

## **APPENDIX D**

### Treatment Process Design Information and Calculations

## DILLINGHAM LAGOON STUDY

2020

	variable - enter value for calculated fields
	assumed values used in report

**BESC #:** 32200002 (D. Beiswenger PM)

**SCOPE:** Provide an engineering report to CRW on alternative wastewater system locations for the City of Dillingham, to be part of a Lagoon Alternative Study funded by the Denali Commission.

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**DILLINGHAM LAGOON - CITY CRITERIA**

**POPULATION ESTIMATES**

2018 Population - Summer	7,000	Based on conversations with City.
2018 Population - Winter	2,382	DCCED Community Database.
2018 Service Connections	235	
2034 Population Estimate	2,625	Source: Alaska Department of Labor and Workforce Development, 2016. Northern Economics, 2016.
Assumed growth rate (%)	0.90	Assumed growth rate (US Census 2018 growth rate = 1.32%, avg growth rate over 2011-2018 = 0.4%)
Design Life	25	
Design Year	2045	
Design Population	2,980	Pop Future = Pop Present * (1 + Growth Rate)^periods

**WASTEWATER DISCHARGE RATES**

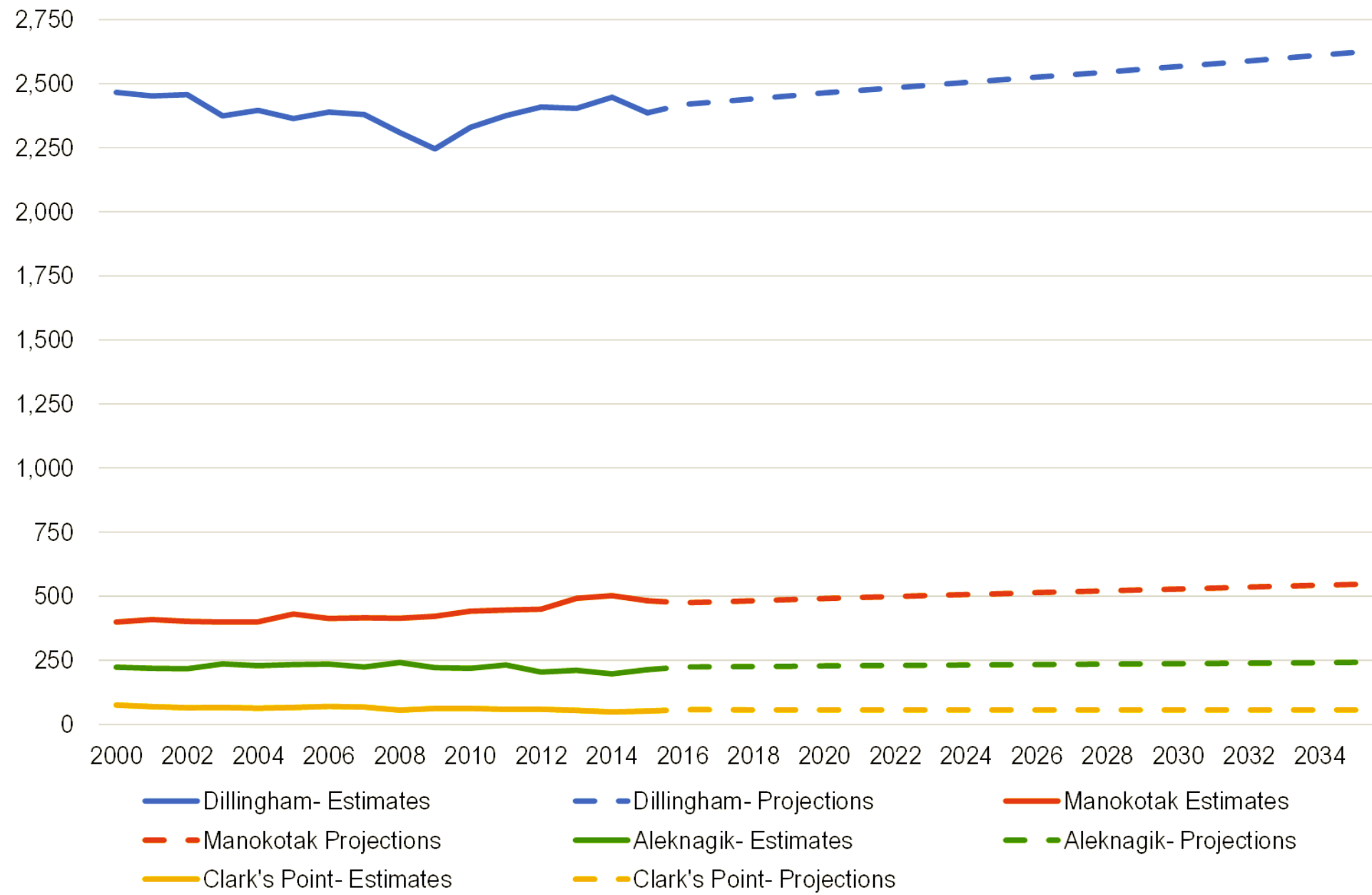
City wastewater flow is from a 2 cell aerated lagoon and includes piped wastewater from City services and dumped wastewater from haul trucks ( primarily summer dumping). Dumping is estimated at 1,800,000 gallons per year (2019).

2018 Max Permitted City Wastewater Discharge Rate	273,000 gallons / day	Based on permit limit for lagoon under GP AKG573004, issued Sept 1, 2018, expires 2023.
2016 Max City Wastewater Discharge Rate	169,727 gallons / day	ECHO Data Download
2017 Max City Wastewater Discharge Rate	142,667 gallons / day	
2018 Max City Wastewater Discharge Rate	126,646 gallons / day	
3-Year Average City Wastewater Discharge Rate	146,347 gallons / day	
Estimated Hospital Wastewater Flow	10,000 gallons / day	Based on google earth dimensions, and typical facultative lagoon sizing criteria (see Hospital tab)
2018 Wastewater flow per capita	53 gpcpd	Based on 2018 resident population and 2018 flow rate
3-year Avg Wastewater flow per capita	61 gpcpd	Based on 2018 resident population and 3-year average flow rate
2034 Daily wastewater flow estimate	161,276 gallons / day	based on avg per capita wastewater rate and projected population for 2034
2045 Daily wastewater flow estimate	183,089 gallons / day	based on avg per capita wastewater rate and projected population for 2045
Design Flow = max permitted flow	273,000 gallons / day	Assume max permitted flow rate to be conservative. Allows for higher flows during fishing season.

**INFLUENT WASTEWATER QUALITY**

(All data from ECHO data download)

2016 BOD AVG MONTHLY	163 mg/L	Assume worst case BOD
2017 BOD AVG MONTHLY	146 mg/L	
2018 BOD AVG MONTHLY	145 mg/L	
3-Year Average	151 mg/L	
2016 BOD AVG MONTHLY	230 pounds/day	
2017 BOD AVG MONTHLY	172 pounds/day	
2018 BOD AVG MONTHLY	157 pounds/day	
3-Year Average	186 pounds/day	=0.0781 #/day per person =0.001273233 #/day per gall WW



## 2019 DILLINGHAM LAGOON UPGRADE DESIGN CRITERIA

The current 2-cell aerated lagoon with surface water discharge.

### POPULATION

DILLINGHAM POPULATION - SUMMER	7,000
DILLINGHAM POPULATION - WINTER	2,250
WASTEWATER SERVICE CONNECTIONS	235

### LAGOON

AVERAGE WASTEWATER FLOW RATE	150,000 GALLONS PER DAY
NUMBER OF CELLS	2
AVERAGE LAGOON AREA (PER CELL)	1.5 ACRES
LAGOON DEPTH	18 FEET
LAGOON FREEBOARD	3 FEET
LAGOON VOLUME (TOTAL)	9,000,000 GALLONS
AVERAGE RESIDENCE TIME	60 DAYS
AVERAGE INFLUENT BIOCHEMICAL OXYGEN DEMAND (BOD)	150 MG/L
AVERAGE INFLUENT TOTAL SUSPENDED SOLIDS (TSS)	140 MG/L
AVERAGE BOD LOADING	125 POUNDS/ACRE DAY

### HAULED WASTEWATER

MAX SPRING / SUMMER / FALL MONTHLY HAUL	120,000 GALLONS PER MONTH
TOTAL SPRING / SUMMER / FALL HAUL (6 MONTHS)	720,000 GALLONS
MAX WINTER MONTHLY HAUL	14,000 GALLONS PER MONTH
TOTAL WINTER HAUL (6 MONTHS)	84,000 GALLONS
MAX DAILY HAUL (SUMMER)	7,500 GALLONS PER DAY

### PERMIT

STATE OF ALASKA GENERAL WASTEWATER PERMIT	AKG573004
DATE ISSUED	9/1/2018
DATE EXPIRES	8/31/2023

### EFFLUENT WASTEWATER PERMIT LIMITS\*

\*PARTIAL LISTING OF KEY CRITERIA - SHADED CRITERIA BASED ON CURRENT MIXING ZONE

MAXIMUM FLOW	273,000 GALLONS PER DAY
PH	6-9
MINIMUM DISSOLVED OXYGEN (DO)	2 MG/L
EFFLUENT MAXIMUM AVERAGE BOD (MONTHLY)	30 mg/L
EFFLUENT MAXIMUM AVERAGE BOD (MONTHLY)	68 lbs/day
EFFLUENT MAXIMUM AVERAGE TSS (MONTHLY)	45 mg/L
EFFLUENT MAXIMUM AVERAGE TSS (MONTHLY)	103 lbs/day
EFFLUENT MAXIMUM AVERAGE FECAL COLIFORM (MONTHLY)	200 FC/100 mL

## KANAKANAK HOSPITAL LAGOON

The hospital currently utilized a two cell, facultative lagoon. The last cell is a percolative cell. The current permit (2006DB0052) has been administratively extended since 2011. The following estimates are based on Google Earth and hospital documentation. expiration.

### Criteria from 2014 DOWL Feasability Study:

Perc Cell Permit	2006DB0052	administratively extended
Discharge Limit		21,000 gpd
2000 Population	people/day	300
2010 Staff	people/day	175 references master plan info
2020 Design Population	people/day	480 (pg 5 of report)
2025 Staff	people/day	324 references master plan info
2014 Residents	people/day	70
2025 Residents	people/day	78
2034 Total Pop	people/day	402 (pg 7 of report )
Staff Use Rate	GPD/person	19
Resident Use Rate	GPD/person	150
Number of Cells		2
Total Lagon Surface Area	Acres	2.6 Both cells
Wastewater Depth	Feet	7
Freeboard	Feet	2
2014 Avg Flow Rate	GPD	13,808 (also references 13,000 in report)
2014 Max Flow Rate	GPD	31,758 with assumed peaking factor
2032 Avg Flow Rate	GPD	17,856 listed as annual average
2031 Max Flow Rate	GPD	41,069 with peaking factor
Cell 1 Detention Time	days	140 facultative cell
Cell 2 Detention Time	days	90 perc cell
Cell 2 permeability	feet/minute	$10^{-5}$ - $10^{-4}$ assumed

All wastewater quality characteristics (BOD, TSS ...) were in report assumed. No testing.

Estimated hospital lagoon has a current daily flow rate of about 8 - 10,000 gpd based on the above. Bryan Reed, with the hospital, confirmed a current use rate 10,000 - 13,000 gpd based on water meters.

## TREATMENT ALTERNATIVE: DEFEND IN PLACE - EXISTING LAGOON

### TREATMENT OBJECTIVE

Meet 2018 permit authorization limits, with room for additional treatment if needed. Potential for increased stringency for ammonia and bacteria limits (see permit tab). Assume that 2019 planned lagoon upgrades (new aeration and baffles and truck dump pond) are completed.

The following criteria are summarized from the DLG Lagoon tab .

### 2045 AERATED LAGOON SIZING CRITERIA

Max Permitted Flow Rate	273,000 gallons / day
Max Estimated DLG Flow Rate	185,000 gallons /day
Influent BOD concentration	150 mg/L
Influent TSS	140 mg/L
Per Capita BOD	0.0781 pounds /day /person
Avg BOD / gallon	0.001273 pounds /day /gallon
Estimated BOD	236 pounds /day
Average Residence Time	60 days
Maximum Recommended Loading Rate	160 pounds BOD/acre day
Estimated Loading Rate	95 pounds BOD/acre day
Lagoon Wastewater Depth	15 feet
Freeboard	3 feet
Max Total Lagoon Depth	18 feet
Total Lagoon Cells	2
Total Surface Area	3 acres
Blower Design Airflow	385 scfm
Fine Bubble Diffusers	35

## TREATMENT ALTERNATIVE: MEMBRANE BIO-REACTOR (MBR)

### TREATMENT OBJECTIVE

Meet wastewater needs of the City of Dillingham in a centralized Membrane Bio-reactor (MBR) / activated sludge system, centrally located to the City of Dillingham. The current outfall would continue to be used to discharge treated wastewater. Minimal changes/expansion of the wastewater collection systems would be needed with this option. The MBR would be located behind the current City Maintenance Shop, and would be readily accessible to workers.

### TRUCK DUMP STATION

Insulated Tank                      10,000 gallons

### MBR SIZING CRITERIA

Max Permitted Flow Rate            273,000 gallons / day  
Max Estimated DLG Flow Rate       185,000 gallons /day  
Influent BOD concentration        150 mg/L  
Influent TSS                            140 mg/L

Peaking Factor                        4  
Average Flow                            190 gpm  
Peak Flow                                758 gpm  
    15,167 gph

**Estimated Equalization Tank Volume**    150,000 gallons  
    20,053 ft<sup>3</sup>  
Tank Diameter                            30 ft  
Resulting Tank Height                 28 ft

**Bioreactor Aertion Tank Volume**        15,000 gallons  
    2,005 ft<sup>3</sup>  
Tank Diameter                            16 ft  
Resulting Tank Height                 10 ft

#### **Sludge Storage**

Sludge Rate                            50 pounds / day  
Max Storage                            8 months  
Sludge Storage Volume                12,000 pounds  
    2,000 gallons  
    267 ft<sup>3</sup>  
Tank Diameter                            8 ft  
Resulting Tank Height                 5 ft

Blower Design Airflow                350 scfm



## TREATMENT ALTERNATIVE: NEW AERATED LAGOON

### TREATMENT OBJECTIVE

Meet 2018 permit authorization limits, with room for additional treatment if needed. Potential for increased stringency for ammonia and bacteria limits (see permit tab). This alternative would require a significant expansion of the sewer collection line. However, it would provide expanded development opportunities, provide greater separation distance to the airport, and be more available to meet possible future needs of the hospital area (the hospital utilizes a private, percolative lagoon that is currently being upgraded).

### TRUCK DUMP STATION

Insulated Tank                      10,000 gallons

### AERATED LAGOON SIZING CRITERIA

Permitted Flow Rate	273,000 gallons / day
	1,033,417 L / day
Influent BOD concentration	150 mg/L
	0.00033069 #/L
2045 Estimated Dillingham Flow	185,000 gallons / day
2045 Estimated Hospital Flow	50,000 gallons / day
Total 2045 Estimated Flow	235,000 gallons / day
	889,571 L / day
# BOD Generated	294 # / day
Recommended Max Loading Rate	160 pounds BOD/acre day
Lagoon Wastewater Depth	12 feet
Freeboard	3 feet
Max Total Lagoon Depth	15 feet
Estimated area needed	1.84 acres
Assume Aerated Cell	2.75 acres
Design Loading Rate	107 pounds BOD/acre day
Polishing Cell	1.00 acre
Residence Time at Max flow (both cells aeration)	81 days
	44 days
Residence Time at Max flow	
Total Surface Area	3.75 acres
Blower Design Airflow	471 scfm
Fine Bubble Diffusers	43

### BAFFLE DESIGN CALCULATIONS

Max Flow                      273,000 gpd  
   189.58 gpm  
   36,495 cfd  
   0.4224 cfs

Max Allowed Velocity    0.0656168 fps  
   30 gpm/sq ft

**CELL 1**

# Windows	2
Window Height	20 inches
Window Length	28 inches
Window Area	560 sq in
	3.89 sq ft
Max Velocity	0.05430791 fps
	24.37 gpm/sq ft

**CELL 2**

# Windows	1
Window Height	30 inches
Window Length	36 inches
Window Area	1080 sq in
	7.50 sq ft
Max Velocity	0.05631931 fps
	25.28 gpm/ sq ft

## TREATMENT ALTERNATIVE: MOVING BED BIO REACTOR (MBBR)

### TREATMENT OBJECTIVE

Meet 2018 permit authorization limits, with room for additional treatment if needed. Potential for increased stringency for ammonia and bacteria limits (see permit tab). This system could be centrally located adjacent to the current City Maintenance Shop, and would be readily accessible to workers. The current outfall would continue to be used to discharge treated wastewater. Minimal changes/expansion of the wastewater collection systems would be needed with this option.

### TRUCK DUMP STATION

Insulated Tank 10,000 gallons

### MBBR SIZING CRITERIA

Max Permitted Flow Rate	273,000 gallons / day
Max Estimated DLG Flow Rate	185,000 gallons /day
Influent BOD concentration	150 mg/L
Influent TSS	140 mg/L

Peaking Factor	4
Average Flow	190 gpm
Peak Flow	758 gpm
	15,167 gph

<b>Estimated Equalization Tank Volume</b>	150,000 gallons
	20,053 ft <sup>3</sup>
Tank Diameter	30 ft
Resulting Tank Height	28 ft

### **Dissolved Air Flotation Bio-reactor**

Number of DAF Trains	2
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BOD Removal Zone Diameter	12 ft
BOD Removal Zone Height	15 ft
BOD Gallons	12,690 gallons
Nitrification Zone Diameter	24 ft
Nitrification Zone Height	15 ft
Nitrification Gallons	50,758 gallons
DAF Volume (ea train)	63,448 gallons
TOTAL DAF VOL (ALL TRAINS)	126,896 gallons

### **Sludge Storage**

Sludge Rate	15.00 pounds / day
Max Storage	8 months
Sludge Storage Volume	3,600 pounds
	537 gallons
	72 ft <sup>3</sup>
Tank Diameter	6 ft
Resulting Tank Height	3 ft

## DILLINGHAM LAGOON PERMIT AND KEY PERMIT LIMITS

Oct-18

### PERMIT

<http://dec.alaska.gov/Applications/Water/WaterPermitSearch/Detail.aspx?id=17355&v=1>

AKG573004 9/1/2018 Date Issued

8/31/2023 Date Expires

### LAGOON GENERAL PERMIT DISCHARGE, WITH DILLINGHAM AUTHORIZATION LIMITS

(at effluent pipe,with assumed mixing zone )

Partial listing of key limits

Flow	273,000 gallons per day	MAX DAILY
pH	6-9	
Dissolved Oxygen (DO)	2 mg/L	MIN
Biochemical Oxygen Demand (BOD)	30 mg/L	AVG MONTHLY
	68 lbs/day	AVG MONTHLY
	45 mg/L	AVG WEEKLY
	103 lbs/day	AVG WEEKLY
	60 mg/L	MAX DAILY
	137 lbs/day	MAX DAILY
Total Suspended Solids (TSS)	45 mg/L	AVG MONTHLY
	103 lbs/day	AVG MONTHLY
	65 mg/L	AVG WEEKLY
	148 lbs/day	AVG WEEKLY
Fecal Coliform Bacterial (FC)	200 FC/100 mL	AVERAGE MONTHLY
	800 FC/100 mL	MAX DAILY



## Effluent Limit Exceedances Report

DILLINGHAM WWTP, DILLINGHAM, AK, 99576

**Facility Information**

NPDES (National Pollutant Discharge Elimination System) ID: AKG573004  
 FRS (Facility Registry Service) ID: 110055981362  
 Other NPDES (National Pollutant Discharge Elimination System) IDs associated with this FRS (Facility Registry Service) ID: AK0021873, AKG570018  
 TRI (Toxics Release Inventory) ID(s): None  
 Major/Non-Major Indicator: Non-Major  
 Facility Type: POTW  
 Latitude: 59.043555  
 Longitude: -158.452308  
 4-Digit SIC (Standard Industrial Classification) Code: --  
 6-Digit NAICS (North American Industry Classification System) Code: --

**Permit Information**

Permit Status: Effective  
 Permit Issuance: STATE OF ALASKA  
 Original Issue Date: 08/01/2013  
 Last Issue Date: 09/01/2018  
 Permit Effective Date: 09/01/2018  
 Permit Expiration Date: 08/31/2023  
 DMR Signer: --  
 Approved Pretreatment Program: No  
 Combined Sewer Overflow (CSO) Outfall: No

**Enforcement Information**

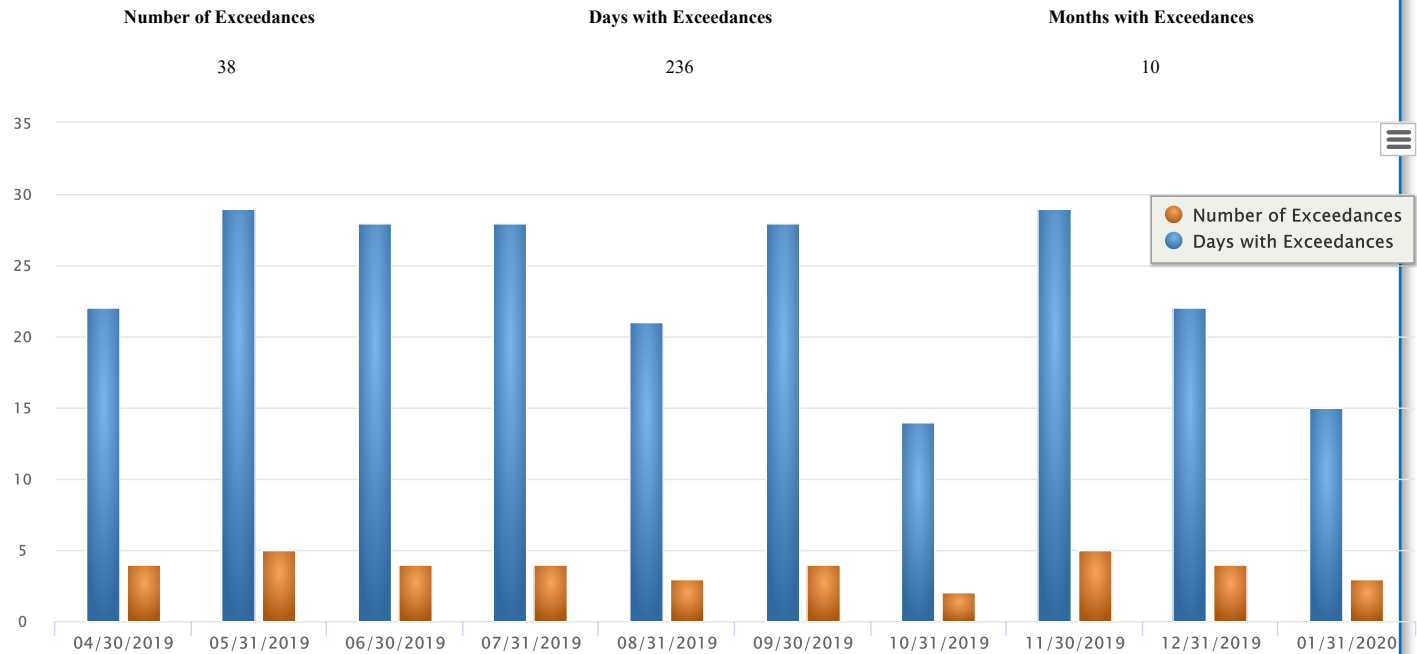
Last Formal Enforcement Action: --  
 Civil Enforcement Case Number: --  
 DOJ/Court Docket Number: --  
 Court Docket Number: --  
 Type Description: --

**Receiving Watershed Information**

Water Body Name (from GNIS): Nushagak River  
 Watershed Name and Number (12-Digit HUC): Not found (Not found)  
 Listed for Impairment: No  
 Impairment Class: Not provided.

Adjust Date Range: Apr. 2019 → Mar. 2020

**Total Exceedance Counts**



**Exceedance Counts by Pollutant**

Parameter Code	Description	Limit Type	Contains Potential Outliers?	Number of Exceedances	Days with Exceedances
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Parameter Code	Description	Limit Type	Contains Potential Outliers?	Number of Exceedances	Days with Exceedances
00310	BOD, 5-day, 20 deg. C	WKLY AVG		18	126
00530	Solids, total suspended	WKLY AVG		15	105
74055	Coliform, fecal general	DAILY MX		5	5

Exceedance Details

Date	Outfall	Parameter	Average Daily Flow (MGD)	Limit Type	DMR Value	Limit Value	Percent Exceedance	Load over Limit (lb/period)	Load over Limit (lb-eq/period)	Days per Period	Days with Exceedances
04/30/2019	001	00310 - BOD, 5-day, 20 deg. C	--	WKLY AVG	73.47 kg/d	<= 46.71 kg/d	57	--	--	30	7
04/30/2019	001	00310 - BOD, 5-day, 20 deg. C	--	WKLY AVG	181 mg/L	<= 45 mg/L	302	--	--	30	7
04/30/2019	001	00530 - Solids, total suspended	--	WKLY AVG	119 mg/L	<= 65 mg/L	83	--	--	30	7
04/30/2019	001	74055 - Coliform, fecal general	--	DAILY MX	1,270 #/100mL	<= 800 #/100mL	59	--	--	30	1
05/31/2019	001	00310 - BOD, 5-day, 20 deg. C	--	WKLY AVG	170 mg/L	<= 45 mg/L	278	--	--	31	7
05/31/2019	001	00310 - BOD, 5-day, 20 deg. C	--	WKLY AVG	89.34 kg/d	<= 46.71 kg/d	91	--	--	31	7
05/31/2019	001	00530 - Solids, total suspended	--	WKLY AVG	493 kg/d	<= 67.12 kg/d	634	--	--	31	7
05/31/2019	001	00530 - Solids, total suspended	--	WKLY AVG	940 mg/L	<= 65 mg/L	1,346	--	--	31	7
05/31/2019	001	74055 - Coliform, fecal general	--	DAILY MX	1,270 #/100mL	<= 800 #/100mL	59	--	--	31	1
06/30/2019	001	00310 - BOD, 5-day, 20 deg. C	--	WKLY AVG	111 kg/d	<= 46.71 kg/d	138	--	--	30	7
06/30/2019	001	00310 - BOD, 5-day, 20 deg. C	--	WKLY AVG	229 mg/L	<= 45 mg/L	409	--	--	30	7
06/30/2019	001	00530 - Solids, total suspended	--	WKLY AVG	167 mg/L	<= 65 mg/L	157	--	--	30	7
06/30/2019	001	00530 - Solids, total suspended	--	WKLY AVG	80.73 kg/d	<= 67.12 kg/d	20	--	--	30	7
07/31/2019	001	00310 - BOD, 5-day, 20 deg. C	--	WKLY AVG	256 mg/L	<= 45 mg/L	469	--	--	31	7
07/31/2019	001	00310 - BOD, 5-day, 20 deg. C	--	WKLY AVG	109 kg/d	<= 46.71 kg/d	133	--	--	31	7
07/31/2019	001	00530 - Solids, total suspended	--	WKLY AVG	76.64 kg/d	<= 67.12 kg/d	14	--	--	31	7
07/31/2019	001	00530 - Solids, total suspended	--	WKLY AVG	180 mg/L	<= 65 mg/L	177	--	--	31	7
08/31/2019	001	00310 - BOD, 5-day, 20 deg. C	--	WKLY AVG	47.17 kg/d	<= 46.71 kg/d	1	--	--	31	7

Date	Outfall	Parameter	Average Daily Flow (MGD)	Limit Type	DMR Value	Limit Value	Percent Exceedance	Load over Limit (lb/period)	Load over Limit (lb-eq/period)	Days per Period	Days with Exceedances
08/31/2019	001	00310 - BOD, 5-day, 20 deg. C	--	WKLY AVG	195 mg/L	<= 45 mg/L	333	--	--	31	7
08/31/2019	001	00530 - Solids, total suspended	--	WKLY AVG	168 mg/L	<= 65 mg/L	158	--	--	31	7
09/30/2019	001	00310 - BOD, 5-day, 20 deg. C	--	WKLY AVG	89.80 kg/d	<= 46.71 kg/d	92	--	--	30	7
09/30/2019	001	00310 - BOD, 5-day, 20 deg. C	--	WKLY AVG	203 mg/L	<= 45 mg/L	351	--	--	30	7
09/30/2019	001	00530 - Solids, total suspended	--	WKLY AVG	77.10 kg/d	<= 67.12 kg/d	15	--	--	30	7
09/30/2019	001	00530 - Solids, total suspended	--	WKLY AVG	175 mg/L	<= 65 mg/L	169	--	--	30	7
10/31/2019	001	00310 - BOD, 5-day, 20 deg. C	--	WKLY AVG	85 mg/L	<= 45 mg/L	89	--	--	31	7
10/31/2019	001	00530 - Solids, total suspended	--	WKLY AVG	102 mg/L	<= 65 mg/L	57	--	--	31	7
11/30/2019	001	00310 - BOD, 5-day, 20 deg. C	--	WKLY AVG	105 mg/L	<= 45 mg/L	133	--	--	30	7
11/30/2019	001	00310 - BOD, 5-day, 20 deg. C	--	WKLY AVG	54.88 kg/d	<= 46.71 kg/d	17	--	--	30	7
11/30/2019	001	00530 - Solids, total suspended	--	WKLY AVG	427 mg/L	<= 65 mg/L	557	--	--	30	7
11/30/2019	001	00530 - Solids, total suspended	--	WKLY AVG	224 kg/d	<= 67.12 kg/d	234	--	--	30	7
11/30/2019	001	74055 - Coliform, fecal general	--	DAILY MX	1,940 #/100mL	<= 800 #/100mL	143	--	--	30	1
12/31/2019	001	00310 - BOD, 5-day, 20 deg. C	--	WKLY AVG	103 mg/L	<= 45 mg/L	129	--	--	31	7
12/31/2019	001	00310 - BOD, 5-day, 20 deg. C	--	WKLY AVG	55.33 kg/d	<= 46.71 kg/d	18	--	--	31	7
12/31/2019	001	00530 - Solids, total suspended	--	WKLY AVG	141 mg/L	<= 65 mg/L	117	--	--	31	7
12/31/2019	001	74055 - Coliform, fecal general	--	DAILY MX	1,270 #/100mL	<= 800 #/100mL	59	--	--	31	1
01/31/2020	001	00310 - BOD, 5-day, 20 deg. C	--	WKLY AVG	88 mg/L	<= 45 mg/L	96	--	--	31	7
01/31/2020	001	00530 - Solids, total suspended	--	WKLY AVG	99 mg/L	<= 65 mg/L	52	--	--	31	7
01/31/2020	001	74055 - Coliform, fecal general	--	DAILY MX	2,000 #/100mL	<= 800 #/100mL	150	--	--	31	1

**SYSTEM DESIGN CALCULATIONS: WASTEWATER  
OPERATOR CERTIFICATION LEVEL ESTIMATE**

Based on 18 AAC 74 (11/26/16) - Contact DEC Op Cert for official determination.

**Treatment Certification Level Required**

- Wastewater Stabilization Pond Lagoon, no aeration, with 1-30 pts
- Wastewater Treatment 1: 1-30 points
- Wastewater Treatment 2: 31-55 points
- Wastewater Treatment 3: 56-75 points
- Wastewater Treatment 4: 76 points +

**SYSTEM:** 2019 DLG Aerated Lagoon  
**DATE:** Oct-19

PROCESS TYPE	PROCESS VALUE	POINTS
Delete or add duplicate lines for processes as needed:		
Size/Peak Day Capacity (gpd)	100,001 - 500,000	9
Pretreatment	None	0
Primary Treatment	None	0
Secondary Treatment	Aerated lagoon	8
Advanced Treatment	None	0
In-Plant Odor Control	None	0
Sludge Thickening / Dewatering	None	0
Sludge Stabilization and Conditioning	None	0
Solids Disposal	Off-site disposal	1
Disinfection	None	0
Effluent Discharge	Plant pumping of effluent	2

<b>Total WW Point Estimate:</b>	<b>20</b>	<b>WW Treatment Level 1</b>
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**SYSTEM DESIGN CALCULATIONS: WASTEWATER  
OPERATOR CERTIFICATION LEVEL ESTIMATE**

Based on 18 AAC 74 (11/26/16) - Contact DEC Op Cert for official determination.

**Treatment Certification Level Required**

- Wastewater Stabilization Pond Lagoon, no aeration, with 1-30 pts
- Wastewater Treatment 1: 1-30 points
- Wastewater Treatment 2: 31-55 points
- Wastewater Treatment 3: 56-75 points
- Wastewater Treatment 4: 76 points +

**SYSTEM:  
DATE:**

**DLG Moving Bed Bioreactor  
Oct-19**

PROCESS TYPE	PROCESS VALUE	POINTS
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Delete or add duplicate lines for processes as needed:

Size/Peak Day Capacity (gpd)	100,001 - 500,000	9
Pretreatment	None	0
Primary Treatment	None	0
Secondary Treatment	Activated bio-filter with aeration	10
Advanced Treatment	Polishing pond or effluent flow equalization	2
In-Plant Odor Control	None	0
Sludge Thickening / Dewatering	None	0
Sludge Stabilization and Conditioning	Chemical stabilization with lime	3
Solids Disposal	Off-site disposal	1
Disinfection	Liquid/powdered hypochlorites	3
Effluent Discharge	Plant pumping of effluent	2

<b>Total WW Point Estimate:</b>	<b>30</b>	<b>WW Treatment Level 1</b>
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**SYSTEM DESIGN CALCULATIONS: WASTEWATER  
OPERATOR CERTIFICATION LEVEL ESTIMATE**

Based on 18 AAC 74 (11/26/16) - Contact DEC Op Cert for official determination.

**Treatment Certification Level Required**

- Wastewater Stabilization Pond Lagoon, no aeration, with 1-30 pts
- Wastewater Treatment 1: 1-30 points
- Wastewater Treatment 2: 31-55 points
- Wastewater Treatment 3: 56-75 points
- Wastewater Treatment 4: 76 points +

**SYSTEM:  
DATE:**

**DLG Membrane Filtration  
Oct-19**

PROCESS TYPE	PROCESS VALUE	POINTS
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Delete or add duplicate lines for processes as needed:

<b>Size/Peak Day Capacity (gpd)</b>	100,001 - 500,000	9
<b>Pretreatment</b>	None	0
<b>Primary Treatment</b>	None	0
<b>Secondary Treatment</b>	Activated Sludge: SBR, ICEAS, or other batch	20
<b>Advanced Treatment</b>	Membrane filtration, integrated systemd	12
<b>In-Plant Odor Control</b>	None	0
<b>Sludge Thickening / Dewatering</b>	None	0
<b>Sludge Stabilization and Conditioning</b>	Unheated anaerobic digestion	8
<b>Solids Disposal</b>	Off-site disposal	1
<b>Disinfection</b>	Liquid/powdered hypochlorites	3
<b>Effluent Discharge</b>	Plant pumping of effluent	2

<b>Total WW Point Estimate:</b>	<b>55</b>	<b>WW Treatment Level 2</b>
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# SYSTEM DESIGN CALCULATIONS: WASTEWATER

## OPERATOR CERTIFICATION LEVEL ESTIMATE

Based on 18 AAC 74 (11/26/16) - Contact DEC Op Cert for official determination.

### Treatment Certification Level Required

Wastewater Stabilization Pond Lagoon, no aeration, with 1-30 pts

Wastewater Treatment 1: 1-30 points

Wastewater Treatment 2: 31-55 points

Wastewater Treatment 3: 56-75 points

Wastewater Treatment 4: 76 points +

**SYSTEM:** DLG Aerated Lagoon with added treatment  
**DATE:** Oct-19

PROCESS TYPE	PROCESS VALUE	POINTS
Delete or add duplicate lines for processes as needed:		
Size/Peak Day Capacity (gpd)	100,001 - 500,000	9
Pretreatment	None	0
Primary Treatment	None	0
Secondary Treatment	Aerated lagoon	8
Advanced Treatment	Nitrification by extended aeration only	2
In-Plant Odor Control	None	0
Sludge Thickening / Dewatering	None	0
Sludge Stabilization and Conditioning	None	0
Solids Disposal	Off-site disposal	1
Disinfection	Liquid/powdered hypochlorites	3
Effluent Discharge	Plant pumping of effluent	2

**Total WW Point Estimate: 25    WW Treatment Level 1**

**WASTEWATER DISCHARGE LIMITS**

Oct 2019

DISCHARGE LIMIT COMPARISON - CURRENT AUTHORIZATION VS. NEW AERATED LAGOON VS. PUBLICLY OWNED TREATMENT WORKS, WITH DISCHARGE TO NUSHAGAK RIVER (FRESH WATER DISCHARGE). PARTIAL LISTING OF KEY LIMITS.

**CURRENT PERMIT AUTHORIZATION**

<http://dec.alaska.gov/Applications/Water/WaterPermitSearch/Detail.aspx?id=17355&v=1>

Currently authorized under 2018 lagoon GP, with assigned authorization limits based on assumed mixing zone

AKG573004

9/1/2018 Date Issued

8/31/2023 Date Expires

	2018 LAGOON AUTHORIZATION (AKG573004)	LAGOON GENERAL PERMIT (AKG573000)	POTW GENERAL PERMIT (AKG572000)		
Flow*	273,000	<1,000,000	<1,000,000	gallons per day	MAX DAILY
pH	6 - 9	6.5 - 8.5	6.5 - 8.5		
Total Residual Chlorine (TRC)	-	0.011		mg/L	AVG MONTHLY
	-	0.019		mg/L	MAX DAILY
Dissolved Oxygen (DO)	2 (min)	7 - 17	7 - 17	mg/L	DAILY MIN - MAX, FRESH WATER
Biochemical Oxygen Demand (BOD)	30	30	30	mg/L	AVG MONTHLY
	68	**	**	lbs/day	AVG MONTHLY
	45	45	45	mg/L	AVG WEEKLY
	103	**	**	lbs/day	AVG WEEKLY
	60	60	60	mg/L	MAX DAILY
	137	**	**	lbs/day	MAX DAILY
% BOD Removal	65	65	85	%	
Total Suspended Solids (TSS)	45	45	30	mg/L	AVG MONTHLY
	103	**	**	lbs/day	AVG MONTHLY
	65	65	45	mg/L	AVG WEEKLY
	148	**	**	lbs/day	AVG WEEKLY
	-	-	60	mg/L	MAX DAILY
	-	-	**	lbs/day	MAX DAILY
% TSS Removal	65	85	85	%	
Fecal Coliform Bacterial (FC)	200	20	20	FC/100 mL	AVERAGE MONTHLY
	800	40	40	FC/100 mL	MAX DAILY
E.coli (fresh water)	Report	Report	126	cfu/100 mL	AVERAGE MONTHLY
	Report	Report	410	cfu/100 mL	MAX DAILY
Total Ammonia as Nitrogen	-	-	Report	mg/L	MAX DAILY

\*Future flow is assumed to be no more than current permit limit. The current average flow is substantially less. The general permit limits are for the flow category from 250,000 - 1,000,000 GPD.

\*\*Mass loading limits, not shown here, will be individually assessed and required in the discharge authorization for the General Permit.