

MEMORANDUM

December 13, 2021

TO: Historical Memo

FM: Matt Macdonald

RE: Vashon Wastewater Treatment Plant – November 2021

The Vashon Wastewater Treatment Plant effluent met all water quality requirements in November 2021. Effluent Biochemical Oxygen Demand (BOD₅) averaged 3.8-mg/l and Total Suspended Solids (TSS) averaged 4.3-mg/l. BOD₅ and TSS removals were 98% and 98%, respectively. All required analytical testing was completed.

Influent flow averaged 0.254 million gallons per day (MGD) in November. A total of 12.43-inches of precipitation fell in November as measured at the Judd Creek rain gage; SeaTac airport weather station reported 10.26-inches. The maximum daily flow of 0.550-MGD occurred on November 14 resulting in a peak hourly flow of 0.774-MGD. None of the peak flow was shaved and stored in the old oxidation ditch in November; the flow rate for peak flow shaving is approximately 0.93 MGD (650 gpm). The impact of rainfall on flow can be found by comparing the average flows of October vs. November: 0.116-MGD vs. 0.254-MGD. Average effluent turbidity for the peak hour flow was <5.0-NTU. Effluent temperature ranged 12.9°C to 15.1°C in November.

The oxidation ditch was operated at an average SRT of 27-days with a control DO concentration of 0.8 mg/L. Mixed liquor TSS (MLSS) ranged from 3,900-mg/L to 4,700-mg/L (excluding a single day of 2130-mg/L explained below). Clarifier 1 was in service for the duration of the month; Clarifier 2 was put online on November 14 to prevent effluent TSS from increasing on high flow days. On Friday November 19, an imbalance in RAS flow from the two in-service clarifiers caused sludge to begin accumulating in Clarifier 2. This shifted solids from the oxidation ditch into the clarifier and led to a measured oxidation ditch TSS of 2130-mg/L on Monday November 22 when the issue was identified by operations. Manually balancing the RAS shifted sludge blanket solids in Clarifier 2 back to the oxidation ditch and the oxidation ditch TSS was back up to 4,650-mg/L on November 24. To prevent this issue from occurring again, a new RAS pumping strategy controlling flow rather than pump speed is being developed.

The sludge volume index (SVI) – which measures the MLSS's settling characteristics – averaged 116-mL/g and increased over the month to a high of 140-mL/g. An estimated 1,900 dry pounds of waste activated sludge were hauled to South Plant for further treatment in November.

The UV system operated with both stages in AUTO for the duration of November.

Vashon – November 2021
 Process Summary

A set of samples was collected on November 15 for nutrient and alkalinity analysis. Total nitrogen (TN) removal was 72%, with an effluent total inorganic nitrogen (TIN) level of 4.3-mg/L (<0.1-mg/L NH₃-N and 4.2-mg/L NO₂+NO₃ as N). Effluent phosphorus (P) was 0.8-mg/L, resulting in a Total-P removal of 67%. A total of 300 lbs of soda ash was added to the ditch in November for pH adjustment. Flow averaged 0.339 MGD on the date of sampling – the tail end of a 5-day storm which significantly diluted the influent nutrient concentrations and caused atypically high effluent nutrient TIN loading, despite the low effluent TIN concentration.

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
7.62	0.254	0.121	0.550	12.43

Table 2. Summary of Monthly Compliance/Exceptions

Biochemical Oxygen Demand 5-day			Total Suspended Solids			Fecal Coliform (no./100 mL)	
Permit mg/L	Actual mg/L	Rem %	Permit mg/L	Actual mg/L	Rem %	Permit	Actual
30	3.8	99	30	4.3	98	200	E0.6

Table 3. Summary of Weekly Compliance/Exceptions

	Biochemical Oxygen Demand (mg/L)		Total Suspended Solids (mg/L)		Fecal Coliforms (Organisms/100 mL)	
	Permit	Actual	Permit	Actual	Permit	Actual
Week 1	45	5.4	45	5.4	400	<1.0
Week 2	45	5.3	45	6.4	400	E0.6
Week 3	45	2.2	45	2.9	400	E0.8
Week 4	45	2.5	45	2.6	400	E0.8