23.209 |
| 1-Mar-05  | 22.828 | 22.876 | 22.888 | 22.973 |
| 30-Mar-05 | 22.729 | 22.881 | 23.044 | 23.143 |
| 26-Apr-05 | 22.076 | 22.52  | 22.725 | 22.814 |
| 24-May-05 | 21.947 | 22.528 | 22.681 | 22.708 |
| 29-Jun-05 | 21.947 | 22.451 | 22.473 | 22.512 |
| 19-Jul-05 | 22.284 | 22.373 | 22.376 | 22.461 |
| 23-Aug-05 | 22.416 | 22.535 | 22.575 | 22.614 |
| 27-Sep-05 | 22.816 | 22.822 | 22.881 | 22.977 |
| 25-Oct-05 | 23.107 | 23.177 | 23.188 | 23.201 |
| 30-Nov-05 | 23.136 | 23.184 | 23.342 | 23.419 |
| 20-Dec-05 | 23.331 | 23.347 | 23.348 | 23.349 |
| 8-Feb-06  | 21.038 | 22.094 | 22.464 | 22.572 |
| 28-Feb-06 | 22.283 | 22.344 | 22.402 | 22.511 |
| 28-Mar-06 | 22.531 | 22.615 | 22.672 | 22.846 |
| 25-Apr-06 | 22.303 | 22.409 | 22.633 | 22.857 |
| 31-May-06 | 21.755 | 22.328 | 22.494 | 22.585 |
| 27-Jun-06 | 21.59  | 21.831 | 22.253 | 22.609 |
| 25-Jul-06 | 22.053 | 22.133 | 22.303 | 22.734 |
| 23-Aug-06 | 22.224 | 22.324 | 22.588 | 22.994 |
| 26-Sep-06 | 22.778 | 22.877 | 22.925 | 22.96  |
| 25-Oct-06 | 23.182 | 23.197 | 23.215 | 23.216 |
| 27-Nov-06 | 23.119 | 23.162 | 23.183 | 23.193 |
| 19-Dec-06 | 22.379 | 22.788 | 22.9   | 23.037 |
| 17-Jan-07 | 22.421 | 22.495 | 22.687 | 23.012 |
| 21-Feb-07 | 22.41  | 22.737 | 22.84  | 23.039 |
| 20-Mar-07 | 21.857 | 22.484 | 22.63  | 22.896 |
| 18-Apr-07 | 22.015 | 22.386 | 22.489 | 22.71  |
| 22-May-07 | 22.001 | 22.292 | 22.44  | 22.469 |
| 19-Jun-07 | 22.031 | 22.337 | 22.462 | 22.48  |
| 17-Jul-07 | 22.04  | 22.331 | 22.406 | 22.457 |
| 18-Sep-07 | 22.593 | 22.66  | 22.714 | 22.792 |
| 16-Oct-07 | 23.001 | 23.028 | 23.05  | 23.111 |
| 27-Nov-07 | 23.25  | 23.252 | 23.257 | 23.262 |
| 18-Dec-07 | 22.773 | 23.017 | 23.074 | 23.093 |
| 30-Jan-08 | 22.969 | 23.006 | 23.041 | 23.108 |
| 26-Feb-08 | 22.938 | 22.958 | 22.972 | 23.043 |
| 18-Mar-08 | 22.426 | 22.924 | 23.211 | 23.301 |
| 22-Apr-08 | 22.851 | 22.91  | 23.02  | 23.093 |
| 21-May-08 | 21.602 | 22.513 | 22.931 | 23.122 |
| 17-Jun-08 | 21.106 | 22.109 | 22.633 | 22.902 |
| 22-Jul-08 | 21.856 | 22.032 | 22.269 | 22.666 |
| 21-Aug-08 | 22.5   | 22.566 | 22.624 | 22.824 |
| 16-Sep-08 | 22.529 | 22.626 | 22.736 | 23.203 |
| 21-Oct-08 | 23.075 | 23.102 | 23.117 | 23.126 |
| 18-Nov-08 | 22.687 | 22.894 | 22.992 | 23.178 |

| Date      | Depth  |        |        |        |
|-----------|--------|--------|--------|--------|
|           | 0 m    | 15 m   | 35 m   | 55 m   |
| 21-Jan-09 | 21.902 | 22.401 | 22.952 | 23.066 |
| 18-Feb-09 | 23.036 | 23.069 | 23.072 | 23.097 |
| 17-Mar-09 | 23.132 | 23.172 | 23.207 | 23.246 |
| 21-Apr-09 | 22.6   | 22.963 | 23.064 | 23.344 |
| 19-May-09 | 22.276 | 22.451 | 22.915 | 22.977 |
| 16-Jun-09 | 21.119 | 22.328 | 22.488 | 22.671 |
| 21-Jul-09 | 21.971 | 22.319 | 22.639 | 23.076 |
| 18-Aug-09 | 22.366 | 22.367 | 22.848 | 23.142 |
| 22-Sep-09 | 22.988 | 22.988 | 22.989 | 23.111 |
| 21-Oct-09 | 23.213 | 23.231 | 23.252 | 23.297 |
| 14-Dec-09 | 22.992 | 23.005 | 23.018 | 23.101 |
| 20-Jan-10 | 22.804 | 22.909 | 22.935 | 22.973 |
| 22-Feb-10 | 22.669 | 22.685 | 22.693 | 22.725 |
| 15-Mar-10 | 22.655 | 22.709 | 22.748 | 22.77  |
| 20-Apr-10 | 22.514 | 22.514 | 22.515 | 22.695 |
| 17-May-10 | 22.228 | 22.281 | 22.343 | 22.465 |
| 22-Jun-10 | 21.535 | 22.04  | 22.211 | 22.217 |
| 21-Jul-10 | 21.643 | 22.119 | 22.295 | 22.392 |
| 18-Aug-10 | 22.304 | 22.305 | 22.371 | 22.459 |
| 22-Sep-10 | 22.574 | 22.743 | 22.858 | 23.019 |
| 19-Oct-10 | 22.488 | 22.772 | 22.856 | 22.952 |
| 16-Nov-10 | 22.87  | 22.959 | 23.125 | 23.267 |
| 21-Dec-10 | 22.886 | 22.918 | 22.965 | 23.148 |
| 19-Jan-11 | 21.867 | 22.588 | 22.851 | 22.94  |
| 23-Feb-11 | 22.416 | 22.422 | 22.45  | 22.474 |
| 22-Mar-11 | 22.434 | 22.463 | 22.502 | 22.602 |
| 19-Apr-11 | 21.963 | 22.007 | 22.263 | 22.498 |
| 21-Jun-11 | 21.312 | 22.043 | 22.141 | 22.178 |
| 19-Jul-11 | 21.989 | 22.084 | 22.17  | 22.286 |
| 16-Aug-11 | 21.738 | 22.075 | 22.235 | 22.426 |
| 20-Sep-11 | 22.086 | 22.421 | 22.562 | 22.615 |
| 18-Oct-11 | 22.728 | 22.73  | 22.738 | 22.779 |
| 29-Nov-11 | 22.968 | 23.001 | 23.02  | 23.066 |
| 20-Dec-11 | 22.955 | 22.956 | 22.983 | 23.144 |
| 26-Jan-12 | 22.995 | 23.012 | 23.04  | 23.133 |
| 23-Feb-12 | 22.489 | 22.83  | 22.884 | 22.95  |
| 22-Mar-12 | 22.36  | 22.764 | 22.887 | 22.913 |
| 17-Apr-12 | 22.079 | 22.341 | 22.505 | 22.776 |
| 22-May-12 | 21.701 | 21.971 | 22.203 | 22.402 |
| 19-Jun-12 | 21.357 | 21.941 | 22.384 | 22.589 |
| 17-Jul-12 | 21.065 | 21.883 | 22.319 | 22.611 |
| 21-Aug-12 | 21.954 | 22.109 | 22.21  | 22.445 |
| 18-Sep-12 | 22.395 | 22.444 | 22.454 | 22.513 |
| 18-Oct-12 | 22.851 | 22.887 | 22.972 | 23.068 |
| 27-Nov-12 | 22.444 | 22.692 | 22.872 | 22.996 |
| 27-Dec-12 | 22.499 | 22.575 | 22.616 | 22.828 |
| 22-Jan-13 | 22.262 | 22.495 | 22.539 | 22.672 |
| 20-Feb-13 | 22.6   | 22.647 | 22.688 | 22.861 |
| 19-Mar-13 | 22.453 | 22.568 | 22.831 | 22.959 |

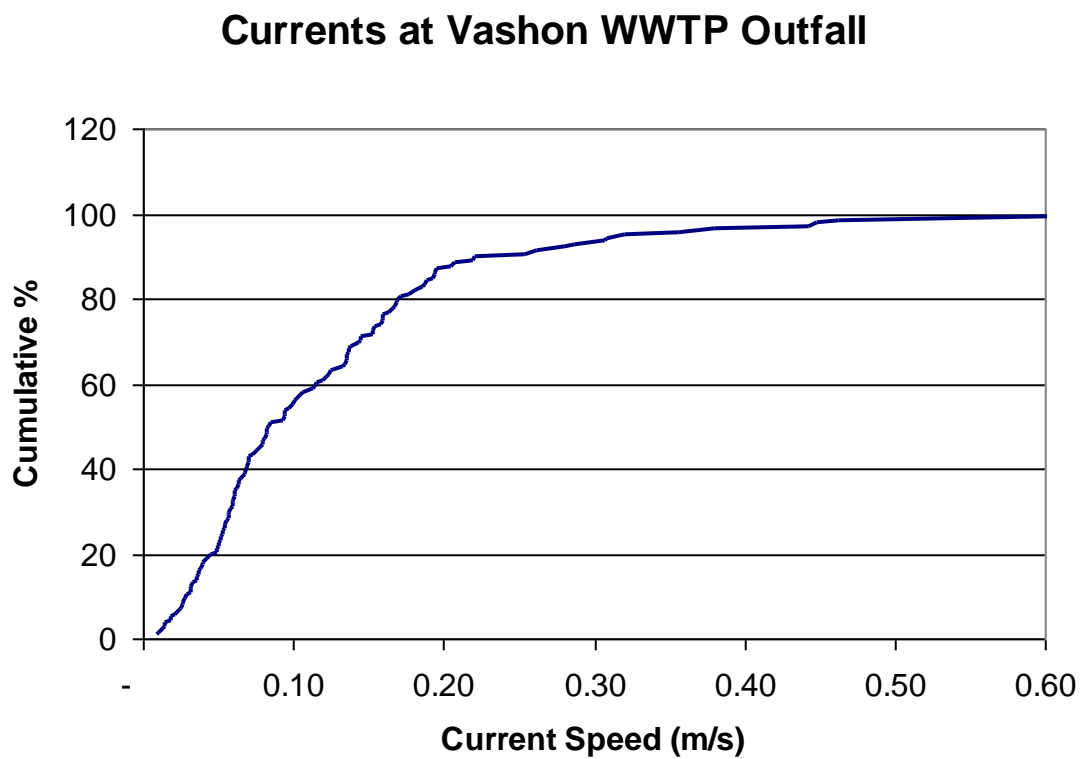
| Date      | Depth  |        |        |        |
|-----------|--------|--------|--------|--------|
|           | 0 m    | 15 m   | 35 m   | 55 m   |
| 15-Apr-13 | 22.031 | 22.582 | 22.699 | 22.795 |
| 21-May-13 | 21.581 | 22.095 | 22.38  | 22.565 |
| 17-Jun-13 | 21.927 | 22.211 | 22.393 | 22.558 |
| 17-Jul-13 | 21.733 | 21.971 | 22.148 | 22.157 |
| 27-Aug-13 | 22.374 | 22.499 | 22.534 | 22.552 |
| 17-Sep-13 | 22.514 | 22.617 | 22.818 | 23.058 |
| 22-Oct-13 | 22.737 | 22.741 | 22.763 | 22.853 |
| 17-Dec-13 | 23.18  | 23.206 | 23.239 | 23.418 |
| 28-Jan-14 | 23.056 | 23.103 | 23.135 | 23.32  |
| 6-Feb-14  | 24.86  | 24.861 | 24.867 | 24.918 |
| 18-Mar-14 | 21.666 | 22.612 | 22.72  | 23.061 |
| 21-Apr-14 | 21.754 | 22.222 | 22.398 | 22.534 |
| 6-May-14  | 21.622 | 22.197 | 22.321 | 22.479 |
| 20-May-14 | 21.359 | 22.035 | 22.146 | 22.257 |
| 3-Jun-14  | 21.616 | 21.945 | 22.087 | 22.217 |
| 17-Jun-14 | 21.86  | 22.018 | 22.127 | 22.183 |
| 8-Jul-14  | 21.114 | 21.93  | 22.16  | 22.422 |
| 22-Jul-14 | 21.638 | 22.034 | 22.211 | 22.337 |
| 9-Sep-14  | 22.41  | 22.466 | 22.609 | 22.957 |
| 23-Sep-14 | 21.982 | 22.389 | 22.655 | 22.834 |
| 7-Oct-14  | 22.636 | 22.711 | 22.795 | 23.11  |
| 21-Oct-14 | 22.684 | 22.842 | 22.94  | 23.11  |
| 4-Nov-14  | 22.545 | 22.842 | 22.911 | 22.937 |
| 18-Nov-14 | 21.608 | 22.379 | 22.56  | 22.735 |
| 16-Dec-14 | 22.355 | 22.438 | 22.475 | 22.52  |
| 21-Jan-15 | 21.933 | 22.174 | 22.345 | 22.397 |
| 3-Feb-15  | 21.932 | 22.116 | 22.305 | 22.574 |
| 18-Feb-15 | 19.921 | 20.718 | 22.21  | 22.308 |
| 23-Mar-15 | 22.025 | 22.095 | 22.183 | 22.215 |
| 7-Apr-15  | 22.108 | 22.153 | 22.256 | 22.264 |
| 21-Apr-15 | 22.103 | 22.104 | 22.113 | 22.213 |
| 6-May-15  | 21.939 | 22.093 | 22.197 | 22.391 |
| 19-May-15 | 21.986 | 22.277 | 22.365 | 22.58  |
| 3-Jun-15  | 22.094 | 22.275 | 22.45  | 22.749 |
| 16-Jun-15 | 22.247 | 22.37  | 22.447 | 22.7   |
| 7-Jul-15  | 22.108 | 22.301 | 22.346 | 22.357 |
| 23-Jul-15 | 21.973 | 22.288 | 22.386 | 22.49  |
| 4-Aug-15  | 22.326 | 22.381 | 22.404 | 22.457 |
| 18-Aug-15 | 22.278 | 22.488 | 22.545 | 22.692 |
| 9-Sep-15  | 22.531 | 22.634 | 22.703 | 22.74  |
| 22-Sep-15 | 22.523 | 22.635 | 22.742 | 22.76  |
| 6-Oct-15  | 22.876 | 22.876 | 22.876 | 22.887 |
| 20-Oct-15 | 22.876 | 22.924 | 22.942 | 22.978 |
| 3-Nov-15  | 22.183 | 22.971 | 23.002 | 23.013 |
| 18-Nov-15 | 22.064 | 22.815 | 22.934 | 23.092 |
| 15-Dec-15 | 22.685 | 22.685 | 22.685 | 22.685 |
| 20-Jan-16 | 22.337 | 22.442 | 22.578 | 22.72  |
| 2-Feb-16  | 21.443 | 22.382 | 22.406 | 22.44  |
| 17-Feb-16 | 21.281 | 22.158 | 22.203 | 22.385 |

| Date      | Depth  |        |        |        |
|-----------|--------|--------|--------|--------|
|           | 0 m    | 15 m   | 35 m   | 55 m   |
| 8-Mar-16  | 21.2   | 21.596 | 21.927 | 22.386 |
| 22-Mar-16 | 21.607 | 21.816 | 21.856 | 22.309 |
| 5-Apr-16  | 17.722 | 21.221 | 21.858 | 22.215 |
| 19-Apr-16 | 21.639 | 21.722 | 21.865 | 22.071 |
| 3-May-16  | 20.673 | 21.425 | 21.63  | 21.789 |
| 17-May-16 | 20.937 | 21.558 | 21.882 | 22.025 |
| 7-Jun-16  | 21.835 | 21.885 | 21.905 | 22.211 |
| 21-Jun-16 | 21.849 | 22.046 | 22.235 | 22.5   |
| 6-Jul-16  | 21.823 | 22.124 | 22.238 | 22.616 |
| 19-Jul-16 | 21.451 | 22.172 | 22.395 | 22.746 |
| 2-Aug-16  | 22.116 | 22.262 | 22.323 | 22.711 |
| 16-Aug-16 | 21.903 | 22.152 | 22.337 | 22.623 |
| 7-Sep-16  | 22.431 | 22.566 | 22.613 | 22.663 |
| 20-Sep-16 | 22.678 | 22.732 | 22.756 | 23.057 |
| 4-Oct-16  | 22.816 | 22.869 | 22.899 | 22.938 |
| 18-Oct-16 | 22.952 | 22.981 | 23.098 | 23.125 |
| 8-Nov-16  | 22.132 | 22.787 | 22.822 | 22.876 |
| 22-Nov-16 | 22.623 | 22.661 | 22.673 | 22.674 |
| 21-Dec-16 | 22.541 | 22.551 | 22.555 | 22.557 |
| 24-Jan-17 | 22.744 | 22.765 | 22.802 | 23.034 |
| 7-Feb-17  | 22.807 | 22.814 | 22.845 | 22.975 |
| 22-Feb-17 | 21.652 | 22.303 | 22.637 | 22.696 |
| 7-Mar-17  | 22.331 | 22.522 | 22.594 | 22.734 |
| 21-Mar-17 | 18.994 | 21.783 | 22.328 | 22.491 |
| 4-Apr-17  | 19.852 | 21.745 | 22.039 | 22.185 |
| 18-Apr-17 | 21.789 | 21.874 | 21.958 | 22.122 |
| 2-May-17  | 21.535 | 21.923 | 21.945 | 21.975 |
| 16-May-17 | 20.997 | 21.648 | 21.887 | 22.112 |
| 7-Jun-17  | 20.437 | 21.399 | 21.716 | 22.267 |
| 20-Jun-17 | 21.523 | 21.669 | 21.784 | 22.016 |
| 6-Jul-17  | 21.257 | 21.483 | 21.752 | 22.136 |
| 18-Jul-17 | 21.459 | 21.579 | 21.709 | 21.87  |
| 8-Aug-17  | 21.768 | 21.91  | 22.077 | 22.512 |
| 29-Aug-17 | 22.07  | 22.164 | 22.237 | 22.258 |
| 20-Sep-17 | 22.273 | 22.518 | 22.604 | 22.919 |
| 2-Oct-17  | 22.351 | 22.559 | 22.717 | 23.006 |
| 18-Oct-17 | 22.812 | 22.925 | 22.996 | 23.172 |
| 7-Nov-17  | 22.968 | 22.968 | 22.974 | 22.998 |
| 21-Nov-17 | 23.106 | 23.147 | 23.157 | 23.183 |
| 19-Dec-17 | 22.693 | 22.795 | 22.875 | 22.974 |
| 17-Jan-18 | 22.57  | 22.632 | 22.737 | 23.05  |
| 6-Feb-18  | 22.105 | 22.556 | 22.575 | 22.585 |
| 21-Feb-18 | 21.849 | 21.997 | 22.125 | 22.46  |
| 6-Mar-18  | 22.739 | 22.796 | 22.83  | 22.896 |
| 20-Mar-18 | 22.459 | 22.542 | 22.587 | 22.645 |
| 3-Apr-18  | 22.547 | 22.651 | 22.674 | 22.687 |
| 17-Apr-18 | 22.254 | 22.378 | 22.59  | 22.863 |
| 8-May-18  | 21.084 | 22.089 | 22.129 | 22.361 |
| 22-May-18 | 21.549 | 21.947 | 22     | 22.261 |

| Date      | Depth  |        |        |        |
|-----------|--------|--------|--------|--------|
|           | 0 m    | 15 m   | 35 m   | 55 m   |
| 5-Jun-18  | 21.752 | 22.046 | 22.124 | 22.201 |
| 19-Jun-18 | 22.026 | 22.219 | 22.301 | 22.327 |
| 10-Jul-18 | 21.484 | 22.169 | 22.315 | 22.648 |
| 24-Jul-18 | 21.932 | 22.154 | 22.286 | 22.561 |
| 21-Aug-18 | 22.064 | 22.306 | 22.448 | 22.657 |
| 5-Sep-18  | 22.462 | 22.512 | 22.589 | 22.598 |
| 18-Sep-18 | 22.544 | 22.695 | 22.787 | 22.837 |
| 3-Oct-18  | 22.814 | 22.846 | 22.901 | 22.902 |
| 16-Oct-18 | 23.035 | 23.042 | 23.045 | 23.045 |
| 14-Nov-18 | 22.977 | 23.042 | 23.073 | 23.209 |
| 27-Nov-18 | 23.221 | 23.235 | 23.244 | 23.271 |
| 18-Dec-18 | 23.148 | 23.253 | 23.352 | 23.363 |
| 15-Jan-19 | 22.651 | 22.762 | 22.924 | 22.969 |
| 7-Feb-19  | 22.705 | 22.755 | 22.775 | 22.798 |
| 20-Feb-19 | 22.83  | 22.87  | 22.878 | 22.906 |
| 5-Mar-19  | 22.936 | 22.944 | 22.949 | 23.016 |
| 19-Mar-19 | 22.933 | 22.981 | 23     | 23.1   |
| 2-Apr-19  | 22.885 | 22.901 | 22.961 | 23.124 |
| 16-Apr-19 | 22.292 | 22.916 | 23.026 | 23.16  |
| 7-May-19  | 22.201 | 22.518 | 22.681 | 23.028 |
| 21-May-19 | 21.711 | 22.547 | 22.724 | 22.764 |
| 4-Jun-19  | 22.336 | 22.494 | 22.615 | 22.911 |
| 18-Jun-19 | 22.186 | 22.394 | 22.617 | 22.756 |
| 2-Jul-19  | 22.248 | 22.504 | 22.69  | 22.957 |
| 16-Jul-19 | 22.346 | 22.585 | 22.707 | 22.981 |
| 6-Aug-19  | 22.593 | 22.668 | 22.716 | 22.732 |
| 20-Aug-19 | 22.24  | 22.739 | 22.842 | 22.9   |
| 4-Sep-19  | 22.701 | 22.819 | 22.852 | 22.921 |
| 17-Sep-19 | 22.815 | 22.91  | 23.038 | 23.11  |
| 8-Oct-19  | 23.066 | 23.124 | 23.195 | 23.254 |
| 22-Oct-19 | 23.06  | 23.08  | 23.123 | 23.14  |
| 5-Nov-19  | 23.099 | 23.103 | 23.104 | 23.104 |
| 19-Nov-19 | 23.213 | 23.227 | 23.232 | 23.238 |
| 11-Dec-19 | 23.409 | 23.409 | 23.418 | 23.474 |
| 8-Jan-20  | 22.567 | 23.165 | 23.367 | 23.533 |
| 4-Feb-20  | 21.343 | 22.7   | 22.828 | 22.865 |
| 19-Feb-20 | 20.823 | 22.134 | 22.321 | 22.373 |
| 3-Mar-20  | 22.067 | 22.315 | 22.407 | 22.608 |
| 17-Mar-20 | 22.169 | 22.186 | 22.276 | 22.465 |
| 2-Jun-20  | 21.612 | 22.006 | 22.379 | 22.381 |
| 16-Jun-20 | 21.751 | 22.493 | 22.546 | 22.614 |
| 7-Jul-20  | 22.187 | 22.285 | 22.42  | 22.595 |
| 21-Jul-20 | 21.635 | 22.013 | 22.377 | 22.723 |
| 4-Aug-20  | 21.972 | 22.279 | 22.381 | 22.483 |
| 18-Aug-20 | 21.997 | 22.237 | 22.335 | 22.362 |
| 9-Sep-20  | 22.507 | 22.538 | 22.556 | 22.625 |
| 22-Sep-20 | 22.652 | 22.749 | 22.777 | 22.827 |
| 6-Oct-20  | 22.827 | 22.841 | 22.853 | 22.882 |
| 21-Oct-20 | 22.919 | 22.969 | 22.976 | 22.984 |

---

|           | Depth  |        |        |        |
|-----------|--------|--------|--------|--------|
| Date      | 0 m    | 15 m   | 35 m   | 55 m   |
| 3-Nov-20  | 22.92  | 22.942 | 22.949 | 22.957 |
| 18-Nov-20 | 22.932 | 22.98  | 22.994 | 23.073 |
| 8-Dec-20  | 22.942 | 22.987 | 23.017 | 23.031 |
| 20-Jan-21 | 21.642 | 22.277 | 22.415 | 22.71  |
| 2-Feb-21  | 22.406 | 22.433 | 22.473 | 22.597 |
| 17-Feb-21 | 22.404 | 22.42  | 22.467 | 22.531 |
| 2-Mar-21  | 22.449 | 22.479 | 22.548 | 22.657 |
| 16-Mar-21 | 22.496 | 22.53  | 22.545 | 22.615 |
| 6-Apr-21  | 22.449 | 22.579 | 22.61  | 22.809 |
| 20-Apr-21 | 22.07  | 22.5   | 22.59  | 22.773 |
| 4-May-21  | 21.78  | 22.653 | 22.691 | 22.767 |
| 18-May-21 | 22.362 | 22.483 | 22.677 | 22.849 |
| 8-Jun-21  | 20.803 | 22.62  | 22.797 | 22.898 |
| 22-Jun-21 | 21.544 | 21.972 | 22.51  | 22.665 |
| 7-Jul-21  | 21.519 | 22.04  | 22.467 | 22.621 |
|           |        |        |        |        |



**Figure 2. Cumulative probability plot of current speeds at Vashon Island Outfall based on drogue measurements.**

## PLUMES Output

/ UM3.

Case 522; ambient file M:\proj\plumes\vplumes\vashon\2021\vashon.001.db; Diffuser table record 1: -----

Ambient Table:

| Depth   | Amb-cur | Amb-dir | Amb-sal | Amb-tem | Amb-pol | Decay | Far-sp | Far-dir | Disprsn  |         |
|---------|---------|---------|---------|---------|---------|-------|--------|---------|----------|---------|
| Density |         |         |         |         |         |       |        |         |          |         |
| m       | m/s     | deg     | psu     | C       | kg/kg   | s-1   | m/s    | deg     | m0.67/s2 | sigma-T |
| 0.0     | 0.227   | 90.0    | 28.38   | 11.6    | 0.0     | 0.0   | 0.084  | 90.0    | 0.0003   | 21.56   |
| 5.0     | 0.227   | 90.0    | 28.44   | 11.29   | 0.0     | 0.0   | 0.084  | 90.0    | 0.0003   | 21.66   |
| 15.0    | 0.227   | 90.0    | 28.47   | 11.18   | 0.0     | 0.0   | 0.084  | 90.0    | 0.0003   | 21.7    |
| 25.0    | 0.227   | 90.0    | 28.51   | 11.04   | 0.0     | 0.0   | 0.084  | 90.0    | 0.0003   | 21.75   |
| 35.0    | 0.227   | 90.0    | 28.56   | 10.89   | 0.0     | 0.0   | 0.084  | 90.0    | 0.0003   | 21.82   |
| 45.0    | 0.227   | 90.0    | 28.64   | 10.66   | 0.0     | 0.0   | 0.084  | 90.0    | 0.0003   | 21.92   |
| 55.0    | 0.227   | 90.0    | 28.76   | 10.45   | 0.0     | 0.0   | 0.084  | 90.0    | 0.0003   | 22.05   |
| 65.0    | 0.227   | 90.0    | 28.85   | 10.22   | 0.0     | 0.0   | 0.084  | 90.0    | 0.0003   | 22.15   |

Diffuser table:

| P-dia | P-elev | V-angle | H-angle | Ports | SttTime | EndTime | Incrmnt | AcuteMZ | ChrcMZ | P-depth | Ttl-flo | Eff-sal | Temp | Polutnt |
|-------|--------|---------|---------|-------|---------|---------|---------|---------|--------|---------|---------|---------|------|---------|
| (in)  | (m)    | (deg)   | (deg)   | ()    | (hr)    | (hr)    | (hr)    | (ft)    | (ft)   | (ft)    | (MGD)   | (psu)   | (C)  | (kg/kg) |
| 8.0   | 1.0    | 0.0     | 0.0     | 1.0   | 1.0     | 771.0   | 1.0     | 20.0    | 200.0  | 200.0   | 0.8     | 0.0     | 15.0 | 100.0   |

Simulation:

Froude number: 5.052; effluent density (sigma-T) -0.83634079; effluent velocity 1.081(m/s);

|                      | Depth | Amb-cur | P-dia | Polutnt | P-speed | Dilutn | x-posn | y-posn                             |
|----------------------|-------|---------|-------|---------|---------|--------|--------|------------------------------------|
| Step                 | (ft)  | (m/s)   | (in)  | (kg/kg) | (m/s)   | ()     | (ft)   | (ft)                               |
| 0                    | 200.0 | 0.227   | 8.0   | 100.0   | 1.081   | 1.0    | 0.0    | 0.0;                               |
| 93                   | 199.7 | 0.227   | 36.23 | 18.35   | 0.28    | 5.349  | 2.181  | 0.795; begin overlap;              |
| 100                  | 199.7 | 0.227   | 39.17 | 16.37   | 0.269   | 5.995  | 2.329  | 0.944;                             |
| 102                  | 199.6 | 0.227   | 40.05 | 15.83   | 0.266   | 6.199  | 2.371  | 0.991; end overlap;                |
| 200                  | 196.9 | 0.227   | 111.2 | 2.34    | 0.234   | 41.8   | 4.567  | 9.18;                              |
| 240                  | 193.9 | 0.227   | 165.2 | 1.06    | 0.234   | 92.27  | 5.318  | 19.28; acute zone;                 |
| 300                  | 185.6 | 0.227   | 300.8 | 0.323   | 0.231   | 302.7  | 6.225  | 53.1;                              |
| 344                  | 175.4 | 0.227   | 467.7 | 0.135   | 0.229   | 723.4  | 6.797  | 112.9; trap level;                 |
| 368                  | 168.9 | 0.227   | 593.6 | 0.0846  | 0.227   | 1155.7 | 7.251  | 207.4; chronic zone;               |
| 370                  | 169.0 | 0.227   | 598.7 | 0.0832  | 0.227   | 1175.4 | 7.313  | 223.2; local maximum rise or fall; |
| Outside chronic zone |       |         |       |         |         |        |        |                                    |

Outside chronic zone

/ UM3.

Case 106; ambient file M:\proj\plumes\vplumes\vashon\2021\vashon.001.db; Diffuser table record 2: -----

Ambient Table:

| Depth   | Amb-cur | Amb-dir | Amb-sal | Amb-tem | Amb-pol | Decay | Far-sp | Far-dir | Disprsn  |         |
|---------|---------|---------|---------|---------|---------|-------|--------|---------|----------|---------|
| Density |         |         |         |         |         |       |        |         |          |         |
| m       | m/s     | deg     | psu     | C       | kg/kg   | s-1   | m/s    | deg     | m0.67/s2 | sigma-T |
| 0.0     | 0.084   | 90.0    | 27.9    | 8.263   | 0.0     | 0.0   | 0.084  | 90.0    | 0.0003   | 21.7    |
| 5.0     | 0.084   | 90.0    | 28.84   | 8.083   | 0.0     | 0.0   | 0.084  | 90.0    | 0.0003   | 22.46   |
| 15.0    | 0.084   | 90.0    | 29.06   | 7.989   | 0.0     | 0.0   | 0.084  | 90.0    | 0.0003   | 22.64   |
| 25.0    | 0.084   | 90.0    | 29.13   | 7.961   | 0.0     | 0.0   | 0.084  | 90.0    | 0.0003   | 22.7    |
| 35.0    | 0.084   | 90.0    | 29.19   | 7.947   | 0.0     | 0.0   | 0.084  | 90.0    | 0.0003   | 22.75   |
| 45.0    | 0.084   | 90.0    | 29.23   | 7.936   | 0.0     | 0.0   | 0.084  | 90.0    | 0.0003   | 22.78   |



---

|      |       |      |       |       |     |     |       |      |        |       |
|------|-------|------|-------|-------|-----|-----|-------|------|--------|-------|
| 55.0 | 0.084 | 90.0 | 29.6  | 7.832 | 0.0 | 0.0 | 0.084 | 90.0 | 0.0003 | 23.09 |
| 65.0 | 0.084 | 90.0 | 29.67 | 7.813 | 0.0 | 0.0 | 0.084 | 90.0 | 0.0003 | 23.15 |

## Diffuser table:

| P-dia   | P-elev  | V-angle | H-angle | Ports | Spacing | SttTime | EndTime | Incrmnt | AcuteMZ | ChrcMZ | P-depth |
|---------|---------|---------|---------|-------|---------|---------|---------|---------|---------|--------|---------|
| Ttl-flo | Eff-sal | Temp    | Polutnt |       |         |         |         |         |         |        |         |
| (in)    | (m)     | (deg)   | (deg)   | ()    | (m)     | (hr)    | (hr)    | (hr)    | (ft)    | (ft)   | (ft)    |
| 8.0     | 1.0     | 0.0     | 0.0     | 1.0   | 100.0   | 2.0     | 771.0   | 3.0     | 20.0    | 200.0  | 200.0   |
| 100.0   |         |         |         |       |         |         |         |         | 0.324   | 0.0    | 15.0    |

## Simulation:

Froude number: 2.002; effluent density (sigma-T) -0.83634079; effluent velocity 0.438(m/s);

| Depth | Amb-cur | P-dia | Polutnt | P-speed | Dilutn | x-posn | y-posn |
|-------|---------|-------|---------|---------|--------|--------|--------|
| Step  | (ft)    | (m/s) | (in)    | (kg/kg) | (m/s)  | ()     | (ft)   |
| 0     | 200.0   | 0.084 | 8.0     | 100.0   | 0.438  | 1.0    | 0.0    |
| 100   | 199.1   | 0.084 | 23.54   | 25.05   | 0.198  | 3.922  | 1.702  |
| 200   | 193.2   | 0.084 | 72.46   | 3.498   | 0.149  | 27.94  | 3.288  |
| 300   | 177.6   | 0.084 | 226.7   | 0.483   | 0.11   | 202.3  | 4.189  |
| 307   | 176.1   | 0.084 | 246.3   | 0.42    | 0.107  | 232.4  | 4.233  |
| 330   | 170.8   | 0.084 | 325.8   | 0.267   | 0.0962 | 366.4  | 4.369  |
| 382   | 164.4   | 0.084 | 470.8   | 0.147   | 0.0839 | 663.8  | 4.603  |

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 11.96 m

| conc    | dilutn | width | distnce | time    |
|---------|--------|-------|---------|---------|
| (kg/kg) | (m)    | (m)   | (hrs)   | (kg/kg) |
| 0.14083 | 694.2  | 15.77 | 60.96   | 0.149   |
|         |        |       |         | 0.0     |
|         |        |       |         | 0.0     |
|         |        |       |         | 8.4     |
|         |        |       |         | 3.00E-4 |

count: 1

**Certificate Of Completion**

Envelope Id: 3A64535EA2EB4E23814386997DFF7C40

Status: Completed

Subject: Please DocuSign: KingCo\_Vashon-NPDES-permit-application\_July2021.pdf

Source Envelope:

Document Pages: 69

Signatures: 2

Envelope Originator:

Certificate Pages: 5

Initials: 0

Christina Fredzess

AutoNav: Enabled

401 5TH AVE

Envelope Stamping: Enabled

SEATTLE, WA 98104

Time Zone: (UTC-08:00) Pacific Time (US &amp; Canada)

cfredzess@kingcounty.gov

IP Address: 198.49.222.20

**Record Tracking**

Status: Original

Holder: Christina Fredzess

Location: DocuSign

7/27/2021 3:53:17 PM

cfredzess@kingcounty.gov

Security Appliance Status: Connected

Pool: FedRamp

Storage Appliance Status: Connected

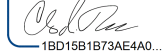
Pool: King County-Dept of Natural Resources &  
Parks-Wastewater Treatment

Location: DocuSign

**Signer Events****Signature****Timestamp**

Christie True

DocuSigned by:

  
1BD15B1B73AE4A0...

Sent: 7/27/2021 4:07:35 PM

Christie.True@kingcounty.gov

Viewed: 7/28/2021 8:18:31 AM

Director, King County Department of Natural

Signed: 7/28/2021 8:18:53 AM

Resources and Parks

Security Level: Email, Account Authentication  
(None)

Signature Adoption: Drawn on Device

Using IP Address: 98.125.227.249

**Electronic Record and Signature Disclosure:**

Accepted: 7/28/2021 8:18:31 AM

ID: 475f4df9-c0eb-4c06-93c1-8eb7941ee57e

**In Person Signer Events****Signature****Timestamp****Editor Delivery Events****Status****Timestamp****Agent Delivery Events****Status****Timestamp****Intermediary Delivery Events****Status****Timestamp****Certified Delivery Events****Status****Timestamp****Carbon Copy Events****Status****Timestamp**

Jeff Lafer

**COPIED**

Sent: 7/27/2021 4:07:34 PM

Jeff.Lafer@kingcounty.gov

Security Level: Email, Account Authentication  
(None)**Electronic Record and Signature Disclosure:**

Accepted: 7/19/2021 1:10:19 PM

ID: b24cd75d-0d48-45d7-967e-614ae1b907a9

Jim Bolger

**COPIED**

Sent: 7/27/2021 4:07:35 PM

jbolger@kingcounty.gov

Jim Bolger

King County General (ITD)

Security Level: Email, Account Authentication  
(None)**Electronic Record and Signature Disclosure:**

Accepted: 7/30/2020 10:45:10 AM

ID: 6b372429-24d3-45a4-9084-5a9d4f147421

| Carbon Copy Events   | Status           | Timestamp  |
|--|------------------|--|
| <p>Kamuron Gurol<br/>kgurol@kingcounty.gov<br/>WTD Director<br/>King County WTD<br/>Security Level: Email, Account Authentication (None)</p> <p><b>Electronic Record and Signature Disclosure:</b><br/>Accepted: 7/27/2021 11:02:14 AM<br/>ID: 8057ac5e-7556-4ba0-8aa6-9c7786343857</p>                | COPIED           | Sent: 7/27/2021 4:07:35 PM   |
| <p>Lester Kinlow<br/>lkinlow@kingcounty.gov<br/>King County<br/>Security Level: Email, Account Authentication (None)</p> <p><b>Electronic Record and Signature Disclosure:</b><br/>Accepted: 8/13/2020 9:13:02 AM<br/>ID: 70c5c4da-a15e-4d6f-acbe-0f1b33d484d9</p>                                     | COPIED           | <p>Sent: 7/27/2021 4:07:34 PM<br/>Viewed: 7/28/2021 8:39:08 AM</p> |
| <p>Marla Oughton<br/>Marla.Oughton@kingcounty.gov<br/>King County-Department of Natural Resources and Parks-Wastewater Treatment<br/>Security Level: Email, Account Authentication (None)</p> <p><b>Electronic Record and Signature Disclosure:</b><br/>Not Offered via DocuSign</p>                   | COPIED           | <p>Sent: 7/27/2021 4:07:34 PM<br/>Viewed: 7/28/2021 9:23:43 AM</p> |
| <p>Robert Waddle<br/>Robert.Waddle@kingcounty.gov<br/>Ops Manager<br/>King County General (ITD)<br/>Security Level: Email, Account Authentication (None)</p> <p><b>Electronic Record and Signature Disclosure:</b><br/>Accepted: 8/13/2020 7:33:46 AM<br/>ID: 80123045-1d65-4623-9004-aacb8005cd30</p> | COPIED           | Sent: 7/27/2021 4:07:34 PM   |
| Witness Events   | Signature        | Timestamp  |
| Notary Events  | Signature        | Timestamp  |
| Envelope Summary Events  | Status           | Timestamps   |
| Envelope Sent  | Hashed/Encrypted | 7/27/2021 4:07:35 PM   |
| Certified Delivered  | Security Checked | 7/28/2021 8:18:31 AM   |
| Signing Complete   | Security Checked | 7/28/2021 8:18:53 AM   |
| Completed  | Security Checked | 7/28/2021 8:18:53 AM   |
| Payment Events   | Status           | Timestamps   |
| Electronic Record and Signature Disclosure   |                  |  |

## **ELECTRONIC RECORD AND SIGNATURE DISCLOSURE**

From time to time, King County-Department of Natural Resources and Parks-Wastewater Treatment (we, us or Company) may be required by law to provide to you certain written notices or disclosures. Described below are the terms and conditions for providing to you such notices and disclosures electronically through the DocuSign system. Please read the information below carefully and thoroughly, and if you can access this information electronically to your satisfaction and agree to this Electronic Record and Signature Disclosure (ERSD), please confirm your agreement by selecting the check-box next to 'I agree to use electronic records and signatures' before clicking 'CONTINUE' within the DocuSign system.

### **Getting paper copies**

At any time, you may request from us a paper copy of any record provided or made available electronically to you by us. You will have the ability to download and print documents we send to you through the DocuSign system during and immediately after the signing session and, if you elect to create a DocuSign account, you may access the documents for a limited period of time (usually 30 days) after such documents are first sent to you. After such time, if you wish for us to send you paper copies of any such documents from our office to you, you will be charged a \$0.00 per-page fee. You may request delivery of such paper copies from us by following the procedure described below.

### **Withdrawing your consent**

If you decide to receive notices and disclosures from us electronically, you may at any time change your mind and tell us that thereafter you want to receive required notices and disclosures only in paper format. How you must inform us of your decision to receive future notices and disclosure in paper format and withdraw your consent to receive notices and disclosures electronically is described below.

### **Consequences of changing your mind**

If you elect to receive required notices and disclosures only in paper format, it will slow the speed at which we can complete certain steps in transactions with you and delivering services to you because we will need first to send the required notices or disclosures to you in paper format, and then wait until we receive back from you your acknowledgment of your receipt of such paper notices or disclosures. Further, you will no longer be able to use the DocuSign system to receive required notices and consents electronically from us or to sign electronically documents from us.

### **All notices and disclosures will be sent to you electronically**

Unless you tell us otherwise in accordance with the procedures described herein, we will provide electronically to you through the DocuSign system all required notices, disclosures, authorizations, acknowledgements, and other documents that are required to be provided or made available to you during the course of our relationship with you. To reduce the chance of you inadvertently not receiving any notice or disclosure, we prefer to provide all of the required notices and disclosures to you by the same method and to the same address that you have given us. Thus, you can receive all the disclosures and notices electronically or in paper format through the paper mail delivery system. If you do not agree with this process, please let us know as described below. Please also see the paragraph immediately above that describes the consequences of your electing not to receive delivery of the notices and disclosures electronically from us.

**How to contact King County-Department of Natural Resources and Parks-Wastewater Treatment:**

You may contact us to let us know of your changes as to how we may contact you electronically, to request paper copies of certain information from us, and to withdraw your prior consent to receive notices and disclosures electronically as follows:

To contact us by email send messages to: [ohansen@kingcounty.gov](mailto:ohansen@kingcounty.gov)

**To advise King County-Department of Natural Resources and Parks-Wastewater Treatment of your new email address**

To let us know of a change in your email address where we should send notices and disclosures electronically to you, you must send an email message to us at [ohansen@kingcounty.gov](mailto:ohansen@kingcounty.gov) and in the body of such request you must state: your previous email address, your new email address. We do not require any other information from you to change your email address.

If you created a DocuSign account, you may update it with your new email address through your account preferences.

**To request paper copies from King County-Department of Natural Resources and Parks-Wastewater Treatment**

To request delivery from us of paper copies of the notices and disclosures previously provided by us to you electronically, you must send us an email to [ohansen@kingcounty.gov](mailto:ohansen@kingcounty.gov) and in the body of such request you must state your email address, full name, mailing address, and telephone number. We will bill you for any fees at that time, if any.

**To withdraw your consent with King County-Department of Natural Resources and Parks-Wastewater Treatment**

To inform us that you no longer wish to receive future notices and disclosures in electronic format you may:

- i. decline to sign a document from within your signing session, and on the subsequent page, select the check-box indicating you wish to withdraw your consent, or you may;
- ii. send us an email to [ohansen@kingcounty.gov](mailto:ohansen@kingcounty.gov) and in the body of such request you must state your email, full name, mailing address, and telephone number. We do not need any other information from you to withdraw consent.. The consequences of your withdrawing consent for online documents will be that transactions may take a longer time to process..

### **Required hardware and software**

The minimum system requirements for using the DocuSign system may change over time. The current system requirements are found here: <https://support.docusign.com/guides/signer-guide-signing-system-requirements>.

### **Acknowledging your access and consent to receive and sign documents electronically**

To confirm to us that you can access this information electronically, which will be similar to other electronic notices and disclosures that we will provide to you, please confirm that you have read this ERSD, and (i) that you are able to print on paper or electronically save this ERSD for your future reference and access; or (ii) that you are able to email this ERSD to an email address where you will be able to print on paper or save it for your future reference and access. Further, if you consent to receiving notices and disclosures exclusively in electronic format as described herein, then select the check-box next to 'I agree to use electronic records and signatures' before clicking 'CONTINUE' within the DocuSign system.

By selecting the check-box next to 'I agree to use electronic records and signatures', you confirm that:

- You can access and read this Electronic Record and Signature Disclosure; and
- You can print on paper this Electronic Record and Signature Disclosure, or save or send this Electronic Record and Disclosure to a location where you can print it, for future reference and access; and
- Until or unless you notify King County-Department of Natural Resources and Parks-Wastewater Treatment as described above, you consent to receive exclusively through electronic means all notices, disclosures, authorizations, acknowledgements, and other documents that are required to be provided or made available to you by King County-Department of Natural Resources and Parks-Wastewater Treatment during the course of your relationship with King County-Department of Natural Resources and Parks-Wastewater Treatment.