MEMORANDUM

May 10, 2024

TO: Historical Memo

FM: Matt Macdonald

RE: Vashon Wastewater Treatment Plant – April 2024

The Vashon Wastewater Treatment Plant effluent met all water quality requirements in April 2024. Effluent Biochemical Oxygen Demand (BOD_5) averaged 2.9-mg/l and Total Suspended Solids (TSS) averaged 4.4-mg/l. BOD_5 and TSS removals were 99% and 98%, respectively. All required analytical testing was completed in April. It is worth noting that some influent BOD and TSS loading data in April was significantly higher than typical and appear to be part of a general trend of influent loading increase in 2024. This increase is currently being investigated.

April 2024 had a below-average amount of rainfall with 1.58-inches of rainfall recorded at the nearby Judd Creek station and 1.09-inches of rainfall recorded at SeaTac Airport; the 30-year historical average for SeaTac Airport in April is 3.67-inches. Influent flow averaged 0.170 million gallons per day (MGD) in April 2024. The maximum daily flow of 0.203-MGD occurred on April 1. Peak hourly flow on April 1 was 0.280-MGD during which the average turbidity was <5-NTU. Effluent temperature in April averaged 14.5℃, and rose from 13.6℃ to 15.5℃ over the month.

The oxidation ditch was operated at an average solids retention time[1] of 19-days. The dissolved oxygen (DO) control set-point was 0.8-mg/L. Mixed liquor TSS averaged 5,200-mg/L, and ranged from 5,100-mg/L to 5,600-mg/L. The sludge volume index, which measures the mixed liquor's settling characteristics, averaged 166-mL/g. An estimated 6,360 dry pounds of waste activated sludge was hauled to South Plant for further treatment in April.

Clarifier #1 was in service for the duration of the month. Two clarifiers are not needed during the dry season so one is removed from service for maintenance and energy savings. The UV system operated with both units in Auto.

A set of samples was collected on April 2 and April 17 for nutrient analysis. Monthly total nitrogen (TN) removal was 98%, with an average effluent TIN concentration of 0.5-mg/L (0.11-mg/L NH_3-N and 0.4-mg/L NO_2+NO_3 as N). The average daily effluent TIN load was 0.8-lbs/day as N, which results in 23-lbs of TIN as N discharged in April. The cumulative annual TIN loading is 295-lbs[2]. Effluent total phosphorus (Total-P) was 1.6-mg/L. No soda ash was added to the ditch for pH adjustment.

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[1] This is not a true solids retention time but rather a metric that is proportional to the solids retention time (the inverse of the Food to Microorganism ratio). It is used for historical consistency.

[2] As a "Permittee with a small TIN load", the Vashon Wastewater Treatment Plant does not have a numeric "action level" for annual cumulative TIN load under the Puget Sound Nutrient General Permit.

Table 1. Summary of Monthly Flow & Rain

Monthly Total Flow Volume, MG	Monthly Average Flow, MGD	Minimum Daily Flow, MGD	Maximum Daily Flow, MGD	Total Rainfall, Inches
5.099	0.170	0.144	0.203	1.58

Table 2. Summary of Monthly Compliance/Exceptions

Biochemical Oxygen Demand 5-day			Total Suspended Solids			Fecal Coliform (CFU/100 mL)	
Permit mg/L	Actual mg/L	Rem %	Permit mg/L	Actual mg/L	Rem %	Permit	Actual
30	2.9	99	30	4.4	98	200	<1.0

Table 3. Summary of Weekly Compliance/Exceptions

	Biochemical Oxygen Demand (mg/L)		Total Suspended Solids (mg/L)		Fecal Coliforms (CFU/100 mL)	
	Permit	Actual	Permit	Actual	Permit	Actual
Week 1	45	2.5	45	3.1	400	<1
Week 2	45	2.7	45	3.3	400	<1
Week 3	45	3.2	45	4.0	400	<1
Week 4	45	3.0	45	4.1	400	<1

Table 4. Summary of Effluent Nitrogen

Average NH_3 mg/L as N	Average $NO_{2+}NO_3$ mg/L as N	Average TIN[3] mg/L as N	Average TKN mg/L as N	Monthly TIN lbs as N	Annual TIN lbs as N	Average Monthly Total N removal %
<0.11	0.4	0.5[4]	1.0	23	295	98%

[3] TIN = Total Inorganic Nitrogen = NH_3 + NO_2+NO_3 (as N)

[4] Due to rounding errors, the monthly average NH_3-N and NO_2+NO_3 as N don't always add up to the monthly average TIN.