

## Permit Compliance Inspection Report

Water Quality Program  
Northwest Region Office

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A. General Information

Facility Name and Address: Brightwater Wastewater Treatment Plant  
22505 State Route 9 SE  
Woodinville, WA 98072

GPS Latitude/Longitude: 47.7921, -122.143

Permit Number: WA0032247, ST0045498, WAG994572

Permit Type: Municipal NPDES Permit (Individual)

Permit Effective Dates: Various to Various

Inspection Date and Time: October 30, 2024, 1:00 PM to 4:00 PM

Discharge to: Puget Sound and Reclaimed Water Users

Receiving Water: Puget Sound

Type of Inspection: Announced  
Compliance Inspection - Without Sampling

Weather: Raining, ~50°F ERTS #: N/A

Photographs Taken: ☒ Yes ☐ No Samples Taken: ☐ Yes ☒ No

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## B. Personnel Information

Ecology Representative(s): Greg Lipnickey (Lead Inspector)  
Sean Wilson (Co-inspector)

Other:

Facility Representative(s): Chapin Brackett, Manager of Process and Environmental Compliance  
Email: cbrackett@kingcounty.gov Phone: 206-477-3347  
Carol Nelson, Process Analyst  
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Matt Nolan, Brightwater Treatment Plant Manager  
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Responsible Party/Official: John Taylor, Director of DNRP  
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MS-KSC-NR-5500  
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Inspector Signature(s)

Reviewer Signature



12/09/2024

Greg Lipnickey  
Date  
NWRO Municipal Enforcement Specialist  
Supervisor



12/10/2024

Shawn McKone  
Date  
Municipal Wastewater Permits Unit



12/09/2024

Sean Wilson  
Date  
Facility Manager

### C. Facility Description and Background

The Brightwater facility is part of the East Section of King County's regional wastewater service area. King County's Department of Natural Resources and Parks – Wastewater Treatment Division (WTD) owns and operates this membrane bioreactor treatment (MBR) facility. The facility is regulated for the wastewater discharge to Puget Sound by NPDES Permit No. WA0032247, issued February 26, 2018, expiring February 28, 2023. WTD submitted a timely application for renewal for this permit, and it has been administratively extended.

The Brightwater facility is also regulated for the production, distribution, and use of reclaimed water under the Washington State Reclaimed Water Individual Permit No. ST0045498., issued March 25, 2019, expiring April 30, 2024. WTD submitted a timely application for renewal of this permit, and it has been administratively extended.

Discharges of nutrients in the form of total inorganic nitrogen from the Brightwater facility is separately regulated under the Puget Sound Nutrients General Permit No. WAG994572, issued December 1, 2021, and expiring on December 31, 2026.

The 69 square mile Brightwater service area in the northeast portion of the regional wastewater service area currently stretches from the north end of Lake Sammamish to the City of Mill Creek in Snohomish County. It includes portions of 10 sewer or utility districts and treats domestic sewage from residential, commercial, and industrial sources. The facility receives flow from only the fully separated portions of the WTD service area but does experience high peak flows during wet weather due to inflow and infiltration (I&I). The main treatment train at the plant includes screening, primary clarifiers, aeration basins, membrane filtration, and chlorine disinfection before discharging to Puget Sound. During the drier months, a diversion structure directs a portion of the treated effluent to dedicated disinfection systems for reclaimed water production. During wet weather events, when flows exceed capacity of the secondary process, the plant is designed for a portion of the flow to receive chemically enhanced primary treatment and bypasses the secondary (aeration basins and membrane) steps. The chemically enhanced primary effluent blends with membrane effluent prior to disinfection and discharge.

### D. Inspection Narrative and Observations

#### 1. Permit Documentation and Records Review

An audit of specific permit records was conducted as part of the inspection. Specifically, the WA0032247 Discharge Monitoring Reports (DMRs) for the months of April 2024, December 2023, and February 2021 were examined. No discrepancies were identified between the data reported in Ecology's PARIS DMR record and the internal WTD laboratory records. A further review of the WA0032247 biosolids sampling for April 2024, including the external laboratory report, was reviewed and the results were found to be consistent with the reported findings.

The calibration records for the pH meters, total residual chlorine (TRC) meters, and the flow meters for the same months were also review. Records showed that both the pH meters and TRC meters were calibrated weekly

without any missed calibrations found. Brightwater uses a large magnetic meter to measure influent and effluent flow rate. The flow meter manufacturer's manual states that annual calibration is not required. This complies with Condition S2.C.2, it leaves the question of how drift or errors in the meter's readings would be noticed or corrected. Further clarification is needed as to what calibration activities are industry best practice for large, in-line, magnetic flow meters.

## 2. Site Walkthrough

In general, the facility is relatively new and has been well maintained. There was no evidence of degraded or rusted piping or equipment. The only major new piece of equipment installed since the last inspection is a classifying selector which is located just south of the electrical substation (more information about this equipment is provided later within this report).

### **Collection Systems and Influent**

The collection system size and influent flow rates are expected to increase in the coming years. Most of these increases will come when portions of the WTD service area undergo rehabilitation and move flow to Brightwater, such as the northern section of the Sammamish Plateau. According to staff interviewed during the inspection, the amount of flow directed to the South Plant has decreased over the past couple of years.

The influent sample system was found to be in good working order. A check of the sample refrigerator temperature log revealed that the highest recorded temperature was 4°C which is within the expected range. Brightwater pulls sample water up from the below grade headworks and it continuously flows through a tank. A sample tube is then run from the influent sampler to this tank to draw the composite influent sample (see Photo 1). Sample tubing is replaced monthly, but there is no cleaning conducted in between replacements. The sample tubing had sections of dark green staining or deposits during the inspection.

### **Primary Sedimentation, Aeration Basins, and Nutrient Removal**

The settling basins were functioning well, with no issues of note. At the time of the inspection, Aeration Basin #2 was not operational due to ongoing repairs from a fire that occurred in August 2023. The repairs were expected to be completed shortly, and the basin was planned to return to operation in the first week of November. Brightwater can operate up to 30 MGD with two aeration basins online, but this does reduce their resilience in case there is a problem with one of the other basins. WTD still has a long-term plan to construct two more aeration basins (for a total of 5) if flows and loads increase.

Each aeration basin is divided into four zones with a pre-aeration anoxic zone. At the time of inspection ammonia levels were around 2.5 mg/L in Zone 2 and the facility is achieving near-total nitrification with only limited denitrification. The internal mixed liquor return rate (IMLR) is approximately 1Q and about 9% of the total secondary treatment basin volume is currently an anoxic zone.

In terms of dissolved oxygen (DO) levels, Zone 1 of each basin is set to 0.8 mg/L, with levels increasing gradually in subsequent zones to a setpoint of 1.6 in Zone 4. At the time of the inspection, the active Zone 4 basins had DO levels of 2.2 and 2.4 mg/L (see Photo 5) indicating that refinement of the controls and

mechanical systems may be needed to achieve the fine DO control desired by WTD. Brightwater is transitioning to operation of the basins to achieve simultaneous nitrification and denitrification, which is expected to take 3 to 6 months. The change must occur slowly to allow time for the bacteria colonies to adjust and minimize process upset. The facility has installed new air flow

meters and automated control valves in each zone, providing operators with better control over the DO levels. In the future, there may be a need for additional carbon sources during low loading months to assist with full denitrification. This need will be assessed as the shift to lower DO levels in the aeration basins continues. The use of fermented primary solids as a carbon source is still under investigation by WTD.

### **Membrane Basins**

The membrane basins were not inspected directly during this visit. From control screens, it was observed that the mixed liquor suspended solids entering the membrane basins were approximately 8000 mg/L and the return activated sludge (RAS) return rate was slightly over 3Q. Brightwater is in the process of replacing their current membrane modules with newer generation modules. These newer modules have greater filter area per unit which eventually (once the replacement is complete) will, in theory allow Brightwater to operate with higher flow) or have more basins out of service. The change over to the new modules is occurring as each of the current modules reaches the end of the service life.

### **Classifying Selector and Solids Handling**

The classifying solids selector was installed and commissioned within the last two years to help with foaming issues and increase control of sludge age. Foam and mixed liquor are pumped to the classifying selector where foam is concentrated and wasted, and mixed liquor is returned to the aeration process. Overall, staff believe the classifier was a successful project that is achieving its goals.

Solids handling processes were also operating effectively. Staff stated that incoming solids typically contained approximately 1.5% solids. The facility has three gravity belt thickeners (GBTs) which operate in a lead-lag configuration, with one typically offline for maintenance or in standby. Polymer is added to assist the GBTs, with a consumption rate of about 5 lbs. polymer per dry ton of solids processed. The GBTs are achieving around 6% solids at the outlet, and the solids digestion time is approximately 30 days.

### **Control Screens and Alarms**

An important focus of the inspection was the review of operator screens and alarms. Initial impressions of the alarm system were that it appeared quite complex with many colors and highlighting. During the inspection, over 50 active alarms were noted (many alarms had been acknowledged, but not yet cleared), several of which were at the highest priority level (Level 1). Staff explained that it is common to have several Level 1 alarms, as these are usually linked to equipment under active maintenance.

Additionally, staff mentioned that optimizing alarm levels for new equipment (such as the classifying selector) can take months. WTD has a team that evaluates and reviews alarm levels across the facility. This team is able to approve changes quickly for simple issues or newly installed equipment as well as meeting periodically to assess alarm trends and discuss improvements. Recent efforts of this team have been focused on reducing the

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overall number of active alarms. Nevertheless, it appears that there is still significant room for improvement to make a system that is easily understandable and that does not encourage long-standing, high priority alarms.

### **Staffing Strategy**

The facility is staffed 24/7. There are three operators scheduled for each weekday day shift, while two operators work the day shift on weekends. Night shifts are covered by a single operator. In total, the facility plans for a total of eight rotating operators. Despite staffing challenges caused by the pandemic, Brightwater maintained a Level III operator at all times. Additionally, WTD has an operations-wide program which aims to establish a pipeline of new staff members.

### **Emergency Preparedness**

In terms of emergency preparedness, mechanics conduct monthly testing of the emergency generators to ensure they are ready for use in the event of an emergency. However, staff stated that chemically enhanced primary clarification procedures have not been practiced within the last few years. This may be an area for future training and improvement.

### **E. Areas of Concern**

Brightwater is operating efficiently, with key systems in good condition. The documentation and records review showed no significant issues. There are two areas for concern noted during the inspection: (1) alarm management and (2) practicing CEPC operations. Overall, the plant is well-managed and capable of handling current and future demands.

If you have any questions or concerns regarding this inspection report, please contact Sean Wilson at [sean.wilson@ecy.wa.gov](mailto:sean.wilson@ecy.wa.gov) or 425-577-4864.

### **ADA Accessibility**

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To request an ADA accommodation, contact Ecology by phone at (360) 407-6831 or email at [ecyadacoordinator@ecy.wa.gov](mailto:ecyadacoordinator@ecy.wa.gov). For Washington Relay Service or TTY call 711 or 877-833-6341. Visit [Ecology's website](#) for more information.





**Photo 1 [IMG\_1095]**

**Description:** Influent sample collection set-up. The white basin is the where the effluent water is drawn into to the sample via the sample tube in the middle of the photo.



**Photo 2 [IMG\_1104]**

**Description:** Gravity belt thickener





**Photo 3 [IMG\_1110]**  
**Description:** Solids thickening room



**Photo 4 [IMG\_1116]**  
**Description:** Aeration Basin 1 DO Control Screen



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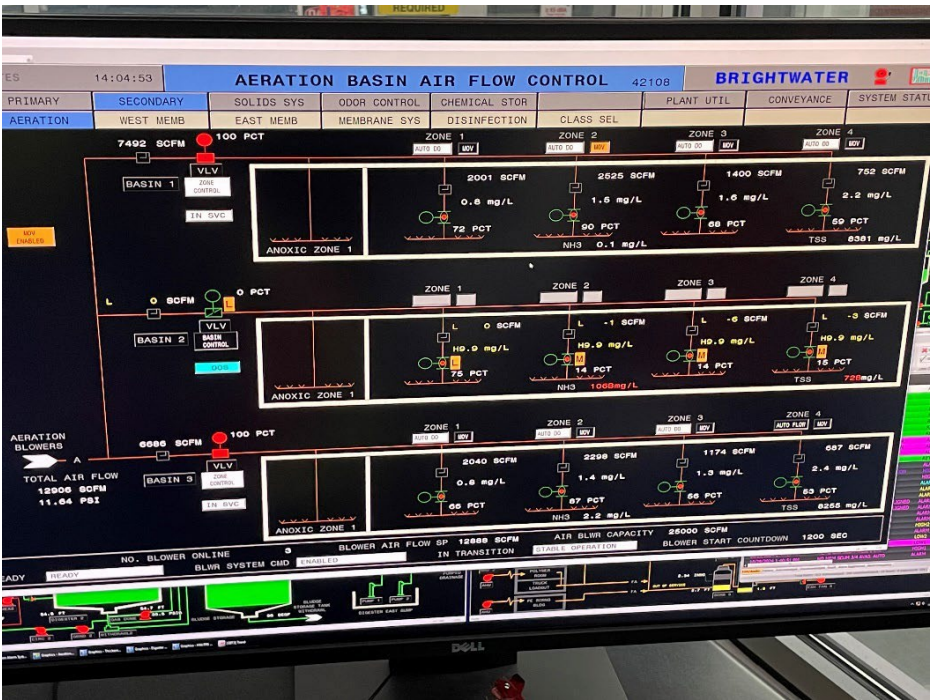


Photo 5 [IMG\_1117]  
Description: Aeration basin air flow control screen

The screenshot shows the 'Active high priority alarms' screen. It features a table with the following columns: Alarm Type, Code Name, Description, AP AY Value, and Q Units Limit. The table lists several active alarms, including 'CLASS SEL PAX PMP SUC PRESS', 'CAUSTIC FLOW', 'AER/MB ODDR STACK AIR H2S', 'MHM VIBRATION DROP38', 'MHM VIBRATION DROP36', 'IPS CS100-01 SHUTDOWN REQUEST', and 'D041P1B2L2P2'. The table is sorted by 'AP AY Value' in descending order.

Alarm Type	Code Name	Description	AP AY Value	Q Units Limit
5:28 PM	SENSOR	BW520PIT520748	CLASS SEL PAX PMP SUC PRESS	1 N -0.48 FTWC
5:50 PM	LOW2	BW520FIT520060	CAUSTIC FLOW	1 O 0.0 GPH
7:01 AM	SENSOR	BW590AIT590321	AER/MB ODDR STACK AIR H2S	1 O 0.0 B PPB
8:38 PM	SENSOR	D038P1B1L8	MHM VIBRATION DROP38	1 - 1000 0001 0000 0001 0000 0000 0000 0
10:16 AM	SENSOR	D036P1B1L8	MHM VIBRATION DROP36	1 - 1000 0001 0000 0001 0000 0000 0000 0
11:16 PM	ALARM	BW-10001-D01PS-SHTDN	IPS CS100-01 SHUTDOWN REQUEST	1 C ALARM 1 0000 0000 0001 0000 0000 0000 0001 00
12:00 PM	ALARM	D041P1B2L2P2		

Photo 6 [IMG\_1120]  
Description: Active high priority alarms screen



**Photo 7 [IMG\_1121]**

**Description:** Foam layer on top of aeration basin



**Photo 8 [IMG\_1127]**

**Description:** Reading screen for ammonia probe in aeration basin





**Photo 9 [IMG\_1131]**

**Description:** Recently installed solids selector structure



**Photo 10 [IMG\_1141]**

**Description:** Classifying selector control screen

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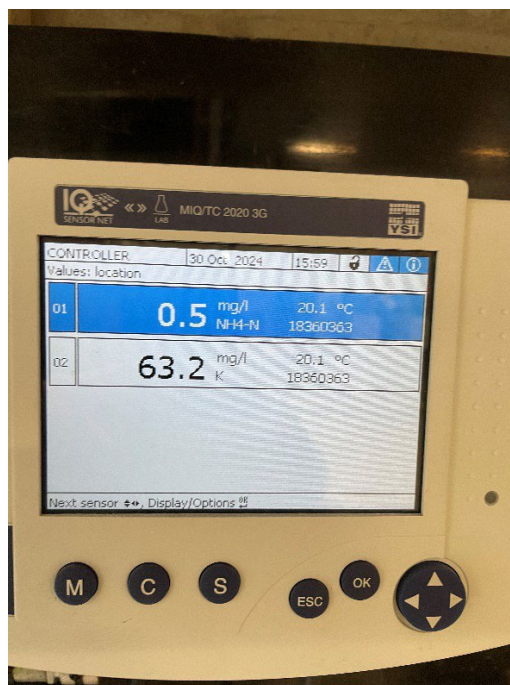
Sampler Fridge Temperature Checks

Location: EFFLUENT (MEMBLANE)

Date	Temperature	Date	Temperature	Date	Temperature
10-1-24	3°	10/30/24	1°		
10/2/24	2°				
10/3/24	3.5°				
10/4/24	2°				
10-7-24	3°				
10-8-24	2°				
10-9-24	2°				
10-10-24	2°				
10/11/24	2°				
10/12/24	3°				
10/14/24	2°				
10-15-24	2°				
10-16-24	3°				
10-17-24	3°				
10-18-24	2.5°				
10/19/24	2°				
10/20/24	2°				
10/21/24	2°				
10/22/24	2°				
10/23/24	3°				
10/24/24	1°				
10/25/24	2°				
10/26/24	3°				
10/27/24	2°				
10/28/24	3°				

**Photo 11 [IMG\_1142]**

**Description:** Effluent sample collection refrigerator temperature logs



**Photo 12 [IMG\_1147]**

**Description:** Effluent nutrient monitor screen