2021 City of Kelowna Wastewater Treatment Annual Report

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Table of Contents

Executive Summary

The Kelowna Wastewater Treatment Facility (WWTF) is a Level IV Environmental Operators Certification program (EOCP) designated treatment facility - owned and operated by the City of Kelowna (COK). The facility is located at 951 Raymer Ave., Kelowna BC and has been in operation at this site since 1913. It currently utilizes modified Bardenpho technology to biologically reduce and remove nutrients from the sewage stream. It has a rated capacity of 70,000 m^3/day (70 MLD) and serves an equivalent population of approximately 130,000. The treatment facility discharges into Lake Okanagan and is operated under Certificate Approval 12211 (Appendix F) in accordance with BC Environmental Management Act.

Inflow and Discharge Volumes

The total influent flow to the plant in 2021 was 12,877,200 m^3 or an average of 35,280 m^3/day, which represents a 1.8% decrease relative to 2020. The equivalent daily rate of discharge was below the estimated rate of effluent discharge listed in the operational certificate and used to calculate the permit fee (Table 1).

	Certificate Discharge Flow	2020 Treated Effluent Flow
Discharge Flow Value - Daily Average	42,747 m^3/day	35,280 m^3/day

Table 1. Daily effluent flow relative to certificate

Effluent Quality Standards

The WWTF monitored all effluent quality standards as regulated under the plant's Operational Certificate of Approval. Wastewater treatment produced the following effluent quality in 2021:

	Operational Certificate Limit	2020 Treated Effluent
Total Suspended Solids (TSS) - Daily Maximum	10 mg/L	All daily max. <10 mg/L
Biochemical Oxygen Demand (BOD) - Daily Maximum	10 mg/L	All daily max. <10 mg/L
Total Phosphorus (TP) - Annual Average	0.25 mg/L	0.19 mg/L
Total Phosphorus (TP) - Daily Max. Concentration	2.0 mg/L	All daily max. <2.0 mg/L
Total Nitrogen (TN) - Annual Average	6.0 mg/L	5.3 mg/L
Total Nitrogen (TN) - Daily Max. Concentration	10.0 mg/L	No excursions of >10 mg/L
Fecal Coliforms – Daily Max. Geometric Mean	50 CFU/100ml	All daily max. < 50 CFU/100ml

Table 2. Effluent quality standards relative to permit

Year End Effluent Composite Results

Analytical results for one-time grab samples, 24-hour composite, and 7-day composite effluent results are reported to the Ministry of Environment on a monthly basis and assessed for compliance and trending purposes. Monitored parameters include TP, Ortho-Phosphorus, TN, Nitrates, Ammonia, Total Kjeldahl Nitrogen, Organic Nitrogen, BOD, TSS, pH, and Total and Fecal Coliform (Table 3).

Year End Report - Water and Wastewater Division Kelowna Wastewater Treatment Facility - ME #12211 - 2021																				
Date	Influent Flow		Final Effluent Composite													Effluent Grab				
			24 hour composite													pH		Bacteria*		
			Ortho P			Total P			NO3	NH3	TKN	Org N	Total N	BOD	Solids					
	Total	Avg	Avg		Total	Avg		Total										Total	Faecal	e.Coli
	ML	MLD	mg/L	kg/day	kg	mg/L	kg/day	kg	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	min	max	cfu/100 mL		
Jan	1079	34.80	0.04	1.39	43	0.14	5.00	155	4.81	0.83	2.73	1.90	7.45	2.1	1.3	6.63	6.78	2.1	<1	<1
Feb	1013	36.17	0.05	1.81	51	0.16	5.86	164	3.78	1.17	2.99	1.82	6.68	1.1	1.6	6.35	6.51	2.1	<1	<1
Mar	1056	34.06	0.03	1.02	32	0.15	5.14	159	3.62	0.46	2.30	1.84	6.41	2.2	2.2	6.29	6.46	4.4	<1	<1
Apr	1018	33.93	0.03	1.02	31	0.16	5.33	160	3.58	0.34	2.05	1.71	5.86	2.9	1.8	6.30	6.45	16.3	1.0	<1
May	1085	35.00	0.13	4.55	141	0.26	8.96	278	3.33	0.32	1.95	1.63	5.25	2.2	1.4	6.35	6.51	2.3	<1	<1
Jun	1047	34.90	0.04	1.40	42	0.15	5.34	160	2.10	0.21	1.86	1.65	3.99	3.9	1.3	6.37	6.54	6.7	<1	<1
Jul	1146	38.20	0.10	3.82	115	0.23	8.60	258	1.96	0.27	1.83	1.56	3.69	1.9	1.3	6.40	6.59	1.4	<1	<1
Aug	1136	36.63	0.17	6.23	193	0.24	8.72	270	2.10	0.43	1.98	1.55	4.01	2.2	1.1	6.39	6.60	3.8	<1	<1
Sep	1080	36.02	0.07	2.52	76	0.18	6.63	199	3.03	0.38	2.06	1.68	4.88	4.3	1.6	6.39	6.60	26.8	<1	1.0
Oct	1101	35.52	0.05	1.78	55	0.16	5.75	178	3.25	0.43	1.94	1.51	4.82	2.4	1.2	6.39	6.58	29.5	1.0	<1
Nov	1060	35.34	0.07	2.47	74	0.20	7.17	215	3.52	0.83	2.52	1.69	5.17	3.8	1.2	6.38	6.51	5.8	<1	2.0
Dec	1056	34.08	0.05	1.70	53	0.22	7.57	235	3.16	1.43	3.36	1.93	5.50	3.0	2.3	6.40	6.52	6.6	<1	1.0
2021	**12,877**	**35.28**	**0.07**	**2.48**	**904**	**0.19**	**6.67**	**2432**	**3.19**	**0.59**	**2.30**	**1.71**	**5.31**	**2.7**	**1.5**	**6.39**	**6.55**	**9.0**	**1.0**	**1.3**
*indicates geometric mean																				

Table 3. Summary of monthly flow and Effluent water quality

Residual Management

1207 loads of waste activated sludge, each averaging 17,140 kg, were removed from the Kelowna WWTF in 2021 for a total of 20,688 metric tonnes, which represents a 3.2% descrease over 2020. The residual was transferred directly to the Commonage composting facility for the production of Ogogrow compost product in accordance with the Organic Matter Recycling Regulation (OMRR). A separate compliance report for the composting facility is issued to the Ministry of Environment under authorization permit #108537. A breakdown of composite moisture, solids, and metal concentrations analyzed on a monthly basis are included in Table 4.

Dewatered Sludge for Composting - 2021															
Total Solids	Moisture Content	Volatile Solids	PCB's	Potassium	Arsenic	Cadmium	Chromium	Cobalt	Copper	Mercury	Molybdenum	Nickel	Lead	Selenium	Zinc
g/L	%	g/L	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
191	80.9	141	0.0	5389	1.6	0.8	10.5	1.1	403	0.4	5.1	7.9	8.5	2.4	239

Table 4. Average monthly Biosolids composite concerntrations

Introduction

As required by the *Ministry of Environment – Operational Certificate 12211*, the COK provides the following annual report in accordance with our conditions on permit.

This report provides an overview of our service area, processing volumes, disinfection procedures, maintenance of works, staff certification program, sampling and analytical testing procedures, authorized discharges, emergency procedures, and collaborative lake monitoring as part of the Ministry Memorandum of Understanding (MOU).

The City of Kelowna's WWTF primary focus is to ensure that sanitary services are held to high standards, meets all permitting requirements and to ensure that our natural water resources are protected. For further details on the content of this report or to request additional information, please contact the City of Kelowna at 250-469-8502 or email ask@kelowna.ca.

Wastewater System Overview

Initially constructed at the City outskirts in 1913 to service a population of 10,000, the treatment plant has continually been upgraded and expanded to meet the needs of the community. The treatment facility underwent a significant, pioneering wastewater treatment conversion in 1982 to a Bardenpho process – a chemical free, biological nutrient removal process.

In 2011, the City completed a large infrastructure project to increase the capacity to treat water from 40,000 to 70,000 m^3/day, which should accommodate the City's sewer servicing needs beyond 2030 (Appendix A).

Treatment Process

On average, it takes 18-20 hours for sanitary sewage to pass through the complete treatment stages from initial screening through to final discharge. Each of the treatment steps are designed to be exclusively independent from the use of chemicals and to effectively reduce the nutrient and biological loading into receiving waters.

Preliminary Treatment

Raw sewage that enters the treatment facility is initially screened through a climbing bar screen and passed through a vortex grit removal system and the resulting grit and debris is collected, washed, dewatered, and transported to the landfill for disposal.

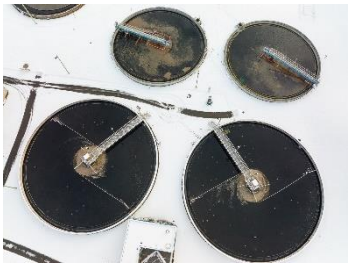
Primary Treatment

Primary clarifiers designed to separate the larger organic solids from the waste stream by gravity sedimentation. Sludge is removed from the bottom of the tanks by scrappers and pumped to Fermenter tanks. During peak flows, a steady flow is maintained by diverting excess flow into equalization basins.

Advanced Nutrient Removal

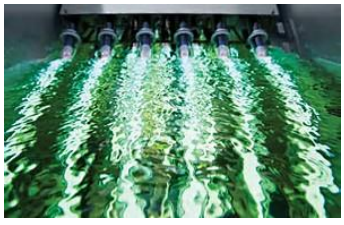
The Biological Nutrient Removal (BNR) system is a modified Bardenpho design consisting of various size bioreactors and cells that consist of three zones: anoxic, anaerobic, and aerobic which reduce ammonia and nitrate to nitrogen gas. Fermenter effluent, rich in Volatile Fatty Acids (VFA's) that aid in phosphorus removal, flows into the beginning of each reactor along with the internal recycle. Each liter that enters the reactor is recycled 4 to 6 times and eventually wasted at a rate of 2,000 m^3/day to the Dissolved Air Floatation (DAF).

Secondary Treatment



The effluent from the bioreactor then proceeds to the secondary clarifiers where the remaining larger solids settle to the bottom of the tank. The clarifiers are fitted with a return system where some of the settled solids return to the bioreactor to feed the incoming flow with bacteria while the effluent proceeds to the final tertiary treatment process.

Tertiary Treatment



Effluent is processed through a series of 10-micron disk filters to reduce remaining suspended material to below discharge limits. Filtration is followed by bacterial inactivation by effluent exposure to low pressure, medium intensity UV radiation system prior to final discharge.

Sludge Conditioning and Composting

Sludge from the primary clarifiers is thickened in fermenters and the resulting waste activated sludge from the bioreactor is further thickened in the four DAF units. The thickened sludge is then pumped separately to the dewatering building where they are blended with polymer and centrifuged into a ~15-20 % solids cake. The resulting cake is trucked to the biosolids composting site where it is mixed with wood waste and composted to create Class A soil conditioner called Ogogrow and sold to businesses, agricultural farmers, and public from the commonage and landfill sites.

Pre-Treatment

Collection System

More than 590 km of gravity sewer mains collect and convey sewage to more than 41 pump stations throughout Kelowna where wastewater is forcibly redirected through a series of gravity and forcemains to the WWTF for treatment. The Utility has an on-going asset management program designed to replace and repair damaged and leaking pipes in the sewer system - both proactively and on-demand in the collection system as well as within the treatment facility. The City uses an internationally accepted condition rating system to evaluate the condition of existing pipes, facilitated by the use of a CCTV video imaging system which, in conjunction with age considerations, establishes a replacement schedule.

Source Control

Under the authority of the Sanitary Sewer/Storm Drain Regulation Bylaw 6618-90 and the Sewerage System User Bylaw 3480, the City sets out the requirements for wastewater discharge monitoring, permitting, and enforcement. In order to minimize excessive nutrient and chemical loading from entering the treatment process, the City has a dedicated Source Control Technician who oversees a monitoring program that samples known high strength industrial and commercial business discharges. The measured concentrations are compared to bylaw discharge limits and offending industries are both educated on reduction options as well as surcharged relative to the volume of over-permitted high strength flow discharged.

<u>2021 Discharge Permit highlights</u>:

- 12 temporary discharge permits issued
- 8 active continuous discharge permits maintained
- Monitoring done semi-annually to ensure compliance with permit limits and confirm the effectiveness and efficiency of required treatment works and waste reduction measures.
- 70 permit audit sampling events
- No fines issued or spills to the sanitary collection system reported

<u>Key Manhole Sampling:</u>
System wide monitoring program continued in 2021 in order to measure and track wastewater strength; measure the concentration and loading of regulated parameters; measure the concentration of toxic substances; monitor pH and H_2S.

Three (3) consecutive 24-hour composite samples collected bi-annually from nine (9) sampling sites:

- North-East Trunk (mixed use)
- Gyro Trunk (mixed use)
- Water St Lift Station (mixed use)
- Guy St Lift Station (mixed use)
- Edwards Lift Station (Commercial/Industrial)
- Jim Bailey Lift Station (Commercial/Industrial)
- Loyd Lift Station (Commercial/Industrial)
- Morrison Lift Station (Residential)
- Birch Lift Station (Residential)

Sewer Data Logging:

City expanded the use of remote, cellular based sensors for sewer monitoring of flows, rain gauges and H_2S in 2021. These included:

- 6 Hydrogen Sulphide sensors to detect elevated sewer gas and nuisance odors
- 3 flow sensors to determine sewer flow and pipe capacity
- 3 rain gauges to determine contribution of storm water to sewer flow

These provided instant, up to date information on sewer conditions and play a vital role in staff safety and reduction in GHG emissions by reducing the number of vehicle trips required.

FOG Management:

The Source Control program has a similar mandate to monitor and enforce restrictions on the discharge of Fats, Oils, and Grease (FOG) into the drainage systems. This primarily includes the inspection of Food Service Establishments (FSE) for use and maintenance records on mandatory Grease Trap devices as per bylaw stipulation (Appendix G).

FOG Enforcement:

The focus continued on the Food Service Establishments (FSEs) sector to ensure proper management of Fats, Oil, and Grease (FOG):

- Current FOG management program reviewed at each FSE inspected
- Best Management Practice (BMP) document was provided to assist FSEs in complying with FOG control requirements
- 42 FSEs inspected

Vehicle wash operations were inspected and samples collected to test for TSS, BOD, COD, FOG, Phenolics, pH, and Metals. Actions carried out through 2021 included:

- Best Management Practice (BMP) document was provided to assist in complying with Bylaw requirements
- 13 vehicle wash operations inspected
- Requirement to keep Oil and Grease separator maintenance log
- Signage was provided for operations with self-serve wash bays in hope to deter illegal dumping

Licensing and Monitoring

Fermentation operations were inspected in 2021 to obtain production levels, wastewater strength, and pollution prevention practices currently in place.

- Operations included: micro-breweries, cideries, distilleries, kombucha producers; and cannabis infused beverage operation.
- Composite samples were collected, where possible, and tested for COD, TSS, pH, and nutrients.
- BMP and Policy documents drafted will be put in place in 2022.

As per Medical Marihuana Producer Business Licence and Regulation Bylaw, all new businesses are inspected prior to issuing a Business Licence to see if the wastewater generated could have a potential impact to the collection system.

Public Education:

- 'Your Turn' FOG cups initiative evaluation continued in 2021. Cups and educational material distributed to households within the Rose Ave Lift Station collection area (single family 500 households)
- Social marketing campaigns through social media, mail-outs, PSAs, etc. continued in 2021, focusing on educating the public on issues of improper disposal of FOG, hazardous waste, 'flushable' wipes, etc.

Water Management

The City of Kelowna continually promotes the concept of water conservation related to irrigation and consumption that returns to sewer. Although primarily designed to conserve water, this also helps limit the flow that requires treatment at the WWTF. Promotion is done through social media, website content, public events, and educational material throughout the year. Low-flow devices and recycling options are listed on our website and include toilet retro-fits, water efficient washing machines and dishwashers, low-flow showerheads, and grey water recycling.

The WWTF irrigation system was converted to use reclaimed wastewater effluent to water landscaping around the treatment plant.The effluent is treated with chlorine and routinely tested to meet Ministry water quality guidelines. The conversion of the irrigation system saved approximately 10,000,000 liters of potable water use over the course of the year.

Storm-Sanitary Interconnects

Wastewater Operations is responsible for infrastructure repair and replacement and rigorously follow-up on reports of possible storm to sanitary interconnection and infiltration issues in conjunction with the City storm drainage technician. This may involve the use of CCTV footage, smoke tests, dye tests, and sample analysis to detect the presence of high bacteria counts related to sewage.

Elevated E.coli. counts in the storm system triggered an investigation into two potential interconnections in 2021. Physical examination of the connection revealed this to be the case and was corrected.

Operations

Water Quality and Treatment Performance

Wastewater quality and flow are monitored through a series of on in-line sensors, composite samplers, and grab samples taken by operators and laboratory staff. Majority of the sample analysis is conducted in the dedicated laboratory facility on site. Total Phosphorus, Total Nitrogen, and Metals analysis is sublet to a third party accredited laboratory as per permit requirements (Appendix F). To ensure quality control, the WWTF lab participates in a biannual Canadian Association of Laboratory Accreditation (CALA) proficiency testing program and has an in-house developed quality control program that has standards for acceptable precision and accuracy of test results . All results of the Quality Control program were classified as being acceptable in 2021.

Influent Quantity and Quality

The WWFT treats wastewater converging from three primary sewage collection networks throughout the City that include the Gyro trunk, Northeast trunk and Ethel Street trunk. An average of 35,280 m^3 of influent was received on a daily basis in 2021, which was below the certificate estimate of 42,747 m^3/day (Table 1). Flow has remained relatively consistent on a year over year (YOY) basis since 2013 and well below the estimated flows listed in the Operational Certificate (Figure 1).

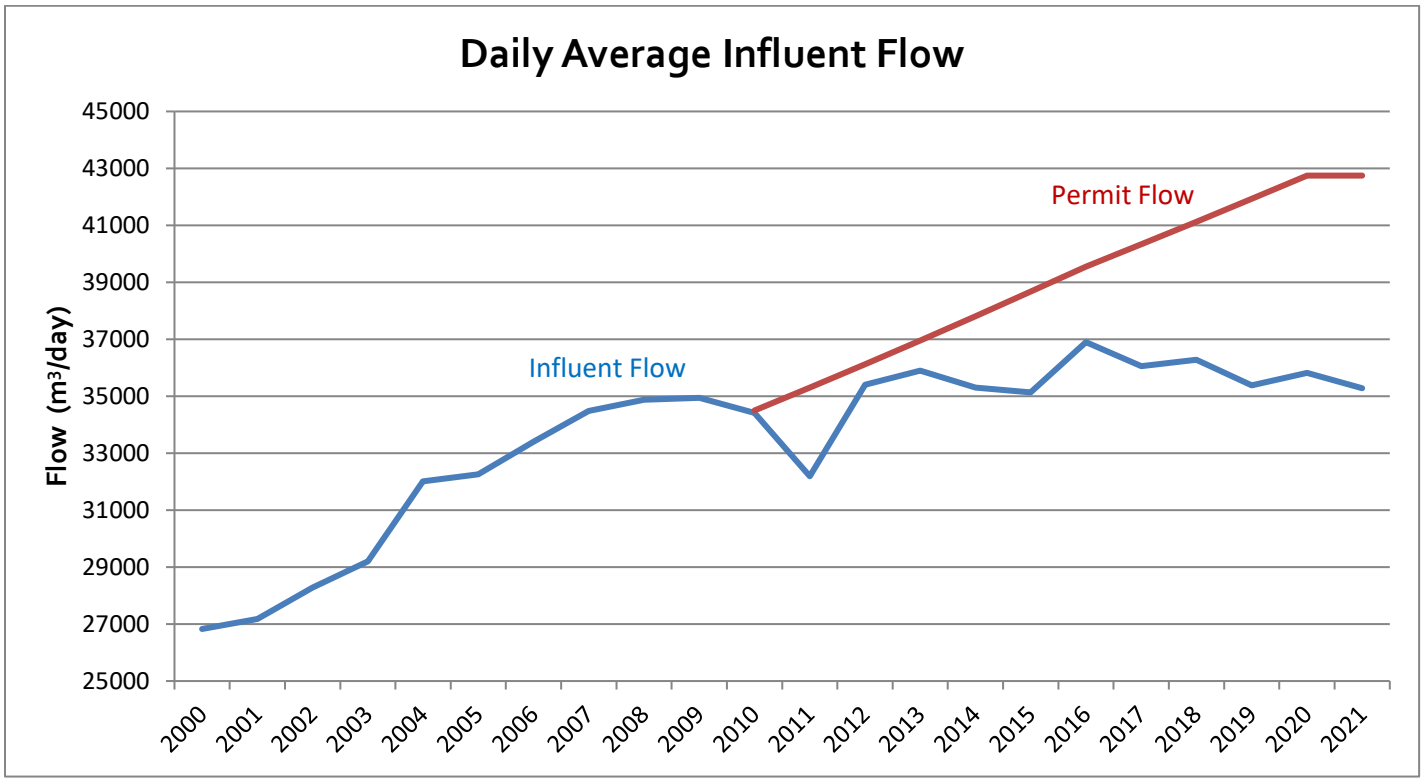


Figure 1 – Historical Influent flow relative to permit

The nutrient and physical properties of the influent are monitored throughout the month to ensure that the biological removal process is balanced with loading demand. A summary of the 2021 monthly averages are listed in Table 5 with supporting data in Appendix B. Nutrient parameters of Nitrate, Ammonia, Phosphate all increased 5-7% over 2019 while Total Nitrogen and Biochemical Oxygen Demand (BOD) decreased 4-9% respectively.

Raw Influent Monthly Averages - 2021								
Date	Raw Influent Grab			Raw Influent Composite				
	pH		NO3	NH3	Total N	Ortho P	Total P	BOD
	min	max	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Jan	7.13	8.19	0.98	40.4	47.2	3.90	5.31	353
Feb	6.94	8.20	1.41	38.9	43.3	3.69	5.14	410
Mar	6.95	8.26	2.28	36.1	47.8	3.72	6.05	328
Apr	6.74	8.11	2.24	36.5	49.4	3.52	8.20	283
May	6.95	8.08	1.90	37.6	38.0	3.42	6.19	197
Jun	6.79	7.89	0.84	39.8	39.6	3.52	6.75	269
Jul	6.73	7.75	2.58	35.4	44.8	3.66	7.88	375
Aug	6.65	7.63	2.96	34.9	44.9	4.24	7.20	428
Sep	6.73	7.67	1.01	44.0	56.3	4.34	8.18	446
Oct	6.75	7.65	1.15	46.4	47.8	4.58	5.85	278
Nov	6.36	7.11	1.53	43.0	51.7	3.99	6.35	447
Dec	6.56	7.34	1.57	43.1	45.7	3.94	6.02	287
2021 Avg.	**6.77**	**7.82**	**1.70**	**39.7**	**46.3**	**3.88**	**6.60**	**347**

Table 5 – Monthly average Influent water quality concentrations

Effluent Quality and Nutrient Removal

The final effluent is treated to meet condition 1.1.2 of the operating permit (Appendix H) that stipulates maximum discharge concentrations for Total Phosphorus, Total Nitrogen, Suspended Solids, BOD, Fecal Coliform (Table 2). In addition to the operational conditions, the plant must also meet all the Federal Government Wastewater System Effluent Regulation (WSER) monitoring and reporting requirements.

Total Phosphorus

Managing Phosphorus discharge from municipal and industrial wastewater treatment is a key factor in preventing eutrophication of surface waters (excessive algae growth and oxygen depletion). Its presence in higher concentrations may cause a variety of water quality problems including increased purification costs, affecting growth of micro-organisms and algae on drinking water (Microcystin).

Municipal wastewater influent typically contains between 5 to 20 mg/L of Total Phosphorus (TP), of which 1-5 mg/L is organic and the remainder inorganic. Ortho-Phosphate, a subset of TP, is the main phosphorus chemical form measured, which is in direct proportion to the total phosphorus concentration. The daily composite discharge of TP peaked at 0.913 mg/L, well below the daily discharge permit limit of 2.0 mg/L while the yearly average TP concentration was calculated to be 0.19 mg/L, also below the annual average permit level set at 0.25 mg/L (Figure 2).

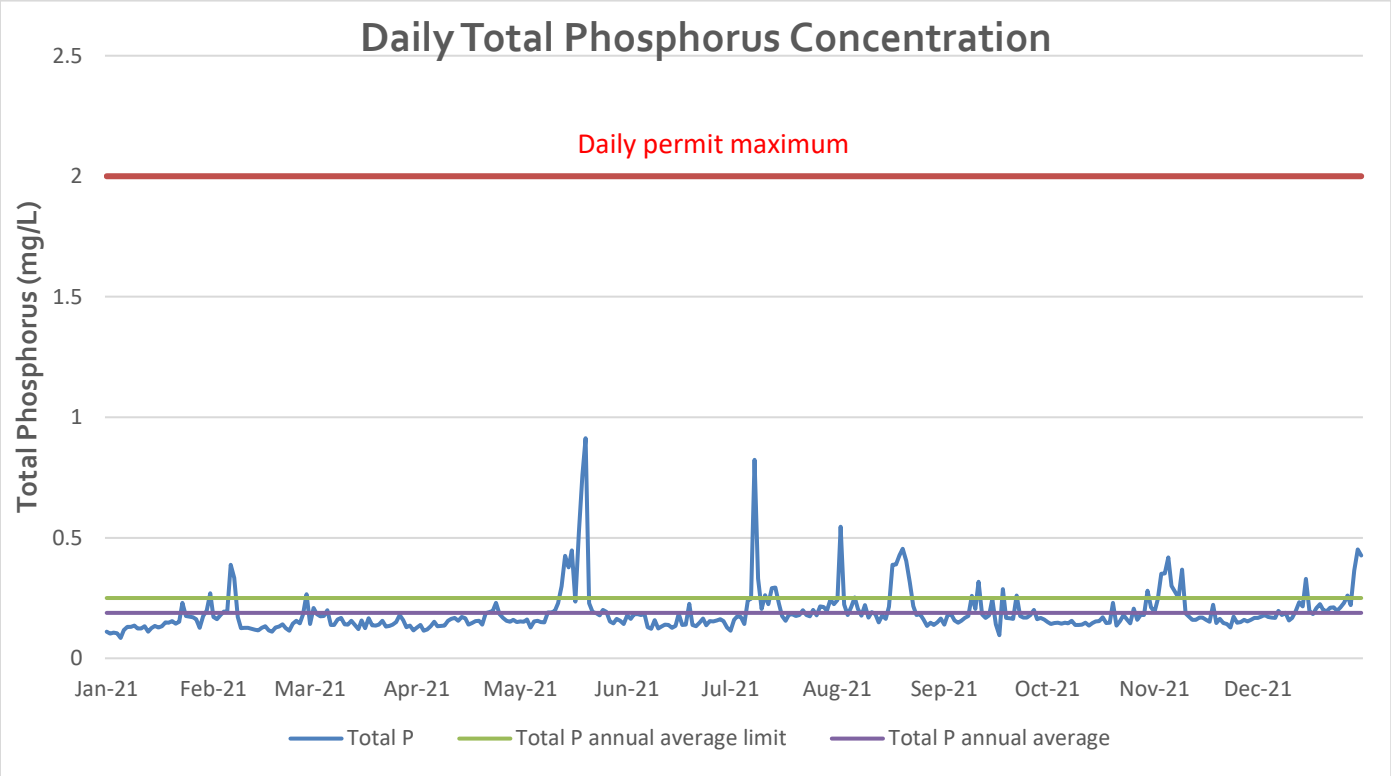


Figure 2. Daily Total Phosphorus concentration relative to permit levels

The total amount of Phosphorus load discharged for 2021 was 2447 kg, which is 6.2% decrease from 2020 and in line with the 20-year historical average (Figure 3).

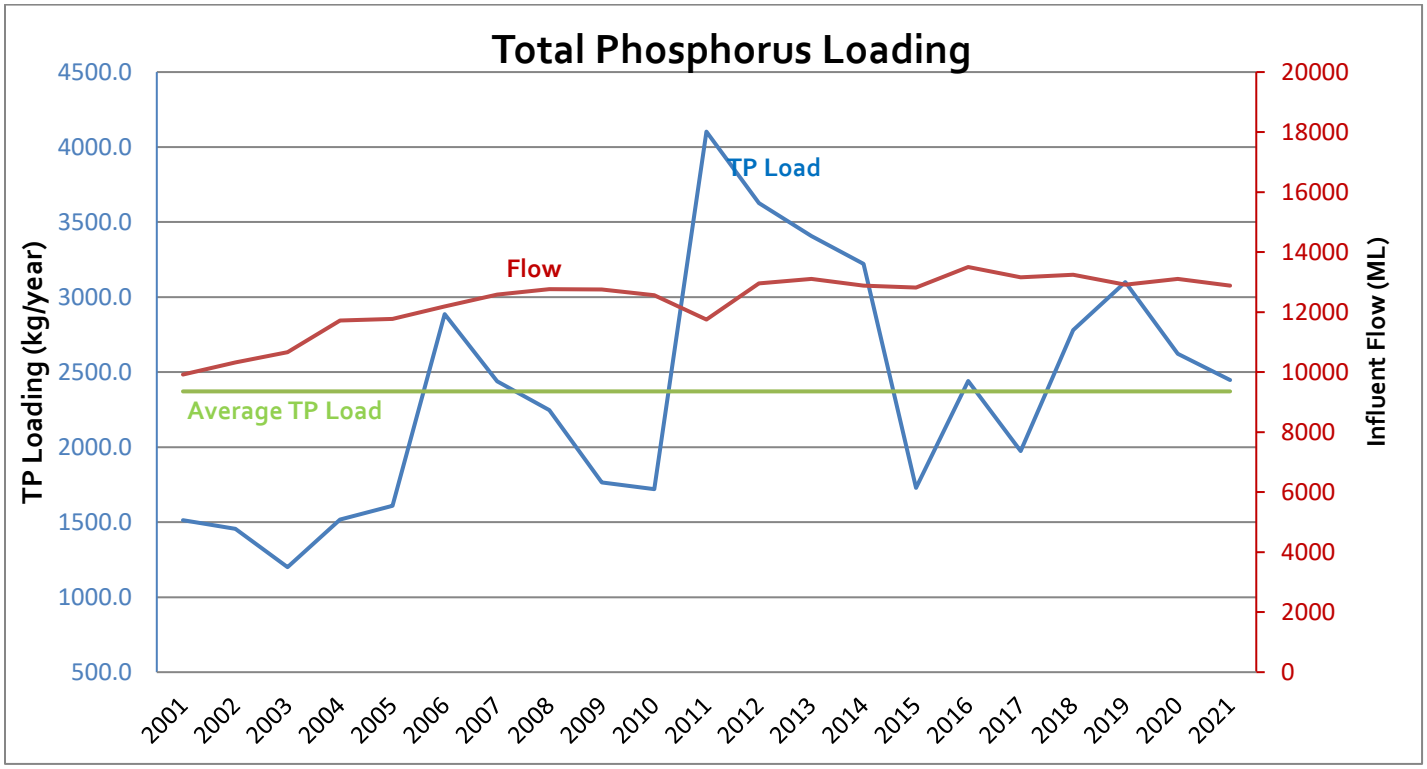


Figure 3. Total Phosphate annual load relative to total Influent flow

The efficiency of the BNR process to remove Total Phosphorus from the waste stream averaged 97.1% for 2021 which represents a 0.3% improvement over 2020 as well as the historical 20-year average (Figure 4).

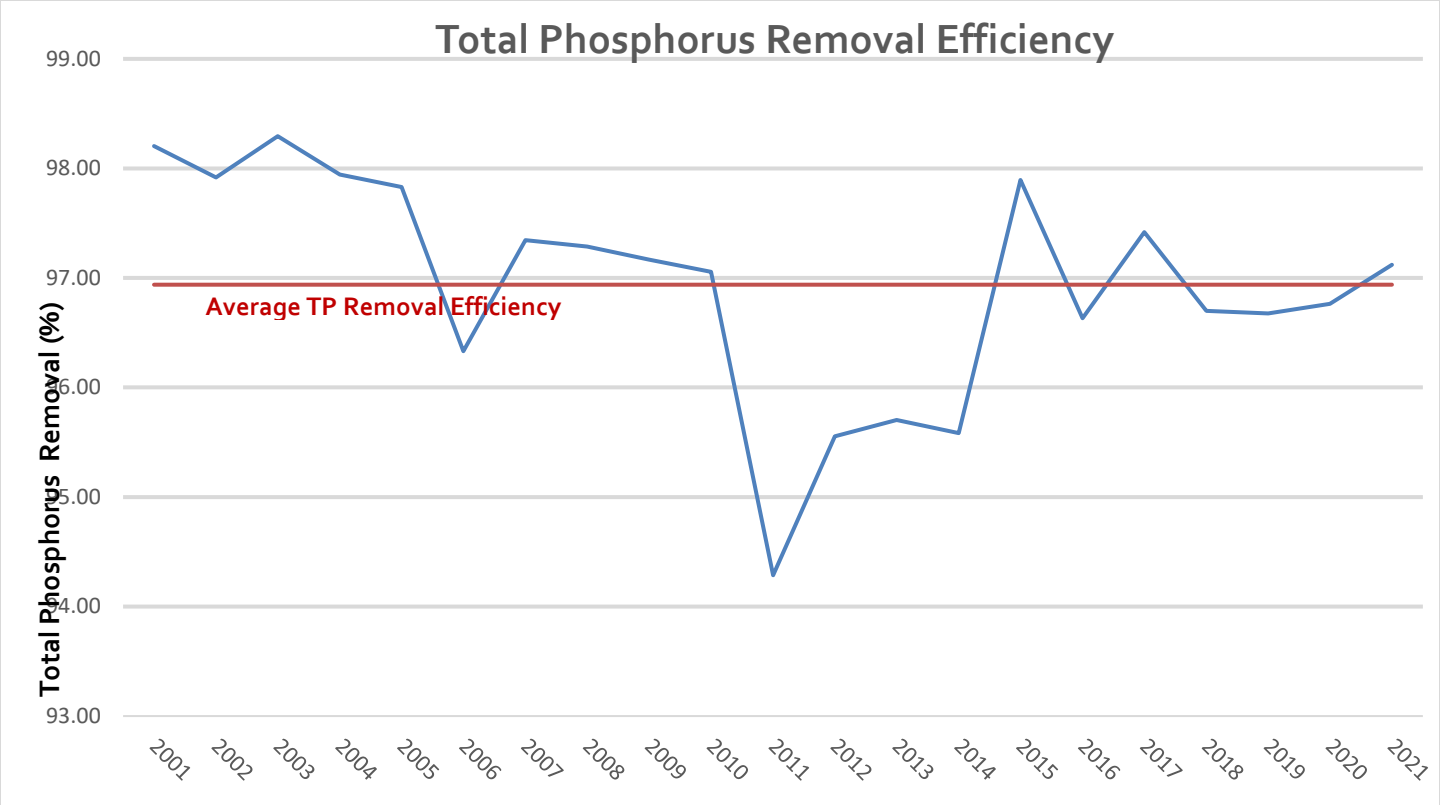


Figure 4. BNR Total Phosphorus removal efficiency from Influent

Total Nitrogen

Excessive Nitrogen release into waterways can have eutrophication affects similar to Total Phosphorus as well as having direct impacts to human health. The Canadian Drinking Water Quality guidelines have stipulated upper concentration limits for both Nitrite and Nitrate in drinking water sources. Considering that the effluent discharge to a drinking water source (Okanagan Lake), limiting the contribution of nitrogen loading discharged to this source is of upmost importance to the treatment process.

The BNR process consists of an aerobic nitrification process that converts Ammonium (NH_4) to Nitrite (NO_2) and subsequent Nitrate (NO_3). This process is followed by an anoxic denitrification process that takes the Nitrate Nitrogen form and coverts it to Nitrogen gas (N_2) and Oxygen (O_2) that is released into the atmosphere. Each of these steps are facilitated by use of specific bacteria that are cycled and maintained in the biological process.

The TN concentration in the effluent is a calculated addition of the various nitrogen forms in the Nitrogen cycle and reported relative to a daily and annual average maximum concentration. The TN daily concentration discharged was below the permitted maximum of 10 mg/L throughout 2021 (Figure 5)

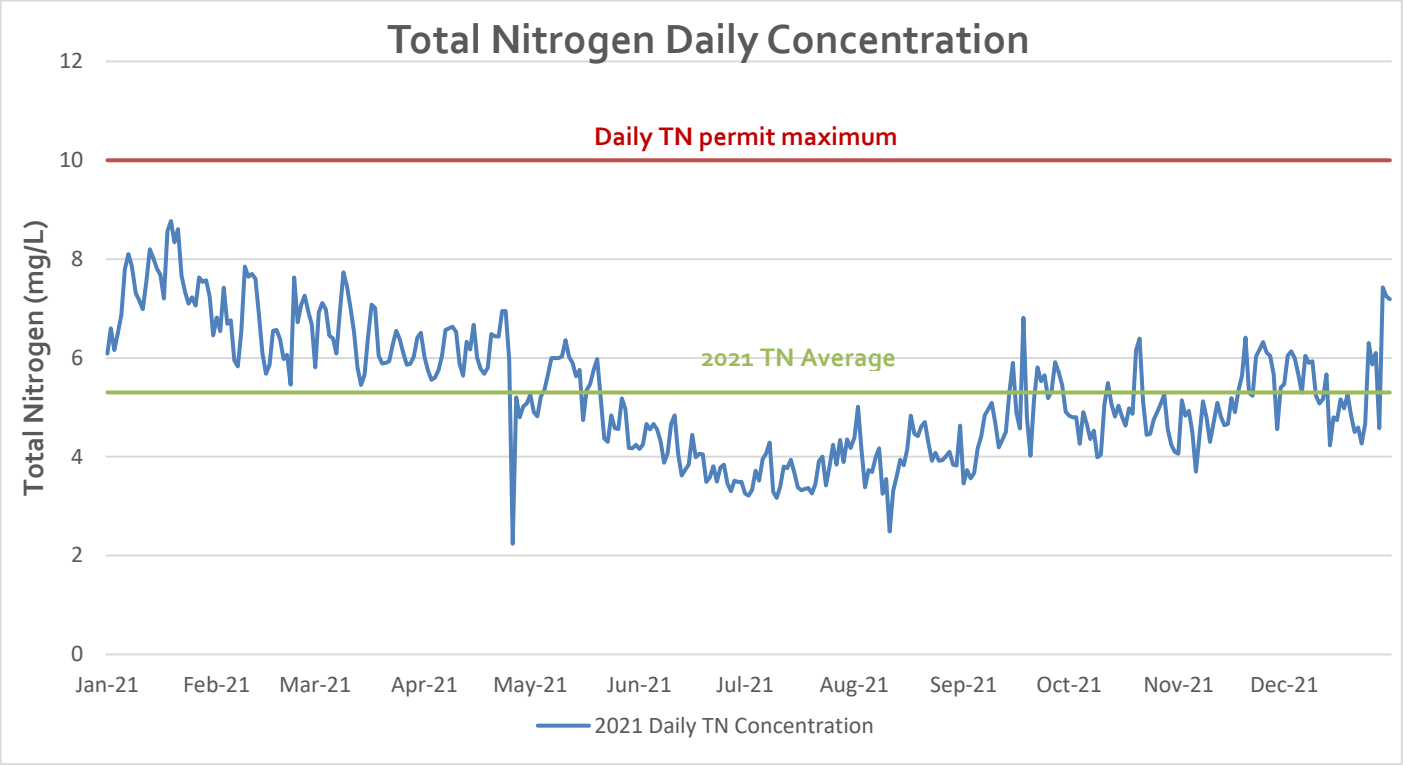


Figure 5. Average daily Total Nitrogen concentration in discharge

The average daily TN concentration discharged was 5.3 mg/L in 2021, which represents a 13% decrease from 2020, below the permit maximum and slightly above the historical 20-year average (Figure 6). Consultants are working with the City to assess flow and nutrient loading to the facility to assist in reversing the longer term trend.

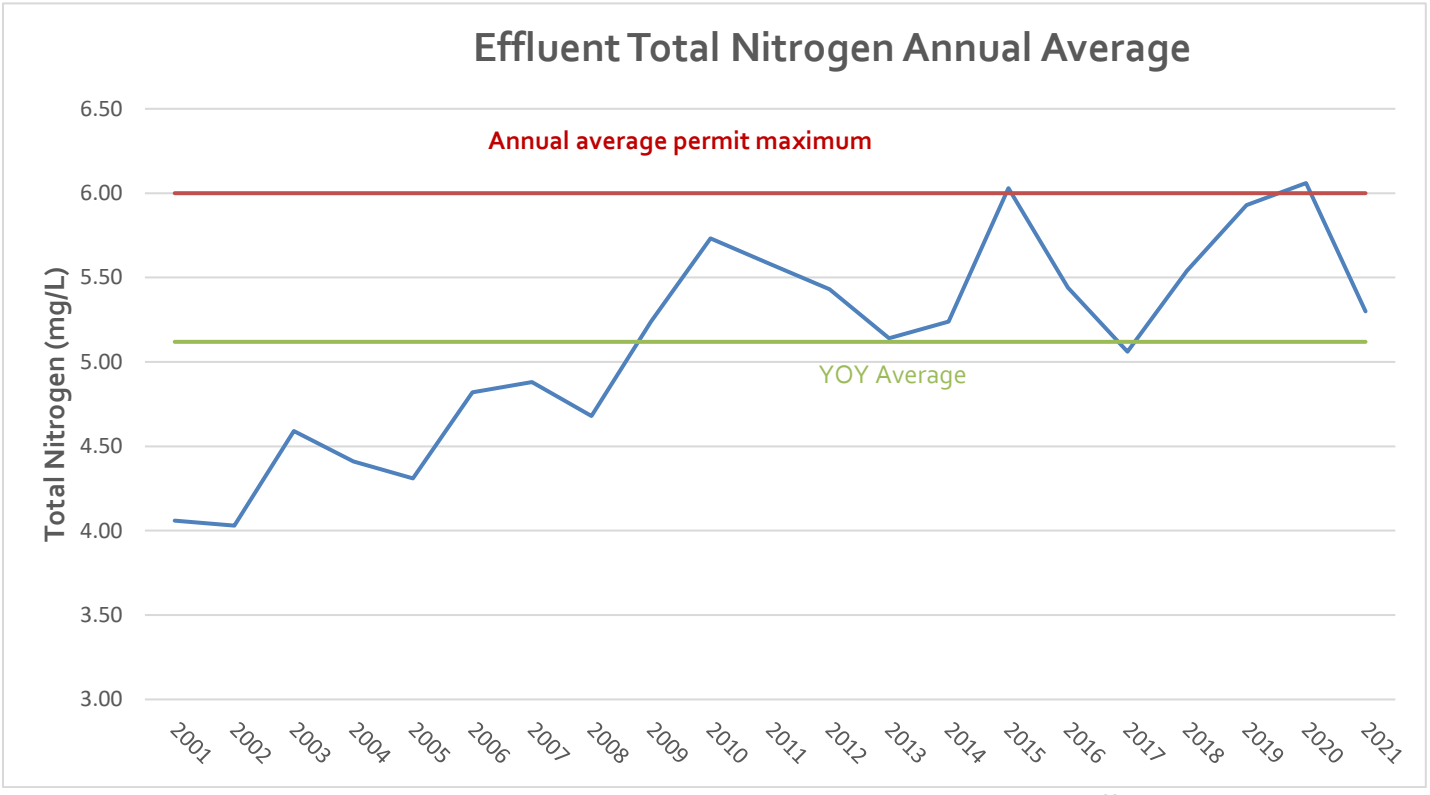


Figure 6. Historical annual average Total Nitrogen concentration in Effluent

The TN loading dropped significantly by 14% relative to 2020 and third lowest point since 2008 (Figure 7).

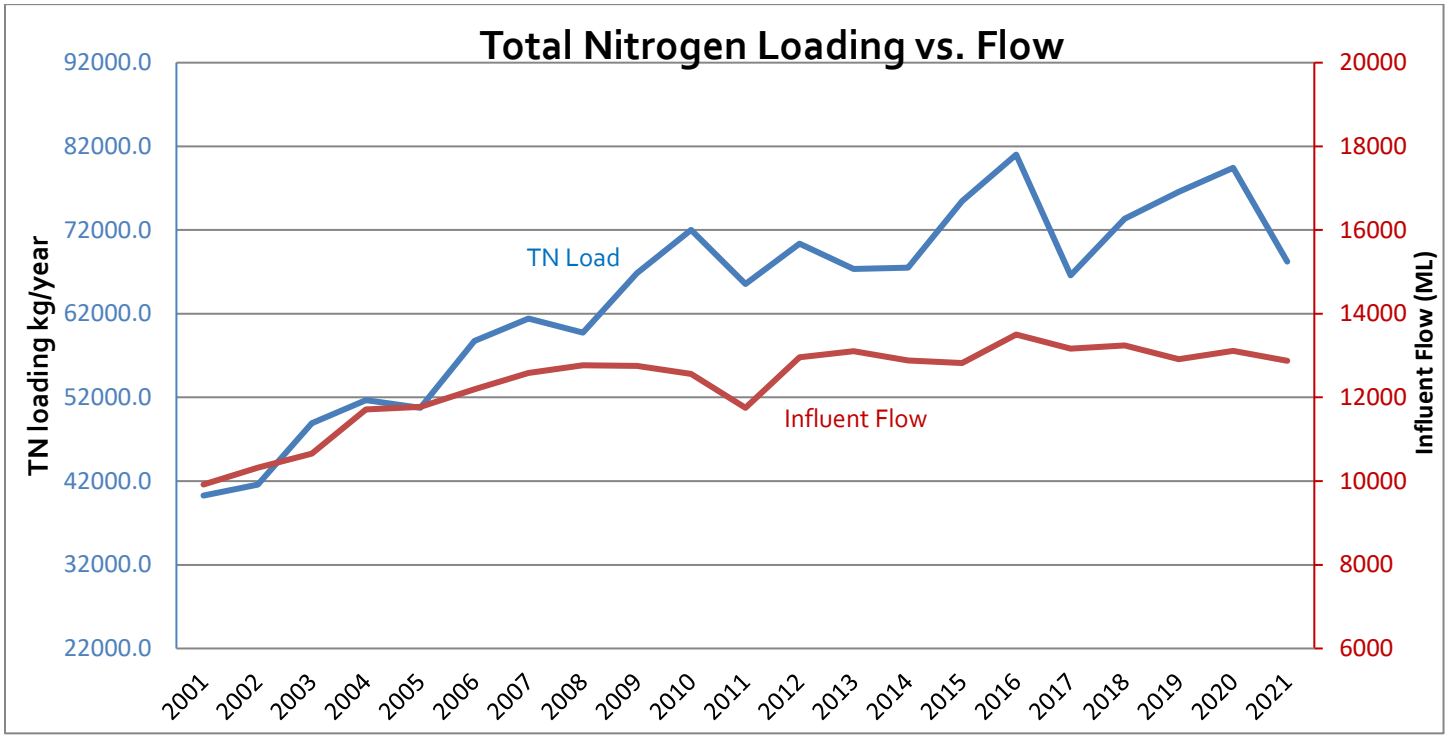


Figure 7. Total Nitrogen Loading relative to Influent Flow

Consistent with the decreased TN loading, the removal efficiency of the facility improved by 1.2% from 87.4% to 88.6% YOY. (Figure 8).

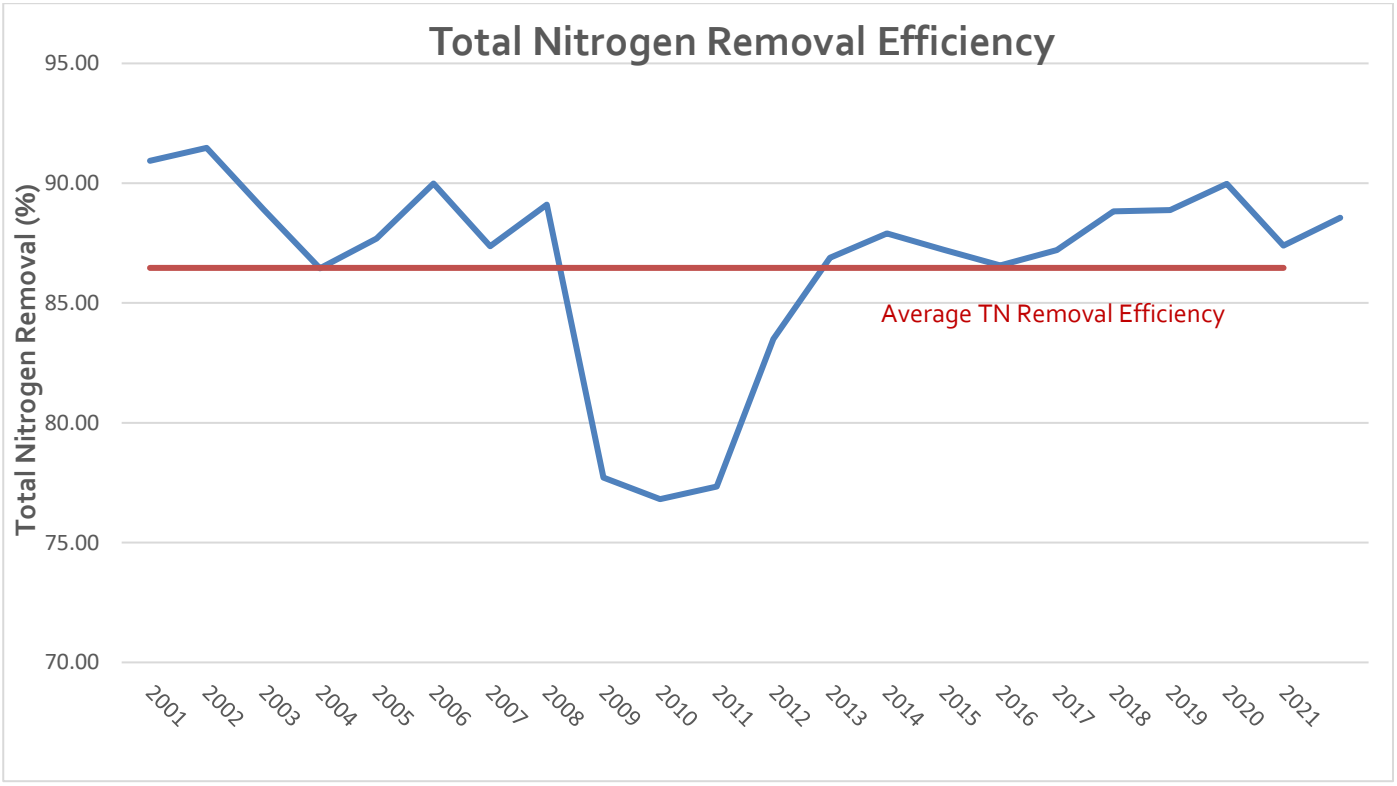


Figure 8. Total Nitrogen removal efficiency

Total Suspended Solids

The TSS data is critical in determining the operational behavior of the wastewater treatment system. They are generally indicative of the amount of nutrients available for the bacteria in the nitrifying and denitrifying process. Although critical to the biological treatment, excessive suspended solids must be removed through successive settling processes followed by filtration before being discharged from the plant.

High TSS values in effluent are often related to the excessive solids generation due to an increase in Biochemical Oxygen Demand (BOD) loading or can indicate problems with nutrient deficiency. High TSS values can also be attributed to high flows, insufficient settling times, or may indicate aeration adjustments are needed.

In addition to operational optimization, suspended solids are also a measure used to assess risks associated with bacterial discharge into natural waters. Particles have the ability to harbor various forms of protozoa, bacteria, and viruses on the surface and can impede effective UV disinfection by shielding the organisms from radiated light exposure and subsequent inactivation.

Suspended solids are sampled from the various points in the treatment process as well as daily from the effluent discharged. The measured TSS values were all well below daily effluent discharge limit of 10 mg/L with no exceedances of the at any point throughout 2021 (Figure 9).

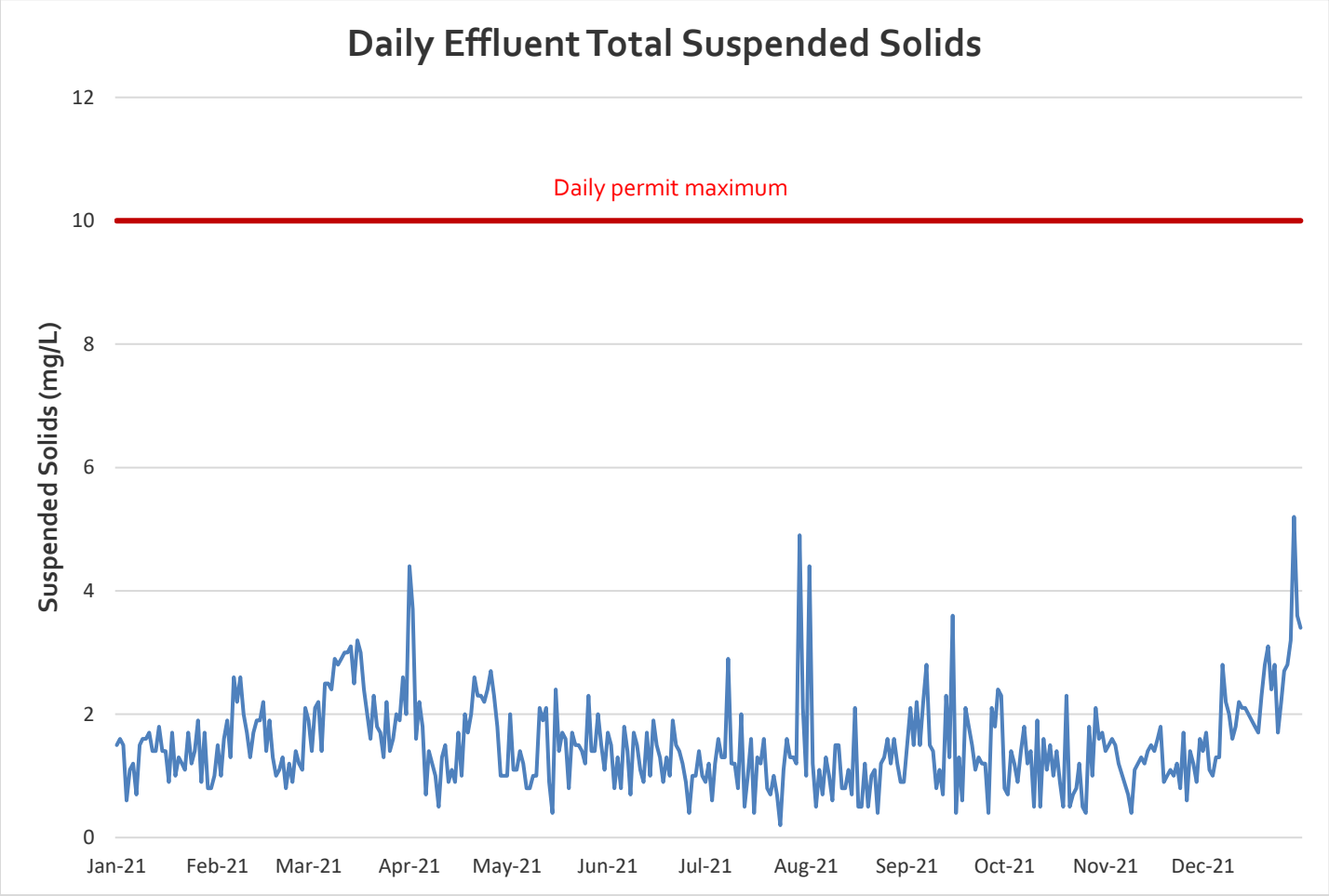


Figure 9. Total Suspended Solid concentration

The 2021 average annual effluent TSS value was 1.5 mg/L and consistent with the historical average over the past 20 years (Figure 10).

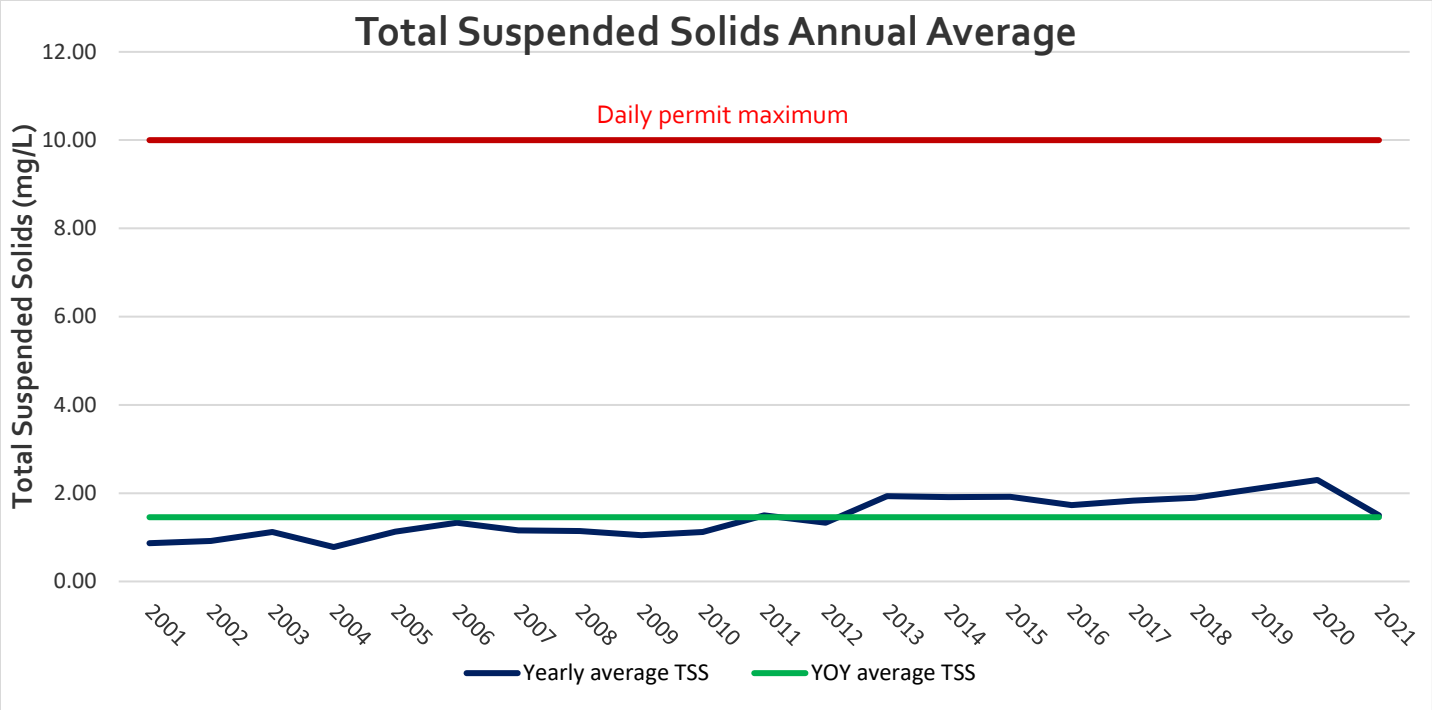


Figure 10. Annual average Total Suspended Solid concentration in effluent

The TSS removal efficiency of the treatment process improved 0.15% over 2020 and remained within 0.5% to the past 20-year historical average (Figure 11).

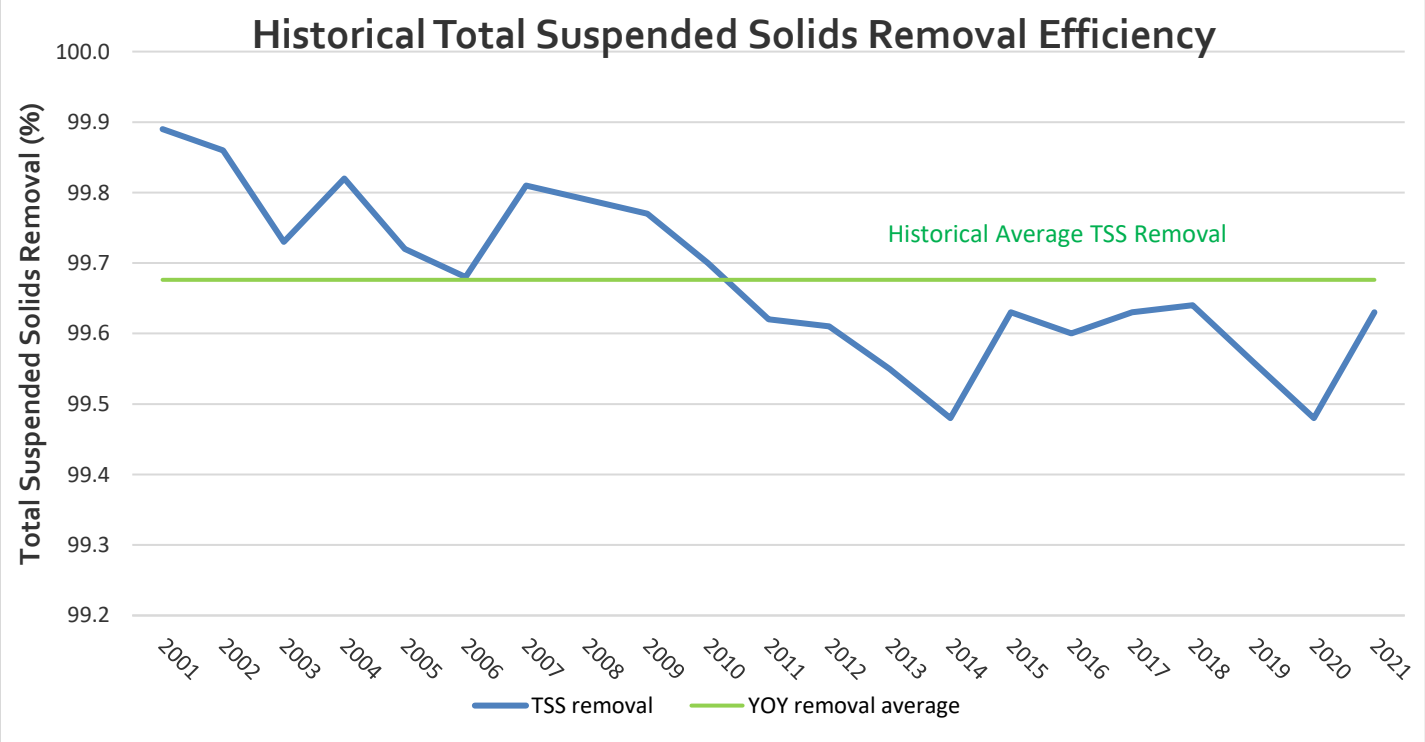


Figure 11. Total Suspended Solid process removal efficiency from Influent flow

Biochemical Oxygen Demand

BOD has traditionally been used to measure the strength of effluent released in natural receiving waters due to the fact that sewage high in BOD can deplete oxygen and can result in fish kills and ecosystem changes.

Wastewater is made up of a variety of inorganic and organic substances made up of carbon compounds such as fecal matter, detergents, soaps, fats, greases, and food particles. These large organic molecules are easily decomposed by bacteria, but the process requires the consumption of oxygen. The amount of oxygen required to convert these compounds in carbon dioxide and water is the biochemical oxygen demand (BOD). The 5-day BOD, or commonly referred to as BOD_5, is measured by the quantity of oxygen depleted over 5 days and is the benchmark for measuring sewage strength.

It is also important to note that BOD serves as the food source for the denitrifying bacteria during the secondary stage of the nitrogen removal process. In these situations, BOD is desired as necessary to support the growth of the beneficial bacteria.

Effluent BOD was typically measured on a weekly basis and consistently fell well below the permit level of 10 mg/L at all times throughout 2021 (Figure 12). YOY, the average BOD concentrations were similar from 2020 through 2021.

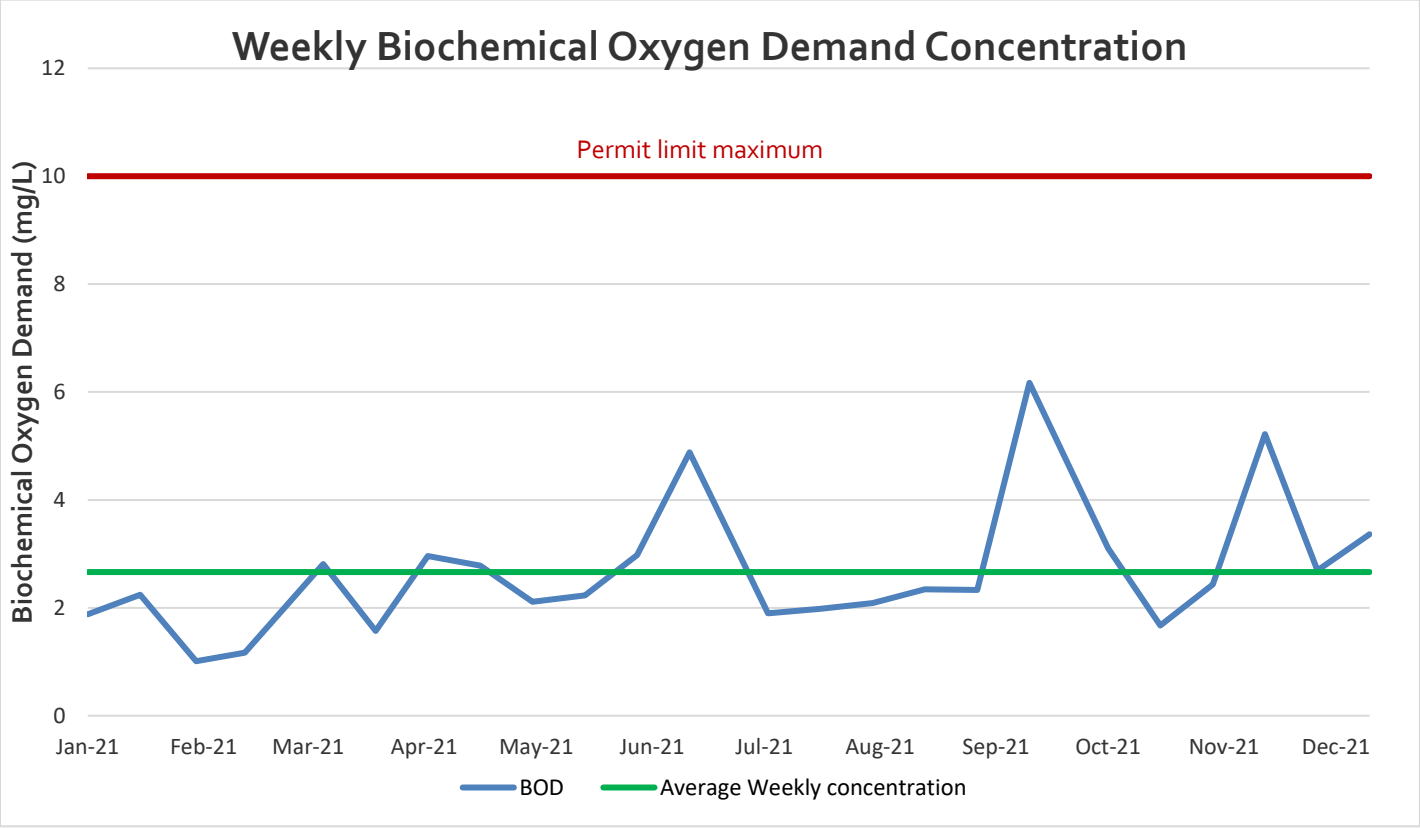


Figure 12. Weekly BOD Effluent concentration relative to permit

The 2021 annual average BOD discharge was 2.66 mg/L and in-line with the 20-year historical BOD annual concentration average (Figure 13). No statistical significant trends were detected.

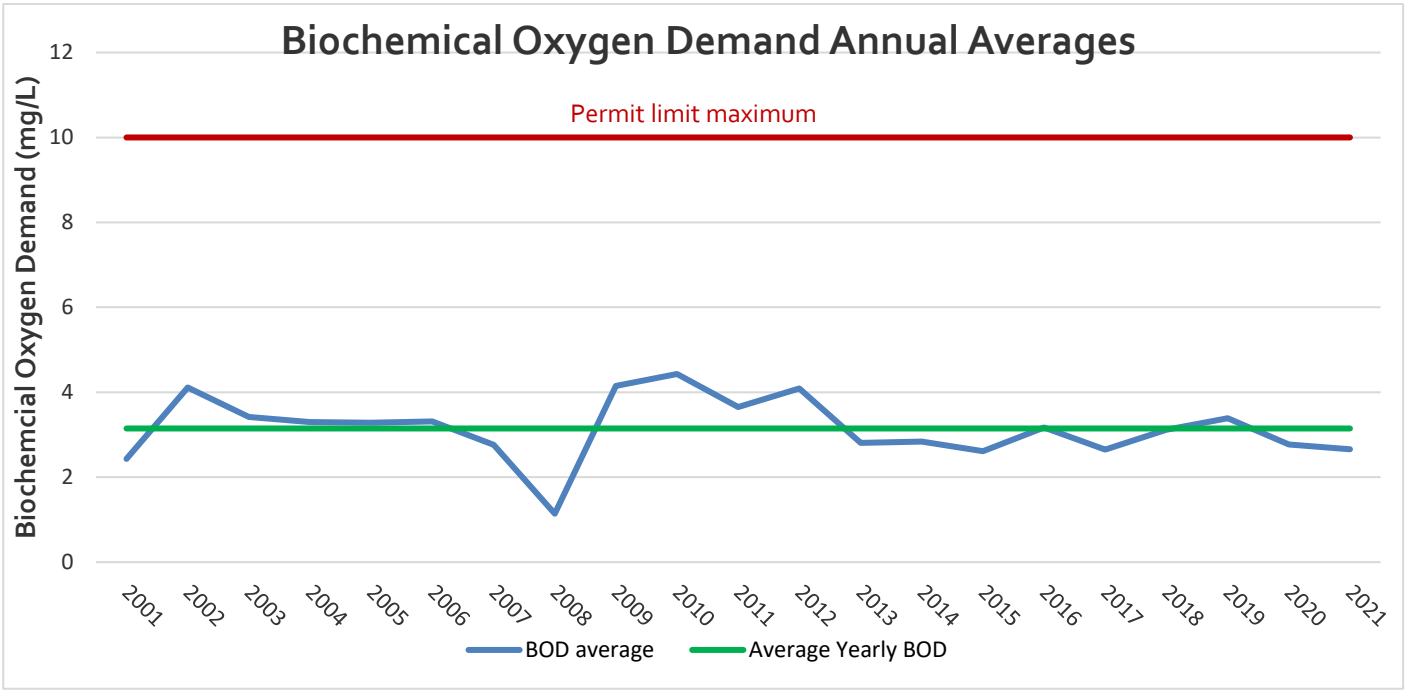


Figure 13. Annual average BOD concentration in discharge relative to permit

The BOD removal efficiency for 2021 was 99.3% and consistent with the past 20-year historical average (Figure 14). The BOD removal efficiency has consistently improved since 2012 and has been within +/- 1.1% of the historical average.

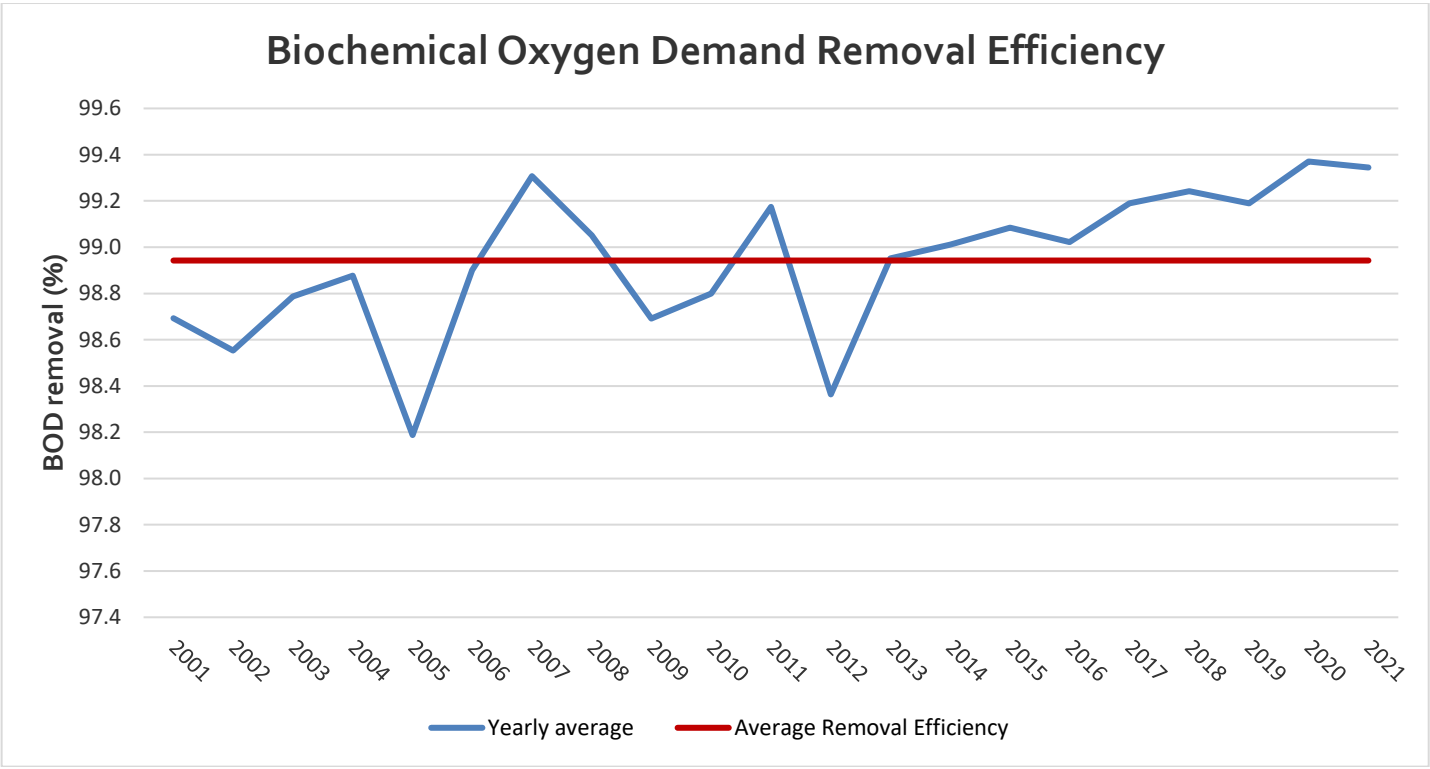


Figure 14 - BOD removal efficiency from Influent

Fecal Coliform

The effectiveness of the effluent UV disinfection is measured weekly through the monitoring of Fecal Coliform bacteria in the UV channels. All values throughout 2021 were well below the permit level of 50 counts/100ml (Figure 15).

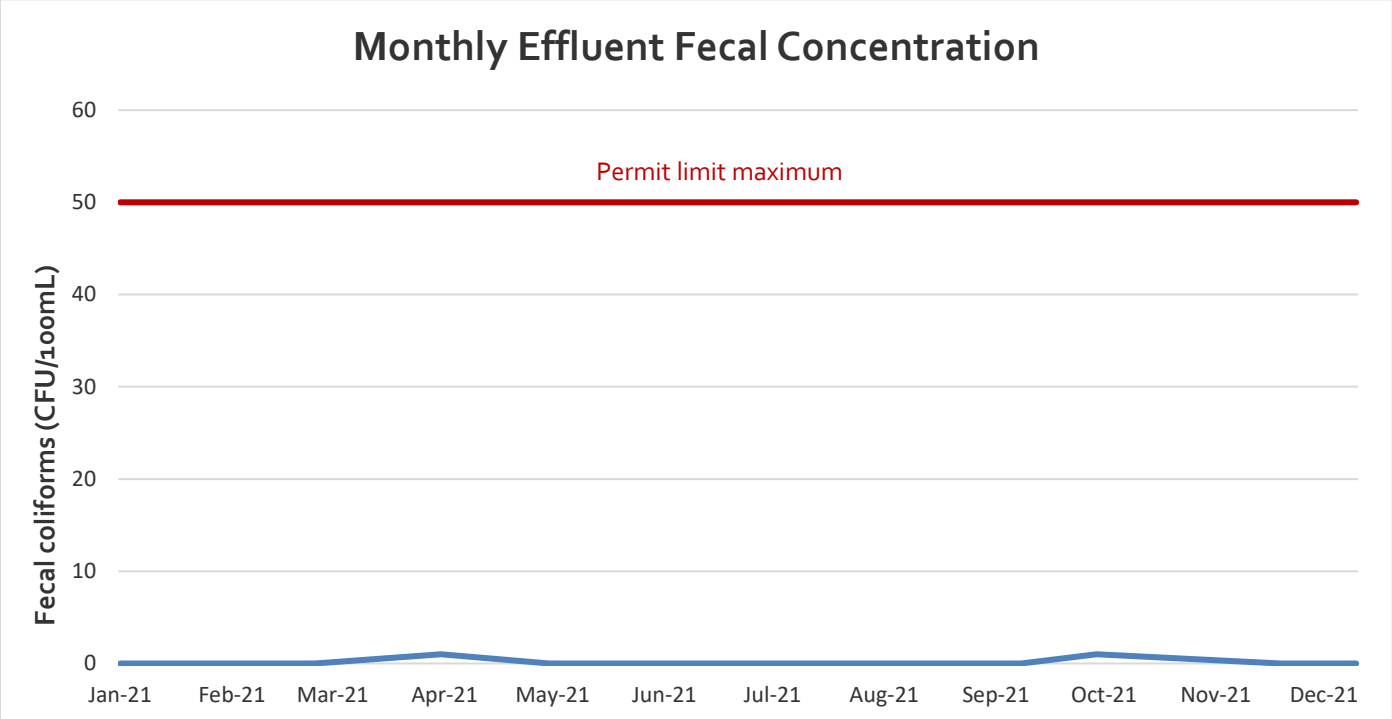


Figure 15. Weekly Fecal concentration in Effluent

There has been a consistent, high level of effective disinfection over the past 21 years and at no time has the annual average Fecal concentration exceeded 1.1 count/100mL (Figure 16).

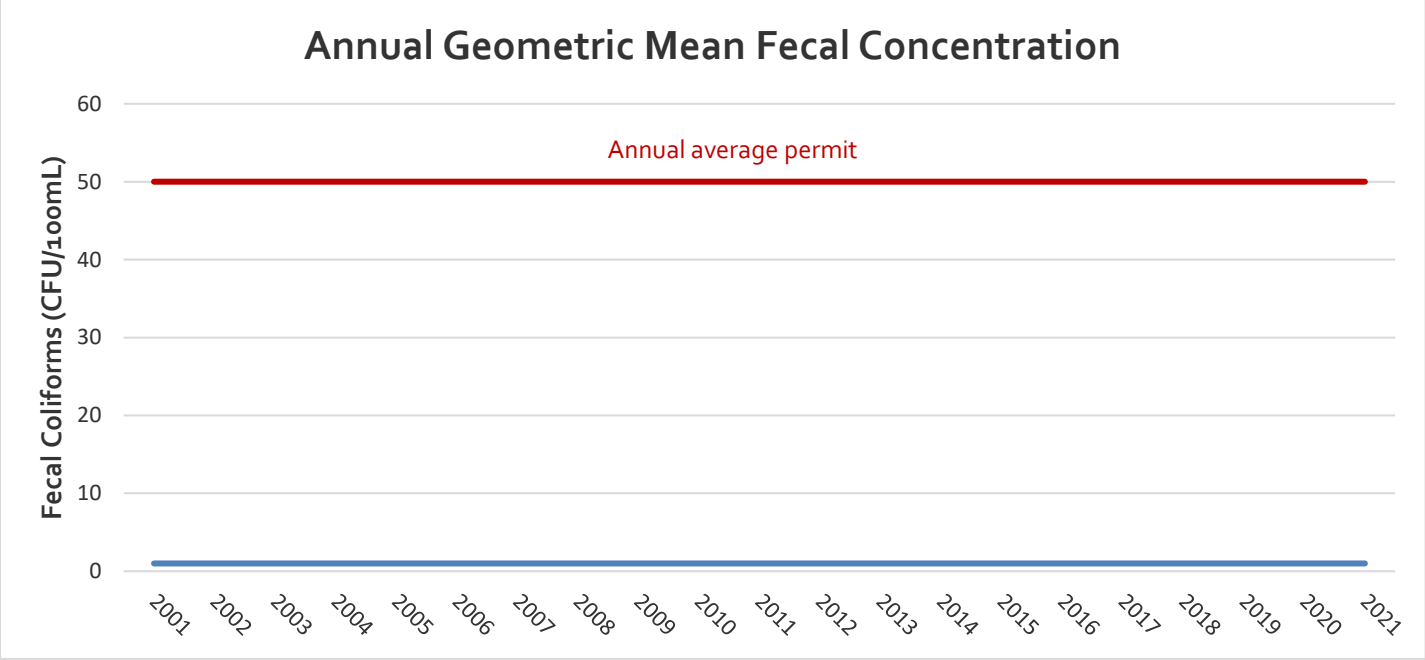


Figure 16 – Annual Average Effluent Fecal concentration

Acute Toxicity

In order to gauge the influence of WWTF discharge on fish in natural receiving waters, acute toxicity is measured and reported on an annual basis to the Federal Government. This analysis effectively measures the cumulative impact of all chemical and biological stresses on trout fish stock by directly exposing the fry to the effluent dilutions over a 96-hour period. Effluent samples were sent to an accredited aquatic laboratory facility and results submitted to the WSER database (Table 6). Results indicate that there was no mortality or stress reported for any of the fish exposed and met all health and regulatory guidelines in 2021.

Acute Lethality	Date	LC50 (%v/v)
WWTF Final Effluent Grab	5-Aug-21	>100

Table 6. Effluent Acute Lethality

Metal Concentrations

Comparative results between the influent and effluent composite measurements indicate that the biological treatment process is effectively removing a wide range of heavy metals from the influent. For each metal parameter, the effluent water quality met all the requirements of the Canadian Drinking Water Guidelines for 2021.

Total Metals (Effluent)	Units	Canadian Drinking Water Guidelines	Influent Composite Jul 19, 2021	Effluent Composite Jul 19, 2021	Influent Composite Dec 13, 2021	Effluent Composite Dec 13, 2021
Aluminum (Al)-Total	mg/L	AO=0.1	0.61	0.0257	0.465	<0.0050
Antimony (Sb)-Total	mg/L	MAC=0.006	0.00104	0.0004	0.00115	0.00051
Arsenic (As)-Total	mg/L	MAC=0.01	0.00124	0.00047	0.00146	0.00062
Barium (Ba)-Total	mg/L	MAC=1	0.0548	0.0192	0.0436	0.0218
Boron (B)-Total	mg/L	MAC=5	0.19	0.184	0.161	0.188
Cadmium (Cd)-Total	mg/L	MAC=0.005	0.000299	0.0000539	0.000251	0.000044
Calcium (Ca)-Total	mg/L		53.5	45.3	44.1	39.4
Chromium (Cr)-Total	mg/L	MAC=0.05	0.00448	0.00056	0.00345	0.00084
Copper (Cu)-Total	mg/L	AO=15	0.219	0.0164	0.207	0.0142
Iron (Fe)-Total	mg/L	AO=0.3	1.2	0.061	0.942	0.094
Lead (Pb)-Total	mg/L	MAC=0.01	0.00462	0.000722	0.00558	0.00108
Magnesium (Mg)-Total	mg/L		16.3	13.8	16.4	13.8
Manganese (Mn)-Total	mg/L	AO=0.05	0.0738	0.0371	0.0721	0.0421
Mercury (Hg)-Total	mg/L	MAC=0.001	0.0000906	0.00003	n/a	n/a
Potassium (K)-Total	mg/L		19.8	16.3	18.1	15.4
Selenium (Se)-Total	mg/L	MAC=0.05	0.00134	0.00039	0.00101	<.00050
Sodium (Na)-Total	mg/L	AO=200	84	71.5	93.6	86.1
Uranium (U)-Total	mg/L	MAC=0.02	0.00319	0.000573	0.00309	0.000968
Zinc (Zn)-Total	mg/L	AO=5	0.247	0.062	0.154	0.0504

MAC= Maximum Acceptable Concentration related to Health Concerns

AO = Aesthetic Objective related toTaste, Odor, Appearance

Table 7. Metal concentrations in Influent and Effluent Composite samples

Lake Monitoring Program

In addition to internal testing program, the COK is part of an annual *Collaborative Okanagan Lake Water Quality Study* that is generated annually by Larratt Aquatic Consultants on behalf of various municipalities and districts that discharge into Okanagan Lake. This report is submitted to the Ministry of Environment as part of the condition on permit for wastewater operations. The report examines the general physical, chemical, and biological health of Lake Okanagan and water quality trends that may be influenced by tributaries as well as outfalls from treatment plants. Parameters generally all fell within water quality objectives published (Nordin, 2005) and accepted by the Ministry of Environment.

Staffing

The WWTF operates with a skilled staff that have been certified to a level that meets Ministry of Environment regulations. This includes; one EOCP Level IV Manager, one EOCP Level III Operations Foreman, three EOCP Level III Operators, eleven EOCP Level II Operators, one Maintance Foreman, three Millwrights, one Instrumentation/Electrical Foreman, three Instrumentation/Electrical Technicians, two Laboratory staff, and one Source Control Technician (Figure 17).

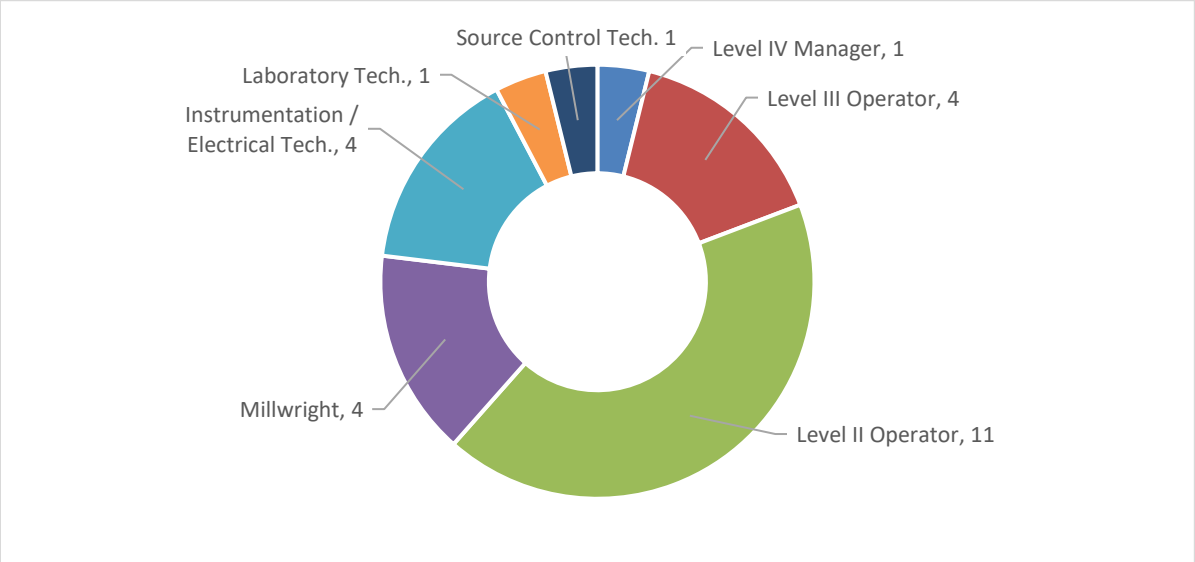


Figure 17. Overview of WWTF Operators certification level and support staff

System Control

The operational monitoring of the wastewater facility is conducted through the use of a Supervisory Control and Data Acquisition Software (SCADA) program. Connected by wireless links, the SCADA software remotely collects information from monitors and sensors at strategic points in the wastewater processing plant. The software interprets the receiving data and automatically adjusts pumps and system settings to maintain pre-defined operating requirements. When an issue is detected within the system, the SCADA system issues alerts and alarms to wastewater system operators who then respond to the concerns. This software platform also allows the COK to collect and track historical performance of our system for auditing and future optimization of the wastewater system.

Operational Maintenance

Valued at more than $100 million, the WWTF infrastructure requires thorough condition assessment, preventative maintenance and scheduled replacement of aging components. To support this, the City has developed and continues to re-assess a comprehensive asset management plan that ensures the WWTF is maintained in good condition. For day to day maintenance, the WWTF utilizes an asset management and scheduling system that highlights facility and equipment work that needs to be maintained. The maintenance is delegated by wastewater foreman and is reviewed by the supervisor for compliance.

Odour Management

The WWTF employs a centralized odor control system that consists of a mechanical bio-filter lined with a patented, engineered media. This biological process eliminates the need for additional chemical treatment and has proven to be highly effective. Foul air is extracted from designated buildings and tanks throughout the plant and cycled through the bio-filter and discharged via a 14-meter stack on-site.

The WWTF has a dedicated service request program whereby the public can provide feedback or register complaints regarding our wastewater treatment process. There was only 1 reported odor complaint registered from residents or businesses in the area throughout 2021.

Emergency Response Plan

A thorough review of the WWTF Emergency Response Plan was conducted in 2018 by staff and updated to reflect current practices and policies and aligns with the permit requirements of the COK treatment plant (Appendix D). Operators and technicians are informed of and carry out mock exercises of the Emergency Response Plan that contains information on course of actions, list of appropriate contacts, and procedures necessary to assist operators and staff to make timely and informed decisions.

Technology and Efficiency Improvements

Energy efficiencies and process efficiencies continue to be drivers at the treatment facility. Three energy reductions were explored and implemented in 2019 through 2021, further reducing the facility energy consumption and overall green house emmissions.

The WWTF continues to participate in the annual National Water Benchmarking Initiative (NWBI) that highlights performance relative to other wastewater treatment facilities across the country. Particular strengths referenced include below average Operational and Maintenance costs per volume treated, zero accidents with lost time on site, below average reactive maintenance, and very minimal regulated tests out of compliance.

Conclusion

There was an overall marked improvement in wastewater nutrient removal and treatment objectives in all major parameters in 2021 relative to the previous year. A summary of the effluent concentrations and loading trends are listed in Table 8.

Total P	Total N	TSS	BOD	Fecal
Down 6%	Down 14%	Down 10%	Down 3%	Similar

Table 8. 2021 Nutrient treatment trend over 2020

Despite a population increase over 12% since 2016, overall influent flow has decreased, indicating a general reduction and potential concentration in waste nutrient discharge (Table 9).

Total P	Total N	TSS	BOD	Fecal	Flow	Population
Similar	Similar	Similar	Similar	Similar	Down 5%	Up 12%

Table 9. Effluent nutrient discharge concentration trends since 2016

The City is committed to continually improving wastewater services to all of its residents, industrial, and commercial stakeholders. Protecting our water source is not an option – it is a priority, for our current generation and those to come. This requires extensive planning, funding, collaboration, vision and leadership from City Council all the way through to the wastewater utility staff and operators working diligently to support the Kelowna vision statement:

"Kelowna, a City of the Future"

City of Kelowna is pleased to present the 2021 Annual Wastewater Report, detailing the health and direction of our wastewater system. If you have any questions about this report or wish to have additional information provided, please contact usity at 250-469-8502 or email at ask@kelowna.ca.

Appendix A

Plant Schematics


City of Kelowna
WASTE WATER TREATMENT PLANT
N
SITE LOCATION

Appendix B

Influent Water Quality Reports

January 2021

Kelowna Wastewater

Report Name: Tabular Report

	Raw Influent		Raw Influent Comp					Raw Influent Grab
January 2021	pH - Daily Minimum ( )	pH - Daily Maximum ( )	BOD - Total (mg/L)	O-PO4 (P) (mg/L)	NH3-N (mg/L)	Phosphorus (total) (mg/L)	Total Nitrogen (mg/L)	NO3+NO2-N (mg/L)
01/01/2021	6.64	7.33		3.90	40.40			
01/02/2021	6.42	7.00		3.30	35.44			
01/03/2021	6.41	7.16		3.30	36.33			
01/04/2021	6.96	7.84		3.90	37.86			0.68
01/05/2021	7.21	8.09		3.50	35.77	4.92	54.0	
01/06/2021	7.17	7.97	190	4.00	38.10			0.83
01/07/2021	7.21	8.06		4.20	41.85			
01/08/2021	6.88	8.13		4.10	44.29			1.57
01/09/2021	7.12	7.95		3.90	40.06			
01/10/2021	7.08	7.82		4.00	39.76			
01/11/2021	7.12	8.00		3.40	40.88			0.26
01/12/2021	7.30	8.30		3.40	41.46	4.57	40.2	
01/13/2021	7.00	8.33		3.80	35.94			1.12
01/14/2021	7.29	8.35		4.10	37.61			
01/15/2021	7.39	8.30		3.50	39.52			0.74
01/16/2021	7.13	8.32		3.40	38.76			
01/17/2021	7.35	8.47		3.80	40.09			
01/18/2021	7.00	8.53		5.40	41.43			1.25
01/19/2021	7.33	8.51		3.90	40.98	5.19	46.0	
01/20/2021	7.42	8.58	515	3.80	40.16	*		0.86
01/21/2021	7.42	8.65		3.70	42.25			
01/22/2021	7.40	8.48		4.10	41.74			1.81
01/23/2021	7.34	8.38		4.20	44.41			
01/24/2021	7.32	8.43		4.00	37.90			
01/25/2021	7.18	8.45		3.70	43.74			1.32
01/26/2021	6.95	8.71		4.30	40.62	6.54	48.6	
01/27/2021	7.25	8.41		3.90	39.15			0.61
01/28/2021	7.27	8.27		3.90	44.30			
01/29/2021	7.24	8.24		4.70	45.74			0.65
01/30/2021	6.97	8.28		3.90	42.37			
01/31/2021	7.10	8.23		4.00	42.10			
Average Total	7.13	8.19	353	3.90	40.36	5.31	47.2	0.96

* indicates Geometric Mean

** indicates Intraday Average

Report Name: Tabular Report

February 2021	Raw Influent		Raw Influent Comp					Raw Influent Grab
	pH - Daily Minimum ( )	pH - Daily Maximum ( )	BOD - Total (mg/L)	O-PO4 (P) (mg/L)	NH3-N (mg/L)	Phosphorus (total) (mg/L)	Total Nitrogen (mg/L)	NO3+NO2-N (mg/L)
02/01/2021	7.02	8.29		3.50	40.21			1.32
02/02/2021	7.25	8.33		3.50	39.71	4.97	46.2	
02/03/2021	7.19	8.31	523	3.80	42.73			0.34
02/04/2021	7.23	8.30		3.60	41.77			
02/05/2021	7.09	8.33		4.20	41.04			2.46
02/06/2021	7.12	8.35		4.00	42.09			
02/07/2021	7.14	8.38		3.80	37.56			
02/08/2021	6.91	8.36		4.10	42.85			1.79
02/09/2021	6.97	8.27		3.70	41.04	5.04	44.9	
02/10/2021	6.85	8.20		3.60	41.84			1.70
02/11/2021	6.93	8.34		3.60	41.03			
02/12/2021	6.91	8.27		4.00	44.42			1.07
02/13/2021	6.79	7.93		4.00	43.43			
02/14/2021	6.70	7.88		4.20	42.70			
02/15/2021	6.72	7.88		3.80	41.97			
02/16/2021	6.95	8.22		3.70	33.47	5.74	41.0	0.55
02/17/2021	6.78	8.01	296	3.80	39.33			
02/18/2021	6.62	8.16		3.90	45.81			
02/19/2021	6.79	8.00		3.00	46.92			2.47
02/20/2021	6.83	8.06		3.70	38.14			
02/21/2021	6.93	8.22		4.00	39.68			
02/22/2021	7.03	8.22		0.58	14.58			1.91
02/23/2021	6.99	8.21		3.76	34.74	4.82	42.0	
02/24/2021	7.03	8.27						1.72
02/25/2021	6.93	8.26		3.94	29.78			
02/26/2021	6.97	8.20		3.44	34.36			0.13
02/27/2021	6.95	8.21		3.86	34.64			
02/28/2021	6.83	8.21		3.73	34.55			
Average Total	6.94	8.20	410	3.69	38.90	5.14	43.3	1.41

* Indicates Geometric Mean
** Indicates Intraday Average

Report Name: Tabular Report

March 2021	Raw Influent		Raw Influent Comp					Raw Influent Grab
	pH - Daily Minimum (-)	pH - Daily Maximum (-)	BOD - Total (mg/L)	O-PO4 (P) (mg/L)	NH3-N (mg/L)	Phosphorus (total) (mg/L)	Total Nitrogen (mg/L)	NO3+NO2-N (mg/L)
03/01/2021	6.90	8.25						2.76
03/02/2021	6.93	8.22		4.46	46.43	6.00	41.0	
03/03/2021	6.91	8.22		3.48	37.83			4.37
03/04/2021	6.96	8.30		4.07	42.32			
03/05/2021	6.76	8.30		3.67	31.75			1.29
03/06/2021	6.92	8.15		3.76	31.94			
03/07/2021	6.90	8.24		3.72	31.91			
03/08/2021	6.93	8.32		3.64	32.30			2.15
03/09/2021	7.01	8.33		3.98	39.17	4.57	43.3	
03/10/2021	6.92	8.26	281	3.66	34.07			0.3
03/11/2021	7.03	8.35		4.76	38.89			
03/12/2021	6.97	8.39		3.63	34.81			0.31
03/13/2021	6.91	8.29		4.06	37.36			
03/14/2021	6.66	8.14		3.66	34.85			
03/15/2021	6.44	8.30		3.45	37.59			3.18
03/16/2021	6.98	8.31		3.88	42.14	7.46	61.3	
03/17/2021	7.00	8.32		3.40	38.70			5.18
03/18/2021	7.01	8.22		4.09	42.84			
03/19/2021	6.88	8.26		4.58	44.15			2.99
03/20/2021	7.04	8.21		3.24	37.96			
03/21/2021	7.07	8.27		3.26	35.58			
03/22/2021	7.09	8.30		3.72	31.41			1.76
03/23/2021	7.10	8.28		3.62	36.27	4.92	43.5	
03/24/2021	7.64	8.30	375	3.26	28.31			1.70
03/25/2021	7.04	8.20		3.56	35.98			
03/26/2021	6.88	8.19						2.37
03/27/2021	7.01	8.23		3.17	30.67			
03/28/2021	6.97	8.25		3.43	28.51			
03/29/2021	6.92	8.27		3.41	35.43			1.24
03/30/2021	6.95	8.21		3.49	34.24	8.32	49.8	
03/31/2021	6.98	8.29		3.73	33.47			
Average Total	6.90	8.26	328	3.72	36.10	6.05	47.6	2.28

* Indicates Geometric Mean

** Indicates Intraday Average

April 2021

Kelowna Wastewater

Report Name: Tabular Report

April 2021	Raw Influent		Raw Influent Comp					Raw Influent Grab
	pH - Daily Minimum ( )	pH - Daily Maximum ( )	BOD - Total (mg/L)	O-PO4 (P) (mg/L)	NH3-N (mg/L)	Phosphorus (total) (mg/L)	Total Nitrogen (mg/L)	NO3+NO2-N (mg/L)
04/01/2021	6.72	8.28		4.63	41.30			2.52
04/02/2021	6.89	8.14		3.22	33.23			
04/03/2021	6.85	8.11		3.81	36.48			
04/04/2021	6.85	8.19		3.92	36.78			
04/05/2021	6.42	8.14		3.07	32.16			
04/06/2021	6.87	8.21		3.09	31.89	12.8	48.4	2.86
04/07/2021	6.73	7.93	407	3.56	40.99			
04/08/2021	6.76	7.79		3.36	33.06			
04/09/2021	6.44	7.66		4.71	43.96			0.89
04/10/2021	6.77	7.71		3.68	40.38			
04/11/2021	6.69	7.73		3.29	35.07			
04/12/2021	6.78	8.14		3.52	35.52			4.22
04/13/2021	6.95	8.24		3.66	36.08	6.93	52.5	
04/14/2021	6.98	8.26		3.17	34.26			2.81
04/15/2021	6.86	8.22		3.58	38.42			
04/16/2021	6.39	8.16		3.69	37.47			1.05
04/17/2021	6.91	8.00		3.10	29.69			
04/18/2021	6.67	8.17		3.27	32.84			
04/19/2021	6.87	8.22		3.36	36.82			2.75
04/20/2021	6.82	8.19		3.54	36.71	8.40	59.8	
04/21/2021	6.42	8.24	159	3.24	34.20			1.19
04/22/2021	6.77	8.25		3.60	35.24			
04/23/2021	6.36	8.16		3.71	43.29			1.11
04/24/2021	6.88	8.01		3.36	30.10			
04/25/2021	6.81	7.99		4.01	38.52			
04/26/2021	6.76	8.21		3.41	42.30			2.43
04/27/2021	6.73	8.24		3.30	39.57	4.68	36.9	
04/28/2021	6.73	8.24		3.12	36.01			2.07
04/29/2021	6.89	8.13		3.12	35.49			
04/30/2021	6.57	8.20						3.04
Average Total	6.74	8.11	283	3.52	36.50	8.20	49.4	2.24

* Indicates Geometric Mean
** Indicates Intraday Average

May 2021

Kelowna Wastewater

Report Name: Tabular Report

May 2021	Raw Influent		Raw Influent Comp					Raw Influent Grab
	pH - Daily Minimum ()	pH - Daily Maximum ()	BOD - Total (mg/L)	O-PO4 (P) (mg/L)	NH3-N (mg/L)	Phosphorus (total) (mg/L)	Total Nitrogen (mg/L)	NO3+NO2-N (mg/L)
05/01/2021	6.94	8.12		3.43	35.93			
05/02/2021	6.93	8.12		3.23	34.23			
05/03/2021	7.13	8.15		3.89	38.10			0.16
05/04/2021	6.90	8.16		3.74	38.79	5.04	37.8	
05/05/2021	6.91	8.14		3.72	41.98			0.20
05/06/2021	7.16	8.16		3.84	36.44			
05/07/2021	7.18	8.18		3.32	23.91			3.49
05/08/2021	7.07	8.15		2.98	37.14			
05/09/2021	6.99	8.11		3.16	34.03			
05/10/2021	7.07	8.18		3.46	37.49			3.58
05/11/2021	7.02	8.15		3.58	37.50	10.2	41.1	
05/12/2021	7.00	8.14		3.26	36.46			3.17
05/13/2021	7.01	8.17		3.66	40.26			
05/14/2021	6.86	8.16						3.60
05/15/2021	6.95	8.12						
05/16/2021	7.03	8.11		4.19	37.17			
05/17/2021	7.02	8.15		3.80	39.01			2.73
05/18/2021	7.04	8.15		3.39	39.42	5.13	37.4	
05/19/2021	6.97	8.13	197	3.49	37.81			2.05
05/20/2021	6.93	8.06		3.72	39.59			
05/21/2021	6.74	8.02		3.36	40.24			1.01
05/22/2021	6.85	7.92		2.79	35.60			
05/23/2021	6.89	7.94		3.92	43.71			
05/24/2021	6.82	7.72		3.18	40.46			
05/25/2021	6.87	8.02		3.43	38.91	4.37	35.5	0.95
05/26/2021	6.96	8.11		4.01	42.81			
05/27/2021	6.73	8.01		3.09	36.68			
05/28/2021	6.97	8.03		2.97	37.55			0.85
05/29/2021	6.94	8.00		2.84	36.53			
05/30/2021	6.82	7.95		2.66	33.61			
05/31/2021	6.83	8.02		3.08	39.12			1.01
Average Total	6.95	8.09	197	3.42	37.60	6.19	38.0	1.90

* Indicates Geometric Mean
** Indicates Intraday Average

Report Name: Tabular Report

June 2021	Raw Influent		Raw Influent Comp					Raw Influent Grab
	pH - Daily Maximum ( )	pH - Daily Minimum ( )	Total Nitrogen (mg/L)	Phosphorus (total) (mg/L)	NH3-N (mg/L)	O-PO4 (P) (mg/L)	BOD - Total (mg/L)	NO3+NO2-N (mg/L)
06/01/2021	7.99	6.68	39.1	6.06	32.33	2.54		
06/02/2021	7.94	6.83			36.87	3.16	176	0.45
06/03/2021	7.63	6.74			37.45	2.67		
06/04/2021	7.38	6.42			40.13	2.83		
06/05/2021	7.47	6.42			41.86	3.10		
06/06/2021	7.71	6.81			41.56	3.12		
06/07/2021	7.57	6.83			37.53	2.96		0.14
06/08/2021	8.06	6.91	34.8	4.97	39.35	3.27		
06/09/2021	8.18	6.36			38.30	3.19		0.32
06/10/2021	8.09	6.91			36.74	3.43		
06/11/2021	7.92	6.93			42.37	3.29		0.71
06/12/2021	7.84	6.89			40.66	3.21		
06/13/2021	7.75	6.86			37.11	2.74		
06/14/2021	7.87	6.11			41.74	3.01		
06/15/2021	9.03	6.61	43.0	5.01	44.68	3.86		0.62
06/16/2021	7.97	6.95			42.73	3.97	362	
06/17/2021	7.94	6.79			40.89	3.85		0.38
06/18/2021	7.94	6.09			40.40	4.10		
06/19/2021	7.90	6.85			37.87	2.92		
06/20/2021	7.94	6.85			39.33	3.31		
06/21/2021	7.92	6.83						1.28
06/22/2021	7.95	6.74	42.8	12.0	43.25	5.02		
06/23/2021	7.99	6.74			34.92	4.20		0.96
06/24/2021	7.84	6.77			39.41	4.44		
06/25/2021	7.79	6.77			43.06	4.00		1.82
06/26/2021	7.69	6.75			44.35	4.16		
06/27/2021	7.77	6.72			44.88	4.56		
06/28/2021	7.76	6.75			34.35	3.35		1.15
06/29/2021	7.91	6.87	38.4	5.70	42.48	4.21		
06/30/2021	7.86	6.84			40.35	3.62		1.41
Average Total	7.89	6.79	39.6	6.75	39.83	3.52	269	0.84

* Indicates Geometric Mean

** Indicates Intraday Average

Report Name: Tabular Report

	Raw Influent		Raw Influent Comp					Raw Influent Grab
July 2021	pH - Daily Minimum ()	pH - Daily Maximum ()	BOD - Total (mg/L)	O-PO4 (P) (mg/L)	NH3-N (mg/L)	Phosphorus (total) (mg/L)	Total Nitrogen (mg/L)	NO3+NO2-N (mg/L)
07/01/2021	6.62	7.81		3.35	39.01			
07/02/2021	6.60	7.79		3.94	39.61			
07/03/2021	6.69	7.79		3.84	39.98			
07/04/2021	6.60	7.82		4.20	42.20			
07/05/2021	6.78	7.87		4.25	33.43			1.60
07/06/2021	6.69	7.71		3.71	34.61	5.76	45.9	
07/07/2021	6.70	7.62		2.89	32.60			2.40
07/08/2021	6.65	7.70		3.45	39.74			
07/09/2021	6.75	7.78		4.06	40.30			1.48
07/10/2021	6.74	7.66		4.12	41.44			
07/11/2021	6.72	7.59		2.57	31.65			
07/12/2021	6.78	7.88		3.87	41.39			3.20
07/13/2021	6.86	7.88		3.98	41.89	5.20	39.0	
07/14/2021	6.83	7.81		3.64	35.52			3.33
07/15/2021	6.83	7.75		4.25	42.56			
07/16/2021	6.84	7.86		3.27	29.24			2.75
07/17/2021	6.83	7.87		2.84	27.46			
07/18/2021	6.76	7.75		2.90	26.26			
07/19/2021	6.65	7.82		3.14	29.99			1.99
07/20/2021	6.69	7.87		3.30	30.97	9.76	60.1	
07/21/2021	6.75	7.73	375	3.39	33.44			2.96
07/22/2021	6.69	7.70		3.89	34.82			
07/23/2021	6.66	7.66		3.82	33.85			2.99
07/24/2021	6.70	7.73		4.15	35.07			
07/25/2021	6.70	7.58		3.91	34.48			
07/26/2021	6.70	7.69		3.41	32.24			2.97
07/27/2021	6.76	7.76		3.39	33.57	10.8	34.0	
07/28/2021	6.70	7.82		4.09	38.31			2.63
07/29/2021	6.67	7.77		3.88	35.45			
07/30/2021	6.71	7.61		3.70	33.92			3.01
07/31/2021	6.69	7.69		4.16	33.71			
Average Total	6.73	7.75	375	3.66	35.44	7.88	44.8	2.58

* Indicates Geometric Mean

** Indicates Intraday Average

Report Name: Tabular Report

August 2021	Raw Influent		Raw Influent Comp					Raw Influent Grab
	pH - Daily Minimum ( )	pH - Daily Maximum ( )	BOD - Total (mg/L)	O-PO4 (P) (mg/L)	NH3-N (mg/L)	Phosphorus (total) (mg/L)	Total Nitrogen (mg/L)	NO3+NO2-N (mg/L)
08/01/2021	6.79	7.74		3.52	33.92			
08/02/2021	6.72	7.65		3.48	31.25			
08/03/2021	6.72	7.60		3.62	27.38	5.68	32.2	3.34
08/04/2021	6.74	7.56	439	4.10	29.09			
08/05/2021	6.83	7.76		3.78	28.33			
08/06/2021	6.22	7.74		4.10	31.38			2.12
08/07/2021	6.72	7.64		3.75	32.95			
08/08/2021	6.73	7.58		3.96	33.21			
08/09/2021	6.71	7.71		4.88	31.16			2.86
08/10/2021	6.71	7.69		4.42	33.58	7.31	55.4	
08/11/2021	6.44	7.79		4.66	39.22			2.85
08/12/2021	6.73	7.84		4.39	35.35			
08/13/2021	6.73	7.81		4.78	34.53			2.58
08/14/2021	6.64	7.63		4.45	34.08			
08/15/2021	6.65	7.35		4.30	32.74			
08/16/2021	6.79	7.57		3.78	29.09			1.38
08/17/2021	6.75	7.85		4.17	36.53	7.25	34.6	
08/18/2021	6.79	8.75	417	3.90	31.32			3.39
08/19/2021	6.74	7.69		4.22	33.44			
08/20/2021	6.78	7.73		4.07	34.05			2.70
08/21/2021	6.82	7.65		3.90	33.88			
08/22/2021	6.81	7.68		3.25	32.34			
08/23/2021	6.67	7.70		3.77	34.14			3.38
08/24/2021	6.58	7.53		4.46	37.28	5.18	36.3	
08/25/2021	6.56	7.34		6.92	56.32			4.12
08/26/2021	6.42	7.20		6.43	56.58			
08/27/2021	6.38	6.97		4.18	32.04			3.23
08/28/2021	6.41	6.98		4.94	37.11			
08/29/2021	6.42	7.14		3.43	26.24			
08/30/2021	6.57	7.82		4.26	42.86			3.60
08/31/2021	6.71	7.84		4.03	41.00	11.7	65.8	
Average Total	6.65	7.63	428	4.25	34.92	7.42	44.9	2.96

:ates Geometric Mean
:ates Intraday Average

Report Name: Tabular Report

September 2021	Raw Influent		Raw Influent Comp					Raw Influent Grab
	pH - Daily Minimum ( )	pH - Daily Maximum ( )	BOD - Total (mg/L)	O-PO4 (P) (mg/L)	NH3-N (mg/L)	Phosphorus (total) (mg/L)	Total Nitrogen (mg/L)	NO3+NO2-N (mg/L)
09/01/2021	6.80	7.60	529	4.05	38.20			1.18
09/02/2021	6.78	7.85		5.31	45.28			
09/03/2021	6.69	7.75		5.24	43.79			0.8
09/04/2021	6.74	7.70		4.14	44.24			
09/05/2021	6.69	7.59		4.22	44.36			
09/06/2021	6.81	7.60		4.30	42.27			
09/07/2021	6.70	7.75		5.18	44.86	6.49	46.8	1.15
09/08/2021	6.84	7.77		4.41	45.51			
09/09/2021	6.56	7.77		5.14	50.69			
09/10/2021	6.67	7.74		5.38	46.54			1.62
09/11/2021	6.40	7.69		4.63	43.93			
09/12/2021	6.68	7.55		4.61	44.85			
09/13/2021	6.77	7.78		3.93	41.60			0.19
09/14/2021	6.68	7.69		4.21	44.64	12.5	61.6	
09/15/2021	6.61	7.62	362	4.01	43.63			1.39
09/16/2021	6.65	7.55		3.80	40.74			
09/17/2021	6.72	7.68		4.85	47.13			0.86
09/18/2021	6.81	7.65		4.39	42.71			
09/19/2021	6.77	7.59		4.23	42.82			
09/20/2021	6.77	7.69		4.19	44.96			1.08
09/21/2021	6.76	7.78		4.75	49.37	7.09	59.9	
09/22/2021	6.66	7.59		3.93	45.76			0.91
09/23/2021	6.69	7.47		4.16	47.54			
09/24/2021	6.62	7.33		3.84	42.19			1.31
09/25/2021	6.62	7.33		3.59	42.03			
09/26/2021	6.88	8.19		3.80	41.10			
09/27/2021	6.75	7.73		3.95	41.28			1.41
09/28/2021	6.91	7.80		4.22	45.80	6.65	56.9	
09/29/2021	6.89	7.86		4.10	42.06			0.20
09/30/2021	6.86	7.67		3.73	40.58			
Average Total	6.73	7.67	446	4.34	44.02	8.18	56.3	1.01

* Indicates Geometric Mean

** *Indicates Intraday Average*

October 2021

Kelowna Wastewater

Report Name: Tabular Report

October 2021	Raw Influent		Raw Influent Comp					Raw Influent Grab
	pH - Daily Minimum ( )	pH - Daily Maximum ( )	BOD - Total (mg/L)	O-PO4 (P) (mg/L)	NH3-N (mg/L)	Phosphorus (total) (mg/L)	Total Nitrogen (mg/L)	NO3+NO2-N (mg/L)
10/01/2021	6.80	7.78		5.41	45.90			0.32
10/02/2021	6.70	7.64		4.67	51.70			
10/03/2021	6.79	7.51		3.32	42.29			
10/04/2021	6.81	7.73		4.07	46.32			0.60
10/05/2021	6.79	7.67		3.80	41.98	6.24	45.3	
10/06/2021	6.80	7.57	173	3.65	43.11			1.05
10/07/2021	6.80	7.73		4.89	52.15			
10/08/2021	6.76	7.66		4.75	50.84			2.15
10/09/2021	6.73	7.51		4.94	48.40			
10/10/2021	6.68	7.45		5.90	51.09			
10/11/2021	6.79	7.71		3.99	44.64			
10/12/2021	6.75	7.76		4.05	48.52	5.06	53.2	1.85
10/13/2021	6.81	7.71		4.30	53.03			
10/14/2021	6.84	7.82		4.66	53.36			
10/15/2021	6.84	7.83		5.44	48.63			1.13
10/16/2021	6.77	7.69		4.17	44.23			
10/17/2021	6.69	7.70		4.27	44.55			
10/18/2021	6.82	7.78		4.90	49.31			0.29
10/19/2021	6.66	7.74		4.43	46.61	7.15	56.3	
10/20/2021	6.72	7.49	383	4.25	40.43			0.17
10/21/2021	6.71	7.53		5.31	46.81			
10/22/2021	6.65	7.39		5.63	42.27			1.82
10/23/2021	6.65	7.34		5.18	45.10			
10/24/2021	6.66	7.32		4.37	46.03			
10/25/2021	6.72	7.65		4.31	41.55			1.95
10/26/2021	6.87	7.87		4.26	41.64	4.93	36.5	
10/27/2021	6.85	7.84		4.75	45.75			
10/28/2021	6.72	7.72		4.22	45.24			
10/29/2021	6.82	7.73						
10/30/2021	6.70	7.66						
10/31/2021	6.72	7.51		4.81	44.01			
Average Total	6.75	7.65	278	4.58	46.40	5.85	47.8	1.15

* indicates Geometric Mean

** *indicates Intraday Average*

November 2021	Raw Influent		Raw Influent Comp					Raw Influent Grab
	pH - Daily Minimum ( )	pH - Daily Maximum ( )	BOD - Total (mg/L)	O-PO4 (P) (mg/L)	NH3-N (mg/L)	Phosphorus (total) (mg/L)	Total Nitrogen (mg/L)	NO3+NO2-N (mg/L)
11/01/2021	6.39	7.10		5.89	55.23			
11/02/2021	6.34	7.15		3.48	39.98	5.54	47.8	
11/03/2021	6.39	7.26	260	4.01	43.90			1.31
11/04/2021	6.34	7.07		4.41	47.19			
11/05/2021	5.87	6.55		4.32	48.12			2.72
11/06/2021	5.71	6.78		4.12	45.99			
11/07/2021	6.59	7.37		3.95	43.61			
11/08/2021	6.58	7.34		3.82	41.32			2.34
11/09/2021	6.57	7.29		4.13	44.04	8.48	55.0	
11/10/2021	6.62	7.38		4.43	46.00			2.04
11/11/2021	6.73	7.66		4.67	47.82			
11/12/2021	6.73	7.65		4.60	45.36			1.51
11/13/2021	6.78	7.59		4.20	41.90			
11/14/2021	6.52	7.57		3.91	41.06			
11/15/2021	6.69	7.25		4.06	42.98			0.38
11/16/2021	6.72	7.52		3.97	42.31	6.93	57.3	
11/17/2021	6.61	7.49	633	4.57	43.14			0.99
11/18/2021	6.31	6.91		4.06	43.16			
11/19/2021	6.10	6.48						1.42
11/20/2021	5.97	6.93		4.06	41.55			
11/21/2021	6.57	7.27		3.88	41.13			
11/22/2021	6.30	6.88		3.89	42.14			1.28
11/23/2021	5.98	6.42		3.92	44.42	4.46	46.8	
11/24/2021	5.88	6.67		2.65	39.06			1.08
11/25/2021	6.38	7.00		2.14	37.92			
11/26/2021	6.12	6.65		5.62	43.51			1.56
11/27/2021	5.90	6.19		3.34	39.22			
11/28/2021	5.77	6.72		3.03	37.30			
11/29/2021	6.47	7.48		3.15	37.30			1.73
11/30/2021	6.81	7.70		3.50	41.07			
Average Total	6.36	7.11	447	3.99	43.03	6.35	51.7	1.53

* indicates Geometric Mean

** *indicates Intraday Average*

December 2021

Kelowna Wastewater

Report Name: Tabular Report

December 2021	Raw Influent		Raw Influent Comp					Raw Influent Grab
	pH - Daily Minimum ( )	pH - Daily Maximum ( )	BOD - Total (mg/L)	O-PO4 (P) (mg/L)	NH3-N (mg/L)	Phosphorus (total) (mg/L)	Total Nitrogen (mg/L)	NO3+NO2-N (mg/L)
12/01/2021	6.78	7.65	276.5					0.60
12/02/2021	6.78	7.69						
12/03/2021	6.81	7.65		4.14	47.21			
12/04/2021	6.71	7.53		3.48	44.80			
12/05/2021	6.69	7.45		3.12	41.81			
12/06/2021	6.76	7.67		3.67	40.70			1.58
12/07/2021	6.42	7.65		3.34	41.03	5.15	46.3	
12/08/2021	6.39	7.18		3.32	37.96			1.45
12/09/2021	6.26	6.90		3.86	43.49			
12/10/2021	6.21	6.89		3.95	43.27			2.10
12/11/2021	6.39	7.04		3.89	43.52			
12/12/2021	6.22	6.80		4.08	44.52			
12/13/2021	6.22	7.08		4.08	40.67			1.09
12/14/2021	6.66	7.61		4.17	44.24	8.20	49.5	
12/15/2021	6.84	7.71	296.5	4.10	43.05			1.68
12/16/2021	6.81	7.73		4.29	44.37			
12/17/2021	6.75	7.67						3.64
12/18/2021	6.71	7.58		4.74	42.99			
12/19/2021	6.66	7.47		3.93	43.25			
12/20/2021	6.80	7.60		4.41	43.40			0.85
12/21/2021	6.67	7.57		4.68	47.00	6.92	48.0	
12/22/2021	6.63	7.41						0.68
12/23/2021	6.37	7.07		3.80	42.79			
12/24/2021	6.15	6.65		3.59	42.67			1.52
12/25/2021	6.08	6.65		4.44	47.35			
12/26/2021	6.32	7.04		4.44	48.20			
12/27/2021	6.42	6.90		4.04	43.83			
12/28/2021	6.62	7.14		2.94	32.49	3.82	38.8	
12/29/2021	6.72	7.51		4.57	44.90			0.24
12/30/2021	6.84	7.62		4.15	43.42			
12/31/2021	6.75	7.58		3.09	40.31			3.36
Average Total	6.56	7.34	286.5	3.94	43.08	6.02	45.7	1.57

* Indicates Geometric Mean

*** Indicates Intraday Average*

Appendix C

Effluent Water Quality Reports

Report Name: Tabular Report

	Raw Influent	Final Effluent Daily Comp WWTF											Final Effluent		Final Effluent Grab	
January 2021	Flow (ML/d)	Phosphorus (total) (mg/L)	daily TP loading (kg/d)	O-PO4 (P) (mg/L)	NO3+NO2-N (mg/L)	NH3-N (mg/L)	Total Kjeldahl Nitrogen / TKN (mg/L)	Org N (mg/L)	Total Nitrogen (mg/L)	Suspended Solids (TSS) (mg/L)	BOD - Total (mg/L)	COD - Total (mg/L)	pH Daily Minimum ( )	pH daily maximum ( )	E.coli (IDEXX) Certified	Fecal (In-House)
1	30.38	0.110	3.34	0.06	4.10	0.44	1.98	1.54	6.09	1.5			6.70	6.88		
2	36.19	0.103	3.73	0.03	4.31	0.55	2.37	1.82	6.60	1.6			6.70	6.87		
3	38.37	0.107	4.11	0.00	3.74	0.46	2.34	1.88	6.16	1.5		46.3	6.69	6.86		
4	33.39	0.104	3.47	0.03	3.87	0.28	2.46	2.18	6.50	0.6			6.71	6.89		
5	33.03	0.0843	2.78	0.02	4.54	0.36	2.02	1.66	6.87	1.1		37.4	6.70	6.86		
6	33.11	0.117	3.87	0.03	5.34	0.32	2.66	2.34	7.80	1.2	1.88	40.0	6.69	6.85		
7	33.07	0.130	4.30	0.01	5.22	0.57	3.30	2.73	8.10	0.7			6.68	6.86	ND	ND
8	37.00	0.130	4.81	0.02	5.19	0.64	2.78	2.14	7.85	1.5			6.68	6.82		
9	32.31	0.136	4.39	0.02	4.76	0.72	2.46	1.74	7.31	1.6			6.68	6.84		
10	33.11	0.124	4.11	0.03	4.86	0.78	2.48	1.70	7.16	1.6		45.5	6.70	6.85		
11	32.62	0.123	4.01	0.00	4.35	0.64	2.49	1.85	6.99	1.7			6.72	6.87		
12	34.79	0.133	4.63	0.01	5.00	0.74	2.42	1.68	7.54	1.4		42.4	6.70	6.84		
13	34.07	0.111	3.78	0.02	5.04	0.95	3.44	2.49	8.20	1.4			6.68	6.80		
14	37.34	0.125	4.67	0.04	4.89	1.20	3.37	2.17	8.02	1.8		39.7	6.69	6.80		
15	38.52	0.134	5.16	0.04	5.33	1.21	2.68	1.47	7.81	1.4			6.69	6.78		
16	33.64	0.128	4.31	0.03	5.23	1.06	2.62	1.56	7.68	1.4			6.68	6.80		
17	33.66	0.133	4.48	0.04	4.96	0.93	2.44	1.51	7.20	0.9		44.5	6.71	6.83		
18	33.22	0.149	4.95	0.03	4.88	1.39	3.82	2.43	8.57	1.7			6.72	6.85		
19	35.06	0.147	5.15	0.03	5.59	1.21	3.22	2.01	8.77	1.0		41.4	6.69	6.78		
20	34.54	0.154	5.31	0.08	5.44	0.84	3.00	2.16	8.34	1.3	2.24	42.3	6.68	6.77		
21	35.35	0.144	5.09	0.06	5.38	0.84	3.33	2.49	8.81	1.2			6.68	6.81		
22	35.02	0.152	5.32	0.04	5.39	0.82	2.51	1.69	7.87	1.1			6.68	6.79		
23	35.76	0.230	8.22	0.10	5.03	0.89	2.56	1.67	7.34	1.7			6.68	6.81		
24	35.55	0.175	6.22	0.09	4.51	0.91	2.78	1.87	7.10	1.2		39.6	6.69	6.82		
25	34.90	0.173	6.04	0.06	4.41	0.95	3.08	2.13	7.23	1.4			6.71	6.84		
26	35.75	0.170	6.08	0.03	4.53	1.00	2.71	1.71	7.06	1.9		39.7	6.38	6.80		
27	35.65	0.162	5.78	0.06	4.94	0.87	3.00	2.13	7.63	0.9			6.39	6.53		
28	35.49	0.126	4.47	0.04	4.79	1.03	2.72	1.69	7.54	1.7		44.5	6.39	6.55		
29	35.73	0.176	6.29	0.08	5.09	0.96	2.53	1.57	7.57	0.8			6.39	6.54		
30	35.24	0.198	6.98	0.09	4.64	0.99	2.54	1.55	7.24	0.8			6.37	6.55		
31	37.07	0.270	10.0	0.13	3.86	1.04	2.48	1.44	6.46	1.0		44.4	6.39	6.57		
Average	34.80	0.1438	5.03	0.04	4.81	0.83	2.73	1.90	7.45	1.3	2.06	42.1	6.63	6.78		
Total	1,078.93		155.85													

* indicates Geometric Mean

*** indicates Intraday Average*

Report Name: Tabular Report

	Raw Influent	Final Effluent Daily Comp WWTF											Final Effluent		Final Effluent Grab	
February 2021	Flow (ML/d)	Phosphorus (total) (mg/L)	daily TP loading (kg/d)	O-PO4 (P) (mg/L)	NO3+NO2-N (mg/L)	NH3-N (mg/L)	Total Kjeldahl Nitrogen / TKN (mg/L)	Org N (mg/L)	Total Nitrogen (mg/L)	Suspended Solids (TSS) (mg/L)	BOD - Total (mg/L)	COD - Total (mg/L)	pH Daily Minimum ( )	pH daily maximum ( )	E.coli (IDEXX) Certified	Fecal (In-House)
1	36.57	0.171	6.25	0.05	3.52	0.93	3.31	2.38	6.82	1.5			6.40	6.59		
2	36.39	0.162	5.90	0.04	3.74	1.01	2.66	1.65	6.54	1.0		43.1	6.39	6.55		
3	36.03	0.179	6.45	0.06	4.11	0.89	3.32	2.43	7.42	1.6			6.39	6.53		
4	35.07	0.194	6.80	0.08	4.08	1.18	2.79	1.61	6.69	1.9	1.01	42.9	6.39	6.53		
5	34.83	0.192	6.69	0.09	4.16	1.41	2.84	1.43	6.76	1.3			6.39	6.53		
6	31.14	0.388	12.1	0.26	3.60	1.13	2.51	1.38	5.95	2.6			6.39	6.54		
7	34.99	0.334	11.7	0.18	3.11	1.59	2.88	1.29	5.83	2.2		43.7	6.39	6.57		
8	39.08	0.171	6.68	0.03	3.65	1.88	3.23	1.35	6.55	2.6			6.34	6.49		
9	39.26	0.125	4.91	0.03	4.15	2.18	4.01	1.83	7.85	2.0		43.1	6.31	6.48	ND	ND
10	37.33	0.126	4.70	0.02	4.34	2.14	3.64	1.50	7.64	1.7			6.32	6.46		
11	37.47	0.126	4.72	0.02	4.52	2.19	3.54	1.35	7.70	1.3		42.0	6.31	6.46		
12	32.99	0.122	4.02	0.07	4.32	1.93	3.64	1.71	7.60	1.7			6.29	6.47		
13	32.00	0.119	3.81	0.05	3.77	1.73	3.40	1.67	6.87	1.9			6.30	6.47		
14	33.31	0.116	3.86	0.05	3.43	1.33	2.90	1.57	6.09	1.9			6.38	6.55		
15	35.29	0.126	4.45	0.03	3.26	1.28	2.64	1.36	5.68	2.2		45.9	6.39	6.55		
16	36.93	0.133	4.91	0.02	3.55	1.23	2.58	1.35	5.86	1.4			6.39	6.55		
17	37.32	0.116	4.33	0.02	3.60	1.38	3.17	1.79	6.55	1.9	1.17	47.7	6.38	6.53		
18	37.51	0.110	4.13	0.02	4.09	1.23	2.66	1.43	6.57	1.3			6.34	6.51		
19	37.76	0.128	4.83	0.03	4.23	0.88	2.36	1.48	6.38	1.0			6.32	6.47		
20	38.12	0.132	5.03	0.04	3.55	0.72	2.33	1.61	5.98	1.1			6.32	6.47		
21	40.86	0.141	5.76	0.05	3.36	0.82	2.82	2.00	6.06	1.3		44.2	6.33	6.50		
22	38.94	0.125	4.87	0.02	2.96	0.51	2.11	1.60	5.46	0.8			6.35	6.53		
23	35.78	0.115	4.11	0.02	3.16	0.53	3.82	3.29	7.63	1.2		43.9	6.32	6.49		
24	37.32	0.143	5.34	0.02	4.33	0.70	2.33	1.63	6.72	0.9			6.32	6.46		
25	38.00	0.156	5.93	0.02	4.36	0.48	2.76	2.28	7.08	1.4		46.4	6.32	6.46		
26	33.58	0.145	4.87	0.03	3.85	0.58	3.30	2.72	7.26	1.2			6.32	6.49		
27	34.11	0.182	6.21	0.05	3.91	0.50	3.01	2.51	6.94	1.1			6.31	6.46		
28	34.91	0.266	9.29	0.12	3.09	0.52	3.10	2.58	6.68	2.1		43.4	6.32	6.48		
Average	36.17	0.162	5.81	0.05	3.78	1.17	2.99	1.81	6.68	1.6	1.09	44.2	6.35	6.51		
Total	1,012.89		162.65													

* indicates Geometric Mean

*** indicates Intraday Average*

March 2021

Kelowna Wastewater

Report Name: Tabular Report

March 2021	Raw Influent Flow (ML/d)	Final Effluent Daily Comp WWTF Phosphorus (total) (mg/L)	daily TP loading (kg/d)	O-PO4 (P) (mg/L)	NO3+NO2-N (mg/L)	NH3-N (mg/L)	Total Kjeldahl Nitrogen / TKN (mg/L)	Org N (mg/L)	Total Nitrogen (mg/L)	Suspended Solids (TSS) (mg/L)	BOD - Total (mg/L)	COD - Total (mg/L)	Final Effluent pH Daily Minimum ( )	Final Effluent pH daily maximum ( )	Final Effluent Grab E.coli (IDEXX) Certified	Final Effluent Grab Fecal (In-House)
1	33.95	0.142	4.82	0.04	3.35	0.66	2.28	1.62	5.81	1.9			6.33	6.49		
2	32.80	0.208	6.82	0.07	3.58	0.90	3.05	2.15	6.92	1.4		42.7	6.32	6.46		ND
3	33.51	0.184	6.17	0.03	4.28	0.93	2.71	1.78	7.11	2.1			6.30	6.44		
4	33.75	0.174	5.87	0.10	3.93	1.07	2.76	1.69	6.98	2.2		46.8	6.31	6.43		
5	33.56	0.175	5.87	0.03	2.53	0.61	2.57	1.96	6.45	1.4			6.31	6.41		
6	34.26	0.199	6.82	0.05	3.70	0.65	2.77	2.12	6.40	2.5			6.30	6.44		
7	34.39	0.138	4.75	0.03	3.16	0.81	2.67	1.86	6.09	2.5		42.2	6.21	6.39		
8	33.37	0.138	4.60	0.03	2.75	0.62	2.83	2.21	6.95	2.4			6.18	6.35		
9	33.49	0.161	5.39	0.05	4.43	1.20	3.01	1.81	7.73	2.9		41.7	6.15	6.31		
10	33.98	0.168	5.71	0.02	4.28	1.04	2.96	1.92	7.45	2.8	2.81	38.1	6.22	6.31		
11	34.46	0.141	4.86	0.02	3.27	0.63	2.70	2.07	7.02	2.9			6.25	6.38		
12	37.27	0.139	5.18	0.02	4.03	0.41	2.32	1.91	6.53	3.0			6.31	6.45		
13	31.49	0.155	4.88	0.02	3.25	0.28	2.18	1.90	5.80	3.0			6.33	6.50		
14	31.80	0.138	4.39	0.02	3.13	0.28	2.09	1.81	5.45	3.1		39.4	6.33	6.52		
15	32.17	0.121	3.89	0.02	3.58	0.22	1.90	1.68	5.66	2.5			6.33	6.53		
16	36.71	0.157	5.76	0.02	3.81	0.20	2.05	1.85	6.43	3.2		41.1	6.32	6.52		
17	35.68	0.125	4.46	0.02	4.77	0.27	2.14	1.87	7.08	3.0			6.31	6.50		
18	35.05	0.166	5.82	0.01	4.81	0.22	2.11	1.89	7.01	2.4		42.6	6.32	6.48		
19	33.33	0.137	4.57	0.02	4.07	0.15	1.87	1.72	6.05	2.0			6.33	6.51		
20	32.90	0.136	4.47	0.02	3.12	0.22	2.06	1.84	5.89	1.6			6.33	6.51		
21	33.29	0.139	4.63	0.02	3.38	0.45	2.23	1.78	5.90	2.3		40.1	6.26	6.52		
22	33.92	0.155	5.26	0.02	3.77	0.25	1.93	1.68	5.93	1.8			6.24	6.43		
23	34.16	0.132	4.51	0.02	3.61	0.26	2.11	1.85	6.27	1.7		42.7	6.26	6.47		
24	34.21	0.134	4.58	0.01	3.92	0.28	2.03	1.75	6.55	1.3	1.57	42.1	6.30	6.45		
25	34.50	0.140	4.83	0.01	3.78	0.30	1.93	1.63	6.38	2.2			6.30	6.48	ND	
26	34.71	0.150	5.21	0.02	3.53	0.29	1.98	1.69	6.10	1.4			6.31	6.48		
27	34.70	0.179	6.21	0.03	3.58	0.26	2.06	1.80	5.86	1.6			6.31	6.47		
28	35.77	0.158	5.65	0.02	3.26	0.25	1.99	1.74	5.88	2.0		42.9	6.33	6.49		
29	34.84	0.129	4.49	0.02	3.03	0.22	2.03	1.81	6.03	1.9			6.32	6.52		
30	34.47	0.136	4.69	0.03	2.79	0.20	2.03	1.83	6.41	2.6			6.30	6.47		
31	33.22	0.116	3.85	0.02	3.73	0.23	1.96	1.73	6.51	2.0		39.2	6.21	6.44		
Average	34.06	0.151	5.13	0.03	3.62	0.46	2.30	1.84	6.41	2.2	2.19	41.7	6.29	6.46		
Total	1,055.71		159.01													

* indicates Geometric Mean

*** indicates Intraday Average*

Report Name: Tabular Report

April 2021	Raw Influent	Final Effluent Daily Comp WWTF											Final Effluent		Final Effluent Grab	
	Flow (ML/d)	Phosphorus (total) (mg/L)	daily TP loading (kg/d)	O-PO4 (P) (mg/L)	NO3+NO2-N (mg/L)	NH3-N (mg/L)	Total Kjeldahl Nitrogen / TKN (mg/L)	Org N (mg/L)	Total Nitrogen (mg/L)	Suspended Solids (TSS) (mg/L)	BOD - Total (mg/L)	COD - Total (mg/L)	pH Daily Minimum ( )	pH daily maximum ( )	E.coli (IDEXX) Certified	Fecal (In-House) (MPN/100ml)
1	32.67	0.127	4.15	0.02	3.81	0.44	1.98	1.54	6.03	4.4			6.18	6.36		
2	32.47	0.138	4.48	0.03	3.85	0.52	1.96	1.44	5.75	3.7			6.18	6.34		
3	32.03	0.114	3.65	0.03	3.51	0.38	1.92	1.54	5.56	1.6			6.21	6.40		
4	32.09	0.120	3.85	0.03	3.22	0.43	2.14	1.71	5.60	2.2			6.26	6.41		
5	33.93	0.133	4.51	0.03	3.17	0.54	2.28	1.74	5.75	1.8		39.7	6.30	6.46		
6	34.59	0.152	5.26	0.02	3.60	0.53	2.23	1.70	6.04	0.7			6.31	6.45	ND	1
7	33.22	0.133	4.42	0.01	3.89	0.85	2.58	1.73	6.57	1.4	2.96	35.6	6.32	6.46		
8	33.45												6.30	6.42		
9	33.13	0.136	4.51	0.03	4.42	0.32	2.06	1.74	6.63	1.0			6.30	6.47		
10	33.30	0.156	5.19	0.03	4.23	0.36	2.15	1.79	6.53	0.5			6.31	6.46		
11	34.67	0.164	5.69	0.03	3.44	0.28	2.08	1.80	5.88	1.3		34.8	6.33	6.48		
12	34.48	0.168	5.79	0.03	3.59	0.19	1.83	1.64	5.64	1.5			6.32	6.50		
13	34.56	0.156	5.39	0.03	3.90	0.43	2.26	1.83	6.33	0.9		37.5	6.32	6.47		
14	34.76	0.171	5.94	0.03	4.16	0.44	1.99	1.55	6.17	1.1			6.32	6.46		
15	34.33	0.166	5.70	0.03	3.86	0.35	2.37	2.02	6.67	0.9		43.5	6.32	6.45		
16	33.77	0.139	4.69	0.04	3.15	0.20	1.94	1.74	6.00	1.7			6.27	6.46		
17	33.71	0.146	4.92	0.04	2.90	0.24	1.93	1.69	5.78	1.0			6.30	6.40		
18	34.89	0.154	5.37	0.03	3.18	0.31	1.96	1.65	5.68	2.0		36.7	6.31	6.45		
19	34.32	0.155	5.32	0.04	3.85	0.24	1.88	1.64	5.80	1.7			6.35	6.51		
20	33.61	0.140	4.71	0.03	4.15	0.21	1.93	1.72	6.48	2.0		42.1	6.30	6.49		
21	33.37	0.188	6.27	0.04	4.32	0.24	2.00	1.76	6.44	2.6	2.78	36.9	6.28	6.45		
22	33.31	0.192	6.40	0.03	3.48	0.22	1.97	1.75	6.43	2.3			6.27	6.43		
23	33.43	0.197	6.59	0.04	3.78	0.23	2.08	1.85	6.95	2.3			6.30	6.40		
24	33.85	0.230	7.79	0.05	3.80	0.51	2.55	2.04	6.95	2.2			6.33	6.47		
25	35.37	0.184	6.51	0.04	2.95	0.52	2.49	1.97	5.96	2.4		41.3	6.36	6.49		
26	34.27	0.168	5.76	0.04	2.94	0.29	1.90	1.61	2.24	2.7			6.37	6.51		
27	35.26	0.156	5.50	0.03	3.09	0.21	1.91	1.70	5.20	2.3		38.2	6.30	6.50		
28	34.64	0.152	5.27	0.03	3.11	0.16	1.63	1.47	4.80	1.8			6.29	6.47		
29	35.21	0.160	5.63	0.03	3.17	0.16	1.85	1.69	5.02	1.0		42.4	6.29	6.46		
30	35.21	0.150	5.28	0.04	3.26	0.19	1.70	1.51	5.08	1.0			6.31	6.47		
Average	33.93	0.157	5.33	0.03	3.58	0.34	2.05	1.71	5.86	1.8	2.87	39.0	6.30	6.45		1*
Total	1,017.90		154.54													

* indicates Geometric Mean

** *indicates Intraday Average*

Report Name: Tabular Report

May 2021	Raw Influent	Final Effluent Daily Comp WWTF											Final Effluent		Final Effluent Grab	
	Flow (ML/d)	Phosphorus (total) (mg/L)	daily TP loading (kg/d)	O-PO4 (P) (mg/L)	NO3+NO2-N (mg/L)	NH3-N (mg/L)	Total Kjeldahl Nitrogen / TKN (mg/L)	Org N (mg/L)	Total Nitrogen (mg/L)	Suspended Solids (TSS) (mg/L)	BOD - Total (mg/L)	COD - Total (mg/L)	pH Daily Minimum ( )	pH daily maximum ( )	E.coli (IDEXX) Certified	Fecal (In-House)
1	34.84	0.153	5.33	0.04	3.23	0.31	1.94	1.63	5.26	1.0			6.36	6.49		
2	35.92	0.152	5.46	0.03	2.89	0.37	1.94	1.57	4.90	2.0		37.5	6.39	6.55		
3	35.32	0.161	5.69	0.04	3.04	0.23	1.86	1.63	4.82	1.1			6.38	6.56		
4	34.29	0.127	4.35	0.03	3.47	0.21	1.78	1.57	5.22	1.1		42.6	6.32	6.52		
5	35.00	0.153	5.36	0.04	3.41	0.25	1.93	1.68	5.35	1.4	2.11	40.5	6.28	6.47		
6	35.05	0.155	5.43	0.03	3.84	0.24	1.84	1.60	5.66	1.2			6.27	6.44		ND
7	34.46	0.150	5.17	0.04	4.02	0.28	1.96	1.68	6.00	0.8			6.27	6.45		
8	34.78	0.149	5.18	0.06	4.20	0.40	2.10	1.70	6.00	0.8			6.34	6.48		
9	35.05	0.190	6.66	0.05	3.80	0.41	2.15	1.74	6.00	1.0		44.3	6.38	6.52		
10	34.88	0.190	6.63	0.04	4.01	0.30	2.02	1.72	6.03	1.0			6.38	6.56		
11	34.85	0.197	6.87	0.04	4.20	0.24	2.12	1.88	6.36	2.1		43.1	6.31	6.52	ND	
12	34.75	0.228	7.92	0.08	4.20	0.26	1.88	1.62	6.02	1.9			6.27	6.47		
13	34.73	0.299	10.4	0.16	4.18	0.35	1.79	1.44	5.90	2.1		37.2	6.27	6.44		
14	34.73	0.425	14.8	0.26	3.76	0.39	1.92	1.53	5.63	0.9			6.30	6.43		
15	34.48	0.377	13.0	0.24	3.25	0.35	2.04	1.69	5.76	0.4			6.34	6.48		
16	35.24	0.448	15.8	0.27	2.81	0.44	1.94	1.50	4.74	2.4		35.5	6.37	6.51		
17	35.35	0.235	8.31	0.12	2.90	0.42	2.54	2.12	5.35	1.4			6.38	6.53		
18	35.54	0.522	18.6	0.36	3.63	0.42	1.82	1.40	5.47	1.7		36.1	6.36	6.51		
19	35.98	0.760	27.3	0.66	3.61	0.57	2.13	1.56	5.76	1.6	2.23	37.1	6.34	6.49		
20	36.01	0.913	32.9	0.83	3.76	0.50	2.23	1.73	5.98	0.8			6.34	6.46		
21	35.56	0.229	8.14	0.11	3.21	0.38	1.98	1.60	5.19	1.7			6.35	6.50		
22	33.71	0.191	6.44	0.07	2.60	0.26	1.80	1.54	4.37	1.5			6.35	6.51		
23	33.25	0.188	6.25	0.08	2.62	0.21	1.69	1.48	4.30	1.5			6.36	6.52		
24	35.50	0.178	6.32	0.07	2.78	0.43	2.08	1.65	4.84	1.4		31.0	6.36	6.54		
25	35.74	0.201	7.18	0.07	2.63	0.32	1.88	1.56	4.58	1.2			6.39	6.54		
26	35.65	0.193	6.88	0.05	2.67	0.29	1.85	1.56	4.56	2.3			6.37	6.55		
27	35.02	0.153	5.36	0.04	3.34	0.27	1.96	1.69	5.18	1.4		30.1	6.37	6.52		
28	34.60	0.145	5.02	0.04	3.07	0.24	1.97	1.73	4.97	1.4			6.37	6.53		
29	34.04	0.163	5.55	0.04	2.80	0.25	1.67	1.42	4.18	2.0			6.37	6.52		
30	35.55	0.155	5.51	0.04	2.38	0.23	1.85	1.62	4.17	1.5		35.5	6.37	6.53		
31	35.24	0.142	5.00	0.05	2.83	0.16	1.75	1.59	4.24	1.1			6.39	6.56		
Average	35.00	0.256	8.99	0.13	3.33	0.32	1.95	1.63	5.25	1.4	2.17	37.5	6.35	6.51		
Total	1,085.11		278.81													

* indicates Geometric Mean

*** indicates Intraday Average*

Report Name: Tabular Report

June 2021	Raw Influent	Final Effluent Daily Comp WWTF											Final Effluent		Final Effluent Grab	
	Flow (ML/d)	COD - Total (mg/L)	BOD - Total (mg/L)	Suspended Solids (TSS) (mg/L)	Total Nitrogen (mg/L)	Org N (mg/L)	Total Kjeldahl Nitrogen / TKN (mg/L)	NH3-N (mg/L)	NO3+NO2-N (mg/L)	O-PO4 (P) (mg/L)	daily TP loading (kg/d)	Phosphorus (total) (mg/L)	pH daily maximum ( )	pH Daily Minimum ( )	Fecal (In-House)	E.coli (IDEXX) Certified
1	35.11	29.8		1.7	4.16	1.53	1.74	0.21	2.79	0.08	6.25	0.178	6.53	6.39	ND	
2	34.70	35.7	2.98	1.5	4.25	1.60	1.78	0.18	2.73	0.05	5.66	0.163	6.55	6.38		
3	34.94			0.8	4.66	1.79	2.15	0.36	2.55	0.05	6.36	0.182	6.52	6.38		
4	34.58			1.3	4.55	2.00	2.15	0.15	1.89	0.04	6.33	0.183	6.52	6.39		
5	33.99			0.8	4.66	2.18	2.33	0.15	1.80	0.04	6.12	0.180	6.52	6.39		
6	35.69	33.3		1.8	4.55	1.94	2.39	0.45	2.24	0.04	6.53	0.183	6.53	6.37		
7	35.27			1.4	4.32	1.80	2.08	0.28	2.25	0.04	4.55	0.129	6.52	6.37		
8	34.57	14.9		0.7	3.88	1.34	1.54	0.20	2.40	0.03	4.22	0.122	6.49	6.33		
9	34.12			1.7	4.07	1.64	1.84	0.20	2.22	0.04	5.39	0.158	6.50	6.32		
10	35.72	32.5		1.5	4.66	1.43	2.26	0.83	2.41	0.04	4.39	0.123	6.48	6.21		
11	36.63			1.1	4.84	1.93	2.27	0.34	2.15	0.03	4.84	0.132	6.30	6.16		
12	37.16			0.9	4.06	1.75	1.87	0.12	1.36	0.04	5.20	0.140	6.43	6.27		
13	38.00			1.7	3.62	1.49	1.80	0.31	1.83	0.03	5.24	0.138	6.52	6.39		
14	37.06	35.2		1.0	3.74	1.55	1.75	0.20	1.99	0.03	4.67	0.126	6.55	6.39		
15	34.05			1.9	3.84	1.50	1.71	0.21	2.13	0.04	4.56	0.134	6.51	6.36		
16	34.45	36.6	4.88	1.5	4.44	1.96	2.22	0.26	2.22	0.04	6.37	0.185	6.50	6.39		ND
17	34.32			1.3	3.99	1.70	1.87	0.17	2.18	0.02	4.74	0.138	6.54	6.40		
18	35.38			0.9	4.06	1.64	1.79	0.15	2.38	0.02	4.92	0.139	6.56	6.40		
19	33.13			1.3	4.05	1.78	2.04	0.26	2.13	0.11	7.49	0.226	6.57	6.40		
20	34.25	31.2		1.0	3.49	1.44	1.55	0.11	2.01	0.02	4.73	0.138	6.61	6.39		
21	35.04			1.9	3.58	1.59	1.68	0.09	1.98	0.05	4.66	0.133	6.60	6.39		
22	34.31	37.5		1.5	3.81	1.64	1.74	0.10	2.13	0.05	5.08	0.148	6.61	6.39		
23	34.42			1.4	3.50	1.43	1.53	0.10	1.96	0.06	5.68	0.165	6.61	6.39		
24	34.04	28.2		1.2	3.78	1.53	1.66	0.13	2.20	0.04	4.66	0.137	6.60	6.39		
25	34.16			0.9	3.84	1.60	1.74	0.14	2.16	0.05	5.26	0.154	6.57	6.39		
26	33.38			0.4	3.46	1.39	1.51	0.12	2.01	0.05	5.11	0.153	6.57	6.39		
27	34.12	37.4		1.0	3.30	1.36	1.48	0.12	1.87	0.06	5.36	0.157	6.59	6.39		
28	34.26			1.0	3.52	1.58	1.70	0.12	1.86	0.06	5.55	0.162	6.62	6.39		
29	34.97	36.9		1.4	3.49	1.51	1.69	0.18	1.91	0.05	5.39	0.154	6.59	6.39		
30	35.07			1.0	3.49	1.68	1.86	0.18	1.11	0.04	4.45	0.127	6.56	6.39		
Average	34.90	32.4	3.93	1.3	3.99	1.64	1.86	0.21	2.10	0.04	5.33	0.153	6.54	6.37		
Total	1,046.89										159.76					

* indicates Geometric Mean

*** indicates Intraday Average*

Report Name: Tabular Report

July 2021	Raw Influent	Final Effluent Daily Comp WWTF											Final Effluent		Final Effluent Grab	
	Flow (ML/d)	Phosphorus (total) (mg/L)	daily TP loading (kg/d)	O-PO4 (P) (mg/L)	NO3+NO2-N (mg/L)	NH3-N (mg/L)	Total Kjeldahl Nitrogen / TKN (mg/L)	Org N (mg/L)	Total Nitrogen (mg/L)	Suspended Solids (TSS) (mg/L)	BOD - Total (mg/L)	COD - Total (mg/L)	pH Daily Minimum ( )	pH daily maximum ( )	E.coli (IDEXX) Certified	Fecal (In-House)
1	39.31	0.115	4.52	0.02	1.49	0.33	1.80	1.47	3.26	0.9		20.9	6.39	6.58		
2	39.39	0.159	6.26	0.02	1.57	0.35	1.72	1.37	3.21	1.2			6.39	6.59		
3	43.80	0.174	7.62	0.04	1.26	0.14	1.74	1.60	3.33	0.6			6.39	6.59		
4	44.50	0.171	7.61	0.02	1.80	0.31	2.02	1.71	3.72	1.2		37.2	6.39	6.57		
5	44.05	0.142	6.26	0.05	1.86	0.18	1.72	1.54	3.52	1.6			6.40	6.59		
6	43.78	0.240	10.5	0.10	2.24	0.21	1.77	1.56	3.95	1.3		36.0	6.39	6.60	ND	ND
7	43.73	0.247	10.8	0.07	2.41	0.19	1.71	1.52	4.07	1.3	1.90	32.2	6.37	6.56		
8	43.93	0.823	36.2	0.60	2.53	0.31	1.69	1.58	4.29	2.9			6.38	6.57		
9	44.54	0.331	14.7	0.20	1.80	0.35	1.61	1.26	3.29	1.2			6.39	6.59		
10	40.78	0.204	8.32	0.09	1.82	0.29	1.49	1.20	3.17	1.2			6.38	6.55		
11		0.262		0.18	1.93	0.39	1.64	1.25	3.40	0.8		34.3	6.39	6.54		
12	41.00	0.225	9.22	0.19	1.90	0.24	2.06	1.82	3.80	2.0			6.39	6.57		
13	40.11	0.291	11.7	0.13	2.11	0.30	1.82	1.52	3.77	0.5		34.7	6.41	6.59		
14	45.60	0.293	13.4	0.13	1.96	0.22	2.16	1.94	3.94	1.0			6.46	6.66		
15	36.47	0.227	8.28	0.10	1.97	0.24	1.85	1.61	3.68	1.6		40.9	6.55	6.69		
16	38.42	0.175	6.72	0.07	1.78	0.21	1.73	1.52	3.38	0.4			6.41	6.68		
17	34.38	0.156	5.36	0.06	1.87	0.29	1.57	1.28	3.32	1.3			6.39	6.60		
18	35.11	0.182	6.39	0.07	1.86	0.29	1.62	1.33	3.35	1.2		29.6	6.39	6.57		
19	33.26	0.182	6.05	0.09	1.82	0.29	1.61	1.32	3.37	1.6			6.37	6.56		
20	32.76	0.176	5.77	0.17	1.76	0.26	1.60	1.34	3.26	0.8		33	6.39	6.54		
21	33.26	0.180	5.99	0.08	1.89	0.29	1.65	1.36	3.45	0.7	1.98	32.1	6.39	6.59		
22	34.60	0.199	6.89	0.06	2.02	0.35	2.00	1.65	3.91	1.0			6.39	6.59		
23	40.56	0.180	7.30	0.05	1.98	0.35	2.12	1.77	4.00	0.7			6.39	6.59		
24	35.20	0.174	6.12	0.07	1.84	0.26	1.64	1.38	3.42	0.2			6.39	6.59		
25	34.72	0.200	6.94	0.07	1.93	0.25	1.94	1.69	3.80	1.1		25.6	6.39	6.60		
26	33.17	0.178	5.90	0.06	2.13	0.19	2.20	2.01	4.24	1.6			6.40	6.62		
27	37.16	0.215	7.99	0.07	2.09	0.25	1.85	1.60	3.84	1.3		22.5	6.39	6.61		
28	32.76	0.212	6.95	0.05	2.25	0.26	2.23	1.97	4.34	1.3			6.39	6.58		
29	33.83	0.197	6.66	0.05	2.32	0.25	1.78	1.53	3.89	1.2		37.3	6.39	6.61		
30	32.90	0.243	7.99	0.11	2.23	0.27	2.12	1.85	4.35	4.9			6.39	6.59		
31	32.78	0.224	7.34	0.10	2.20	0.23	2.05	1.82	4.18	2.1			6.40	6.62		
Average	38.20	0.225	8.73	0.10	1.96	0.27	1.83	1.56	3.69	1.3	1.94	32.0	6.40	6.59		
Total	1,145.86		261.75													

* indicates Geometric Mean

*** indicates Intraday Average*

Report Name: Tabular Report

August 2021	Raw Influent Flow (ML/d)	Final Effluent Daily Comp WWTF Phosphorus (total) (mg/L)	daily TP loading (kg/d)	O-PO4 (P) (mg/L)	NO3+NO2-N (mg/L)	NH3-N (mg/L)	Total Kjeldahl Nitrogen / TKN (mg/L)	Org N (mg/L)	Total Nitrogen (mg/L)	Suspended Solids (TSS) (mg/L)	BOD - Total (mg/L)	COD - Total (mg/L)	Final Effluent pH Daily Minimum ( )	pH daily maximum ( )	Final Effluent Grab E.coli (IDEXX) Certified	Fecal (In-House)
1	31.75	0.242	7.68	0.78	2.09	1.39	2.08	0.69	4.39	1.0			6.39	6.62		
2	33.11	0.546	18.1	0.40	1.89	1.28	3.18	1.90	5.01	4.4		40.4	6.39	6.61		
3	33.65	0.223	7.50	0.11	1.88	0.46	2.21	1.75	4.13	1.2			6.40	6.60		
4	33.44	0.180	6.02	0.08	1.56	0.31	1.83	1.52	3.38	0.5	2.09	31.3	6.40	6.61		
5	32.87	0.213	7.00	0.08	1.65	0.29	2.06	1.77	3.73	1.1			6.40	6.62		
6	32.13	0.252	8.10	0.13	1.62	0.25	2.01	1.76	3.69	0.7			6.40	6.60		
7	33.81	0.204	6.90	0.07	1.74	0.35	2.19	1.84	3.98	1.3			6.40	6.63		
8	35.99	0.177	6.37	0.06	1.87	0.34	2.22	1.88	4.17	1.0		24.7	6.39	6.60		
9	36.17	0.221	7.99	0.13	1.55	0.27	1.72	1.45	3.25	0.6			6.40	6.61		
10	36.98	0.169	6.25	0.06	1.53	0.50	2.13	1.63	3.55	1.5		33.9	6.39	6.61	ND	ND
11	38.91	0.192	7.47	0.13	1.57	0.43	2.18	1.75	2.49	1.5			6.39	6.56		
12	34.43	0.185	6.37	0.11	1.75	0.25	1.55	1.30	3.31	0.8		36.0	6.39	6.62		
13	32.63	0.149	4.86	0.17	1.96	0.34	1.66	1.32	3.61	0.8			6.39	6.62		
14	31.61	0.178	5.63	0.16	2.00	0.38	1.92	1.54	3.94	1.1			6.39	6.59		
15	32.50	0.164	5.33	0.14	2.05	0.27	1.76	1.49	3.83	0.7		36.4	6.39	6.60		
16	33.18	0.214	7.10	0.22	2.49	0.27	1.71	1.44	4.16	2.1			6.39	6.62		
17	31.83	0.388	12.4	0.43	2.81	0.73	2.02	1.29	4.83	0.5		38.7	6.39	6.59		
18	33.26	0.389	12.9	0.25	2.76	0.43	1.88	1.45	4.47	0.5	2.34	34.9	6.39	6.57		
19	32.41	0.428	13.9	0.31	2.69	0.33	1.81	1.48	4.42	1.2			6.39	6.58		
20	37.29	0.454	16.9	0.35	2.52	0.43	2.17	1.74	4.62	0.5			6.39	6.57		
21	37.36	0.404	15.1	0.32	2.29	0.41	2.44	2.03	4.70	1.0			6.39	6.59		
22	43.15	0.316	13.6	0.21	2.22	0.58	2.12	1.54	4.28	1.1		43.5	6.40	6.59		
23	42.89	0.216	9.26	0.08	2.33	0.33	1.82	1.49	3.92	0.4			6.39	6.58		
24	37.59	0.180	6.77	0.07	2.46	0.21	1.70	1.49	4.08	1.2		39.9	6.39	6.60		
25	41.71	0.184	7.67	0.06	2.35	0.22	1.64	1.42	3.92	1.3			6.39	6.61		
26	41.85	0.161	6.74	0.05	2.26	0.21	1.74	1.53	3.93	1.6		44.3	6.39	6.61		
27	42.18	0.134	5.65	0.07	226	0.40	1.88	1.48	4.01	1.2			6.39	6.60		
28	41.88	0.148	6.20	0.06	2.20	0.39	2.00	1.61	4.10	1.6			6.40	6.60		
29	42.25	0.138	5.83	0.06	2.17	0.40	1.79	1.39	3.84	1.2		47.6	6.40	6.58		
30	42.87	0.149	6.39	0.04	2.18	0.34	1.73	1.39	3.82	0.9			6.39	6.60		
31	43.92	0.165	7.25	0.02	238	0.41	2.38	1.97	4.63	0.9		47.5	6.39	6.62		
Average	36.63	0.238	8.56	0.17	16.92	0.43	1.98	1.56	4.01	1.1	2.22	38.4	6.39	6.60		
Total	1,135.60		265.23													

ites Geometric Mean
ites *Intraday Average*

Report Name: Tabular Report

September 2021	Raw Influent	Final Effluent Daily Comp WWTF											Final Effluent		Final Effluent Grab	
	Flow (ML/d)	Phosphorus (total) (mg/L)	daily TP loading (kg/d)	O-PO4 (P) (mg/L)	NO3+NO2-N (mg/L)	NH3-N (mg/L)	Total Kjeldahl Nitrogen / TKN (mg/L)	Org N (mg/L)	Total Nitrogen (mg/L)	Suspended Solids (TSS) (mg/L)	BOD - Total (mg/L)	COD - Total (mg/L)	pH Daily Minimum ( )	pH daily maximum ( )	E.coli (IDEXX) Certified (MPN/100ml)	Fecal (In-House)
1	41.34	0.139	5.75	0.05	1.97	0.28	1.67	1.39	3.46	1.5	2.33	40.7	6.42	6.61		
2	38.27	0.178	6.81	0.05	1.81	0.31	2.07	1.76	3.73	2.1			6.40	6.61		
3	35.37	0.184	6.51	0.03	1.77	0.37	1.85	1.48	3.56	1.5			6.39	6.58		
4	31.87	0.157	5.00	0.03	1.92	0.33	1.81	1.48	3.67	2.2			6.39	6.57		
5	36.82	0.148	5.45	0.03	2.39	0.42	1.90	1.48	4.17	1.5			6.40	6.58		
6	34.55	0.156	5.39	0.04	2.40	0.70	2.14	1.44	4.41	2.2		40.2	6.39	6.58		
7	33.83	0.168	5.68	0.06	2.58	0.48	2.28	1.80	4.84	2.8			6.40	6.59		
8	32.83	0.175	5.75	0.06	3.11	0.45	2.05	1.60	4.96	1.5			6.40	6.50		
9	36.34	0.259	9.41	0.15	3.12	0.39	2.13	1.74	5.09	1.4		34.7	6.40	6.58		
10	36.78	0.204	7.50	0.10	3.18	0.32	1.73	1.41	4.68	0.8			6.40	6.60		
11	40.86	0.318	13.0	0.23	2.63	0.31	1.67	1.36	4.19	1.1			6.40	6.59		
12	42.62	0.182	7.76	0.09	2.59	0.42	1.92	1.50	4.34	0.7		39.5	6.40	6.62		
13	42.50	0.168	7.14	0.10	2.79	0.29	1.87	1.58	4.50	2.3			6.40	6.64		
14	37.42	0.178	6.66	0.07	3.34	0.23	2.08	1.85	5.30	1.3		43.8	6.39	6.60		ND
15	34.13	0.246	8.40	0.07	3.47	0.22	2.51	2.29	5.90	3.6	6.17	44.4	6.39	6.61		
16	37.70	0.141	5.32	0.04	3.52	0.22	1.68	1.46	4.89	0.4			6.39	6.60	1	
17	37.19	0.0952	3.54	0.06	3.25	0.21	1.78	1.57	4.57	1.3			6.39	6.63		
18	39.13	0.287	11.2	0.11	3.50	0.29	3.76	3.47	6.81	0.6			6.39	6.59		
19	39.47	0.168	6.63	0.08	3.33	0.38	1.88	1.50	4.78	2.1		47.0	6.40	6.62		
20	34.36	0.166	5.70	0.07	2.45	0.14	1.70	1.56	4.02	1.8			6.40	6.62		
21	33.57	0.164	5.51	0.07	3.53	0.35	2.01	1.66	5.15	1.5		43.5	6.40	6.65		
22	31.94	0.260	8.30	0.11	3.84	0.39	2.11	1.72	5.81	1.1			6.40	6.60		
23	33.48	0.176	5.89	0.06	3.89	0.37	1.94	1.57	5.53	1.3		40.9	6.40	6.63		
24	33.24	0.169	5.62	0.06	3.86	0.37	2.00	1.63	5.65	1.2			6.40	6.61		
25	31.88	0.169	5.39	0.05	3.39	0.34	1.96	1.62	5.19	1.2			6.40	6.63		
26	34.47	0.179	6.17	0.05	3.04	0.89	2.45	1.56	5.33	0.4		39.4	6.31	6.48		
27	35.60	0.200	7.12	0.05	3.66	0.49	2.50	2.01	5.91	2.1			6.39	6.61		
28	33.41	0.162	5.41	0.04	3.45	0.54	2.34	1.80	5.71	1.8		44.3	6.39	6.59		
29	33.89	0.168	5.69	0.05	3.62	0.51	2.24	1.73	5.45	2.4			6.41	6.59		
30	35.63	0.161	5.74	0.05	3.64	0.51	1.68	1.17	4.91	2.3		40.4	6.40	6.65		
Average	36.02	0.1842	6.65	0.07	3.03	0.38	2.06	1.67	4.88	1.8	4.25	41.6	6.39	6.60	1*	
Total	1,080.49		199.44													

* indicates Geometric Mean

*** indicates Intraday Average*

Report Name: Tabular Report

	Raw Influent	Final Effluent Daily Comp WWTF											Final Effluent		Final Effluent Grab	
October 2021	Flow (ML/d)	Phosphorus (total) (mg/L)	daily TP loading (kg/d)	O-PO4 (P) (mg/L)	NO3+NO2-N (mg/L)	NH3-N (mg/L)	Total Kjeldahl Nitrogen / TKN (mg/L)	Org N (mg/L)	Total Nitrogen (mg/L)	Suspended Solids (TSS) (mg/L)	BOD - Total (mg/L)	COD - Total (mg/L)	pH Daily Minimum [ ]	pH daily maximum [ ]	E.coli (IDEXX) Certified	Fecal (In-House) (MPN/100ml)
1	34.68	0.150	5.20	0.06	3.52	0.38	1.89	1.50	4.83	0.8			6.40	6.62		
2	33.16	0.142	4.71	0.06	3.40	0.41	1.88	1.47	4.80	0.7			6.39	6.61		
3	33.97	0.146	4.96	0.06	3.22	0.49	1.94	1.45	4.80	1.4		43.2	6.40	6.61		
4	33.67	0.148	4.97	0.06	3.76	0.36	1.88	1.53	4.26	1.2			6.40	6.65		
5	34.37	0.143	4.91	0.06	3.34	0.14	1.72	1.58	4.90	0.9		44.9	6.40	6.61	ND	1
6	34.25	0.148	5.07	0.06	3.61	0.19	1.70	1.51	4.66	1.4	3.10	45.8	6.40	6.63		
7	33.47	0.145	4.86	0.06	3.09	0.27	1.80	1.53	4.36	1.8			6.40	6.63		
8	37.73	0.156	5.86	0.06	3.06	0.28	1.96	1.68	4.53	1.2			6.39	6.59		
9	32.84	0.138	4.53	0.06	2.71	0.30	1.80	1.50	3.99	1.4			6.40	6.62		
10	34.71	0.138	4.79	0.04	2.66	0.40	1.90	1.50	4.04	0.5			6.40	6.63		
11	37.86	0.139	5.26	0.03	3.29	0.73	2.32	1.59	5.06	1.9		36.3	6.40	6.63		
12	36.72	0.147	5.40	0.04	3.55	0.59	2.18	1.59	5.49	0.5	*		6.39	6.60		
13	42.42	0.136	5.77	0.04	3.64	0.48	2.04	1.56	5.07	1.6			6.39	6.55		
14	40.64	0.146	5.93	0.04	3.54	0.44	1.87	1.43	4.81	1.1		33.2	6.39	6.57		
15	38.43	0.153	5.88	0.01	3.90	0.30	1.75	1.45	5.03	1.5			6.39	6.57		
16	33.20	0.154	5.11	0.01	3.26	0.33	1.75	1.42	4.81	1.0			6.39	6.59		
17	35.2	0.170	5.98	0.01	3.08	0.36	1.78	1.42	4.63	1.4		30.0	6.39	6.59		
18	36.28	0.146	5.15	0.07	3.29	0.19	1.60	1.41	4.98	0.9			6.39	6.61		
19	35.26	0.148	5.22	0.08	3.81	0.33	1.45	1.12	4.87	0.5		40.2	6.39	6.57		
20	33.77	0.230	7.77	0.12	4.11	0.97	2.54	1.57	5.16	2.3	1.67	33.8	6.39	6.53		
21	33.11	0.135	4.47	0.01	3.65	0.90	2.95	2.05	6.39	0.5			6.38	6.50		
22	35.1	0.154	5.41	0.04	3.51	0.65	2.01	1.36	5.11	0.7			6.39	6.53		
23	33.1	0.180	5.96	0.07	2.89	0.47	1.95	1.48	4.44	0.8			6.39	6.54		
24	34.71	0.162	5.62	0.04	2.73	0.47	2.04	1.57	4.46	1.2		41.3	6.39	6.55		
25	34.89	0.145	5.06	0.06	2.71	0.27	1.70	1.43	4.75	0.5			6.39	6.58		
26	35.13	0.206	7.24	0.08	3.20	0.30	1.92	1.62	4.90	0.4		42.6	6.39	6.56		
27	35.96	0.160	5.75	0.05	3.10	0.30	1.89	1.59	5.07	1.8			6.39	6.57		
28	36.3	0.181	6.93	0.05	3.27	0.64	2.26	1.62	5.26	1.0		37.1	6.38	6.56		
29	37.64	0.179	6.74	0.06	3.09	0.48	1.85	1.37	4.56	2.1			6.38	6.51		
30	36.17	0.280	10.1	0.14	2.60	0.53	1.92	1.39	4.24	1.6			6.38	6.52		
31	35.46	0.211	7.48	0.08	2.58	0.50	1.80	1.30	4.10	1.7		32.9	6.39	6.52		
Average Total	35.52 1,101.09	0.162	5.74 178.07	0.06	3.25	0.43	1.94	1.50	4.82	1.2	2.39	38.4	6.39	6.58		1*

* indicates Geometric Mean
** indicates Intraday Average

Report Name: Tabular Report

November 2021	Raw Influent	Final Effluent Daily Comp WWTF											Final Effluent		Final Effluent Grab	
	Flow (ML/d)	Phosphorus (total) (mg/L)	daily TP loading (kg/d)	O-PO4 (P) (mg/L)	NO3+NO2-N (mg/L)	NH3-N (mg/L)	Total Kjeldahl Nitrogen / TKN (mg/L)	Org N (mg/L)	Total Nitrogen (mg/L)	Suspended Solids (TSS) (mg/L)	BOD - Total (mg/L)	COD - Total (mg/L)	pH Daily Minimum ( )	pH daily maximum ( )	E.coli (IDEXX) Certified (MPN/100ml)	Fecal (In-House)
1	35.87	0.193	6.92	0.06	3.07	0.33	1.75	1.42	4.06	1.4			6.39	6.55		
2	35.56	0.244	8.68	0.09	4.00	0.53	1.99	1.46	5.14	1.5		37.9	6.37	6.50		
3	36.21	0.351	12.7	0.21	3.54	0.50	2.13	1.63	4.83	1.6	2.43	32.6	6.39	6.50		
4	35.27	0.352	12.4	0.17	3.51	0.54	2.20	1.66	4.93	1.5			6.39	6.52		
5	35.05	0.419	14.7	0.26	3.65	0.46	1.96	1.50	4.49	1.2			6.39	6.54		
6	35.14	0.300	10.5	0.12	2.83	0.18	1.71	1.53	3.70				6.39	6.52		
7	35.24												6.39	6.53		
8	34.68	0.251	8.70	0.11	3.82	0.86	2.48	1.62	5.12	0.7			6.39	6.54		
9	34.30	0.368	12.6	0.17	3.34	0.64	2.24	1.60	4.80	0.4		18.9	6.39	6.51		
10	33.94	0.186	6.31	0.05	3.82	0.40	1.97	1.57	4.30	1.1			6.39	6.52		
11	34.04												6.39	6.52		
12	36.55	0.160	5.85	0.06	2.57	0.17	2.00	1.83	5.09	1.3			6.39	6.52		
13	37.16	0.160	5.95	0.05	2.91	0.42	2.14	1.72	4.81	1.2			6.39	6.54		
14	40.54	0.169	6.85	0.04	3.13	0.88	2.28	1.40	4.64	1.4		35.6	6.37	6.51		
15	36.85	0.169	6.23	0.05	3.19	0.89	2.39	1.50	4.66	1.5			6.39	6.52		
16	34.51	0.159	5.49	0.03	3.90	0.85	2.29	1.44	5.19	1.4		40.5	6.37	6.47		
17	33.68	0.152	5.12	0.04	3.63	0.57	2.27	1.70	4.90	1.6	5.22	35.7	6.38	6.49		
18	37.64	0.222	8.36	0.04	3.86	0.73	2.40	1.67	5.34	1.8			6.39	6.51		
19	36.46	0.146	5.32	0.04	3.79	1.06	2.66	1.60	5.64	0.9			6.38	6.50		
20	34.79	0.164	5.71	0.05	2.95	1.13	3.83	2.70	6.41	1.0			6.37	6.49		
21	36.03	0.146	5.26	0.04	3.33	1.16	2.81	1.65	5.30	1.1		38.1	6.38	6.50		
22	35.60	0.142	5.06	0.03	3.46	0.93	2.70	1.77	5.23	1.0			6.39	6.52		
23	35.16	0.128	4.50	0.02	4.01	1.17	2.78	1.61	6.03	1.2		39.3	6.39	6.50		
24	36.02	0.173	6.23	0.02	3.97	1.45	3.01	1.56	6.17	0.8			6.39	6.48		
25	35.39	0.147	5.20	0.02	3.98	1.71	3.27	1.56	6.32	1.7		41.5	6.39	6.47	2.0	ND
26	35.10	0.150	5.26	0.03	3.25	1.23	3.61	2.38	6.11	0.6			6.39	6.48		
27	33.73	0.159	5.36	0.03	3.35	1.00	3.67	2.67	6.04	1.4			6.36	6.47		
28	34.17	0.153	5.23	0.03	3.71	1.45	3.30	1.85	5.67	1.2		42.3	6.37	6.47		
29	32.95	0.160	5.27	0.03	3.86	0.98	2.03	1.05	4.56	0.9			6.39	6.49		
30	32.55	0.167	5.44	0.03	4.05	0.95	2.60	1.65	5.40	1.6		37.5	6.37	6.49		
Average	35.34	0.203	7.19	0.07	3.52	0.83	2.52	1.69	5.17	1.2	3.83	36.4	6.38	6.51	2.0	
Total	1,060.18		201.20													

* indicates Geometric Mean

** *indicates Intraday Average*

December 2021

Kelowna Wastewater

Report Name: Tabular Report

December 2021	Raw Influent	Final Effluent Daily Comp WWTF										Final Effluent		Final Effluent Grab	
	Flow (ML/d)	Phosphorus (total) (mg/L)	daily TP loading (kg/d)	O-PO4 (P) (mg/L)	NO3+NO2-N (mg/L)	NH3-N (mg/L)	Total Kjeldahl Nitrogen / TKN (mg/L)	Org N (mg/L)	Total Nitrogen (mg/L)	Suspended Solids (TSS) (mg/L)	BOD - Total (mg/L)	COD - Total (mg/L)	pH Daily Minimum ( )	pH daily maximum ( )	E.coli (IDEXX) Certified (MPN/100ml)	Fecal (In-House)
1	33.22	0.168	5.58	0.04	5.06	0.88	2.65	1.77	5.47	1.4	2.69	43.6	6.39	6.48		
2	34.42	0.173	5.95	0.05	5.55	1.18	2.90	1.72	6.05	1.7			6.39	6.50		
3	34.29	0.180	6.17	0.03	4.26	0.37	2.94	2.57	6.13	1.1			6.39	6.50		
4	34.88	0.172	6.00	0.03	3.73	0.53	2.74	2.21	5.99	1.0			6.39	6.49		
5	36.19	0.169	6.12	0.02	4.46	1.25	2.79	1.54	5.67	1.3		44.4	6.39	6.50		
6	35.76	0.168	6.01	0.03	4.45	0.88	2.77	1.89	5.30	1.3			6.39	6.52		
7	35.41	0.197	6.98	0.04	4.38	1.15	2.97	1.82	6.04	2.8		43.4	6.39	6.49		
8	35.82	0.180	6.45	0.02	4.18	1.07	3.05	1.98	5.90	2.2			6.39	6.48		
9	35.48	0.189	6.71	0.02	4.35	1.22	2.99	1.77	5.93	2.0		43.5	6.39	6.47		
10	35.50	0.157	5.57	0.03	4.30	1.14	2.75	1.61	5.24	1.6			6.39	6.48		
11	36.15	0.168	6.07	0.03	3.74	1.16	2.83	1.67	5.08	1.8			6.39	6.49		
12	36.58	0.196	7.17	0.05	3.50	1.27	3.13	1.86	5.17	2.2		45.3	6.39	6.51		
13	36.20	0.233	8.43	0.06	3.33	0.98	3.51	2.53	5.67	2.1			6.40	6.52		
14	36.19	0.215	7.78	0.06	2.83	0.96	2.67	1.71	4.23	2.1		45.7	6.40	6.53		
15	35.44	0.329	11.7	0.04	4.95	1.13	3.06	1.93	4.80	2.0	3.36	47.6	6.40	6.51		
16	33.70	0.196	6.61	0.03	5.18	1.26	2.83	1.57	4.74	1.9			6.40	6.52	1.0	ND
17	33.07	0.183	6.05	0.13	2.36	1.61	3.14	1.53	5.16	1.8			6.39	6.52		
18	32.33	0.208	6.72	0.04	2.35	1.31	3.15	1.84	4.98	1.7			6.39	6.51		
19	31.98	0.225	7.20	0.05	2.15	1.26	3.30	2.04	5.26	2.3		47.1	6.40	6.54		
20	33.38	0.201	6.71	0.03	2.17	1.02	2.95	1.93	4.83	2.8			6.40	6.55		
21	32.56	0.196	6.38	0.03	2.16	1.13	2.56	1.43	4.50	3.1		48.2	6.40	6.53		
22	33.02	0.210	6.93	0.04	2.11	1.02	2.88	1.86	4.59	2.4			6.40	6.53		
23	34.27	0.211	7.23	0.05	2.00	1.13	2.64	1.51	4.27	2.8		47.2	6.40	6.55		
24	32.50	0.197	6.40	0.05	1.57	0.22	2.88	2.66	4.67	1.7			6.41	6.57		
25	31.16	0.211	6.57	0.03	2.05	0.53	4.45	3.92	6.30	2.2			6.41	6.59		
26	29.82	0.230	6.86	0.04	2.15	1.93	4.00	2.07	5.87	2.7		44.1	6.40	6.56		
27	32.90	0.260	8.55	0.06	1.98	1.83	4.54	2.71	6.10	2.8			6.40	6.56		
28	33.03	0.220	7.27	0.05	1.86	2.82	2.93	0.11	4.58	3.2		51.4	6.40	6.55		
29	34.46	0.364	12.5	0.12	1.70	3.95	6.10	2.15	7.43	5.2			6.41	6.56		
30	33.18	0.451	15.0	0.15	1.48	4.23	6.02	1.79	7.25	3.6		56.3	6.40	6.57		
31	33.60	0.427	14.3	0.19	1.60	3.92	5.92	2.00	7.19	3.4			6.41	6.57		
Average	34.08	0.222	7.55	0.05	3.16	1.43	3.36	1.93	5.50	2.3	3.03	46.8	6.40	6.52	1.0*	
Total	1,056.49		233.97													

* indicates Geometric Mean

** *Indicates Intraday Average*

Appendix D

Emergency Response Protocol

EMERGENCY RESPONSE MANUAL

Civic Operations

Wastewater Treatment Facility

2021

Wastewater Treatment Facility Emergency Response

4.5 Wastewater Treatment Facility Emergency Response

4.5.1 Influent Contamination Response

A toxic substance has entered the sanitary sewer system.

Immediately notify the Operations Foreman, if you are unable to reach the Foreman notify the Wastewater Manager. If unable to reach either of these individuals notify one of the WWTF Senior Operators. If any Mechanical and/or Electrical work is needed also notify the appropriate Foreman. Emergency contact list in appendix D of this document.

A small amount of a toxic substance easily identified by odor, colour, or pH, and a known spill to the sanitary sewer is at distance from the plant, allowing time to respond before it reaches the plant.

Objective: Contain the toxic substance in a primary clarifier and prevent it from reaching the bioreactor.

Before substance reaches WWTF:

1. Open influent gate to all primary clarifiers that are out of service. Do not put sludge withdraw valves into service.
2. Close influent gates to all primary clarifiers that were in service
3. Ensure drain valves are closed
4. Turn off ALL sources of internal recycle (filter backwash, centrifuge, DAF wasting, EQ basin, prowell pump, etc.) to reduce the volume of flow.
5. Close primary scum trough valve that feeds decanter.
6. Ensure all primary scum troughs are upright (closed).
7. Watch at the headworks for the first signs of the substance reaching the plant
8. Fill out emergency response report, Appendix A of this document.

When the substance reaches the headworks:

1. Take a grab sample of the influent.
2. Check odor, color and pH
3. Store samples as per instructions in response kit.
4. Repeat every 10 minutes until the substance clears the headworks.
5. During low flows
    a. Clarifiers 4 through 6 will fill in approximately 22 minutes
    b. Clarifiers 7 through 9 will fill in approximately 29 minutes.

When the substance clears the headworks:

1. Take one more grab sample to confirm that influent is clear of the toxic substance.
2. Check odor, color and pH
3. Open influent gates to all primary clarifiers that were taken out of service.
4. Close influent gates to all primary clarifiers that were put into service.
5. Turn on all sources of internal recycle that were turned off (filter backwash, centrifuge, DAF wasting, EQ basin, prowell pump, etc.).

Removal of contaminated liquid will be assessed and direction provided by Foreman or Manager.

4.5.1 Influent Contamination Response continued

A toxic spill to the sanitary sewer is too large to contain in primary clarifiers, or is not detected until it has already reached the primary clarifiers, or has entered the bioreactor. It is readily identified by odor, colour or pH.

Objective: contain damage to one train of the bioreactor, and prevent mixing of poisoned primary effluent and biomass with living biomass.

Before substance reaches bioreactors

1. Open influent gate to all primary clarifiers that are out of service. Do not put sludge withdraw valves into service.
2. Close influent gates to all primary clarifiers that were in service.
3. Close rotorks to all primary clarifiers that were in service.
4. Turn off ALL sources of internal recycle (filter backwash, centrifuge, DAF wasting, EQ basin, prowell pump, etc.) to reduce the volume of flow.
5. Plug off scum troughs.
6. Fill out emergency response report, Appendix A of this document.

If the substance has reached the bioreactors:

1. Open influent gates to a bioreactor that is out of service.
2. Close influent gates to all bioreactors that were in service.
3. Turn off RAS and WAS pumps for bioreactors that were in service.
4. Turn off ALL sources of internal recycle (filter backwash, centrifuge, DAF wasting, EQ basin, prowell pump, etc.) to reduce the volume of flow.
5. Turn off supernatant pumps
6. Fill out emergency response report, Appendix A of this document.

When the substance reaches the headworks:

1. Take a grab sample of the influent.
2. Repeat every 10 minutes until the substance clears the headworks.

When the substance clears the headworks:

1. Take one more grab sample to confirm that influent is clear of the toxic substance.
2. Open influent gate to all primary's that were in service.
3. Return rotorks to normal operation primary's that were taken out of service.
4. Close influent gates to all primary clarifiers that were put in service
5. Turn on ALL sources of internal recycle (filter backwash, centrifuge, DAF wasting, EQ basin, prowell pump, etc.) to reduce the volume of flow.
6. Remove plugs from scum troughs.
7. Open influent gates to bioreactors that were in service.
8. Close influent gates to all bioreactors that were put in service.
9. Turn on RAS and WAS pumps for bioreactors that were in service.
10. Turn on sources of internal recycle (filter backwash, centrifuge, DAF wasting, EQ basin, prowell pump, etc.) to reduce the volume of flow.
11. Turn on supernatant pumps

Removal of contaminated liquid will be assessed and direction provided by Foreman or Manager.

4.5.2 Permit Violation

Effluent quality has already or may potentially violate the operating permit.

Objective: Correct problem as soon as possible.

Ammonia and/or Total Phosphorous

1. Online Analyzer has alerted you via Total N &/0r Total P alarm
2. To verify effluent is exceeding or is expected to exceed the Operating Permit (See chart below) grab a sample from the UV building effluent channel and test for ammonia (NH3) and Ortho Phosphorous (OPO4).
3. If the plant effluent is exceeding permit levels open all effluent gates to all out of service primary clarifiers.
4. 4. Notify the Operations Foreman, if you are unable to reach the Foreman notify the Wastewater Manager. If unable to reach either of these individuals notify one of the WWTF Senior Operators. If any Mechanical and/or Electrical work is needed also notify the appropriate Foreman.
5. Fill out emergency response report, Appendix A of this document.

Total Suspended Solids

1. If TSS is exceeding or expected (High Disc Filter Levels) to exceed the Operating Permit (See chart below).
2. Open all effluent gates on all out of service primary clarifiers.
3. Perform a TSS analysis on final effluent.
4. If the TSS is exceeding Operating Permit levels. 4. Notify the Operations Foreman, if you are unable to reach the Foreman notify the Wastewater Manager. If unable to reach either of these individuals notify one of the WWTF Senior Operators. If any Mechanical and/or Electrical work is needed also notify the appropriate Foreman.
5. Fill out emergency response report, Appendix A of this document.

Ministry of Environment Daily Maximum Values:

TP 2.0 mg/L TN 10.0 mg/L TSS 10.0 mg/L

UV banks are not operating:

1. Immediately 4. Notify the Operations Foreman, if you are unable to reach the Foreman notify the Wastewater Manager. If unable to reach either of these individuals notify one of the WWTF Senior Operators. If any Mechanical and/or Electrical work is needed also notify the appropriate Foreman.
2. Open all effluent gates on all out of service primary clarifiers.
3. Fill out emergency response report, Appendix A of this document.

Next steps will be assessed and direction provided Foreman or Manager.

4.5.3 Major Component or Tankage Failure

A major process component has failed. This may include anything from mechanical failure to failed containment walls in the bioreactor, primary and secondary clarifiers, fermenter, etc.

Immediately 4. Notify the Operations Foreman, if you are unable to reach the Foreman notify the Wastewater Manager. If unable to reach either of these individuals notify one of the WWTF Senior Operators. If any Mechanical and/or Electrical work is needed also notify the appropriate Foreman.

Objective: Prevent damage to public and private property, injury to staff and the public, and restore the plant to operation as soon as possible.

1. If there is danger of fire or explosion contact the Fire Hall
2. If the component failure results in a chemical spill to the environment refer to the Chemical Spill Response section of this manual.
3. Divert flows to any undamaged tanks that are not in use.
4. Isolate failed component.
5. Fill out emergency response report, Appendix A of this document.

Next steps will be assessed and direction provided Foreman or Manager.

4.5.4 Outfall Pipe Failure

A major failure of the outfall pipe has occurred.

Immediately 4. Notify the Operations Foreman, if you are unable to reach the Foreman notify the Wastewater Manager. If unable to reach either of these individuals notify one of the WWTF Senior Operators. If any Mechanical and/or Electrical work is needed also notify the appropriate Foreman.

Objective: Prevent flooding of private property due to effluent overflow.

1. Open influent gates to all secondary clarifiers that are not in service
2. Fill out emergency response report, Appendix A of this document.

Next steps will be assessed and direction provided Foreman or Manager.

4.5.5 Chemical Spill Response

A chemical spill has occurred within the plant and may impact the environment or plant influent.

Immediately 4. Notify the Operations Foreman, if you are unable to reach the Foreman notify the Wastewater Manager. If unable to reach either of these individuals notify one of the WWTF Senior Operators. If any Mechanical and/or Electrical work is needed also notify the appropriate Foreman.

Objective: Prevent injury or loss of life to staff and the public. Contain and clean up the spill as soon as possible.

1. Follow all chemical safety procedures, refer to MSDS.
2. If isolation or repair of the leak can be done safely proceed with the isolation or repair.
3. If spill is to the environment the Supervisor or Foreman will contact the MoE.
4. If the spill is contained on site and will affect the influent, open influent gates on all primary's that are out of service.
5. Utilize chemical spill containment equipment.
6. Complete spill report form located in this document.
7. Fill out spill incident report, Appendix B of this document.

Next steps will be assessed and direction provided Foreman or Manager.

4.5.6 Genset Power Failure

Genset power to the plant has been interrupted and will remain off for an undetermined amount of time.

Immediately 4. Notify the Operations Foreman, if you are unable to reach the Foreman notify the Wastewater Manager. If unable to reach either of these individuals notify one of the WWTF Senior Operators. If any Mechanical and/or Electrical work is needed also notify the appropriate Foreman.

Objective: Maintain flow to the plant and maintain highest possible level of treatment until power is restored.

1. Start the 200 kw genset to provide power to the raw pumps.
2. Manually open influent screen gates.
3. Fill out emergency response report, Appendix A of this document.

Next steps will be assessed and direction provided Foreman or Manager.

4.5.7 Flood Emergency Response

Flooding is affecting or is expected to affect the daily quantity of influent to the Wastewater Treatment Facility.

Immediately 4. Notify the Operations Foreman, if you are unable to reach the Foreman notify the Wastewater Manager. If unable to reach either of these individuals notify one of the WWTF Senior Operators. If any Mechanical and/or Electrical work is needed also notify the appropriate Foreman.

Objective: Maintain the efficient operation of the plant while still fulfilling the requirements of the plant operating permit.

1. When influent flow exceeds 800 lps for 1 hour open gate to all primary clarifiers that are out of service.
2. Fill out emergency response report, Appendix A of this document.

Next steps will be assessed and direction provided Foreman or Manager.

4.5.8 Fire Emergency Response

Immediately 4. Notify the Operations Foreman, if you are unable to reach the Foreman notify the Wastewater Manager. If unable to reach either of these individuals notify one of the WWTF Senior Operators. If any Mechanical and/or Electrical work is needed also notify the appropriate Foreman.

1. Call the fire department.
2. If fire involves chemicals refer to MSDS.
3. Extinguish or attempt to control small fires, but at no time risk life or injury by fighting a large fire; close doors; have all personnel leave the area.
4. Meet the fire trucks at the main gate and assist the first firefighters by directing them to the fire.
5. If effluent quality if effected refer to Permit Violation Response section of the manual.
6. Fill out emergency response report, Appendix A of this document.

Next steps will be assessed and direction provided Foreman or Manager.

Appendix A

Emergency Response Report

City Staff Reporting or Receiving Report of an Emergency:

Name:	Date:	Time: a.m.☐ p.m.☐

Person Reporting Emergency (if other than City Staff)

Name:	Telephone No.:
Address:	

Emergency Details

Location:

Type of Emergency (i.e. fire, flood etc.):

Surroundings:

Agencies Contacted:

Forward To: _____
(Immediate Supervisor)

Action Taken:

Comments:

Immediate Supervisor's Signature _____

Date _____

Forward to: _____
(Unit Supervisor)

Action Taken:

Comments:

Submitted:

Motor Vehicle Accident Report ☐

Property Damage Report ☐

Spill Incident Report ☐

Notice of Contamination ☐

Unit Supervisor's Signature _____

Date _____

Forward To: Section Superintendent

Appendix B
Spill Incident Report

City Staff Reporting or Receiving Report of a Spill:

Name:	Date:	Time: a.m.☐ p.m.☐

Person Reporting Spill (if other than City Staff)

Name:	Telephone No.:
Address:	

Incident Details

Location:

Substance (i.e. oil, acid, etc.):

Reportable Quantity?	Discharge to Secondary Containment?	Discharge to Environment?
Yes ☐ No ☐	Yes ☐ No ☐ N/A ☐	Yes ☐ No ☐

Affected Areas:

Agencies Contacted:

Forward To: _____
(Immediate Supervisor)

Action Taken:

Comments:

Immediate Supervisor's Signature _____
Date _____

Forward to: _____
(Unit Supervisor)

Action Taken:

Comments:

Submitted:
Motor Vehicle Accident Report ☐
Property Damage Report ☐
Emergency Response Report ☐
Notice of Contamination ☐

Unit Supervisor's Signature _____
Date _____

Forward To: Section Superintendent
Forward To: Strategic Project Manager

Appendix C

City of Kelowna Wastewater Treatment Facility and d Utilities Network Emergency Contact List

SPILLS TO SANITARY SEWER:

WWTF Office Hours (7:00 a.m. – 3:30 p.m.)
Front Desk: 250-469-8502

Wastewater Source Control Technician (Sanitary Sewer) Karolina Radic:
Office: 250-469-8866 Cell: 250-869-2173

WWTF After Hours:
Firehall: 250-469-8801
Firehall Dispatch: 250-469-2206

	Home	Office	Cellular
Foreman (Henry Kohout)	250-765-4263	250-469-8429	250-870-3962
Foreman (Mike Humes)	250-768-2669	250-469-8870	250-300-0226
Foreman (Doug Tomlin)	250-768-9343	250-469-8871	250-870-8317
Wastewater Manager (Mike Gosselin)	250-859-1158	250-468-8867	250-859-1158
Senior Operators:			
Rick Hildred	250-765-0003		250-870-8316
Kevin Bakay	250-764-0465	250-763-2627	250-859-4223
Sam Lange	250-765-9892		250-869-2548
Water/Wastewater Manager (Kevin Van Vliet)	250-764-6222	250-469-8826	250-864-7240
Director- Civic Operations (Joe Creron)	250-707-0204	250-469-8833	250-717-6234

SPILLS TO STORM SEWER:

Utilities Network Maintenance Office Hours (7:00 a.m. – 3:30 p.m.**)**
Front Desk: 250-469-8501
Drainage Technician (Storm Sewer) Office : 250-469-8887 Cell: 250-470-3503

Utilities Network Maintenance After Hours
Firehall: 250-469-8801
Firehall Dispatch: 250-860-6419 (911)

	Home	Office	Cellular
Utility Networks Foreman (Mark Torgerson)	250-763-2422	250-469-8918	250-470-3505
Utility Operations Supervisor (Mike Murrell)	250-862-4828	250-469-8914	250-717-7901

Additional Emergency Numbers

Fire Department		250-860-6419 (911)
Police Department		911
Ambulance Service		911
Central Okanagan Regional District		250-763-4918
Highways Dept. (Electrical) Contractor: Westcana		1-800-840-8690
City Electrical (call KFD Dispatch)		250-860-6419
Irrigation Districts (call KFD Dispatch)		250-860-6419
Argo Road Maintenance		1-800-663-7623
Fortis		1-866-436-7847
(call KFD for other emergency numbers after hours)		
Hazardous Material Spills		1-800-663-3456
Canutec (chemical spills)	(collect)	(613) 996-6666 Cell call *666
Glenmore-Ellison Irrigation District (GEID)		250-763-6506
South-East Kelowna Irrigation District (SEKID)		250-861-4200
Rutland Waterworks		250-765-5218
Black Mountain Irrigation District (BMID)		250-765-5169

The following is a partial list of available services and equipment within the Central Okanagan Regional District. All equipment rentals must go through City Equipment for approval.

4.7.2 Bottled Water Suppliers In R.D.C.O.

Canadian Springs Water Co. Ltd.	250-860-0007
Culligan Water Conditioning 1950 Windsor Rd, Kelowna	250-806-6733

4.7.3 Public Works and Transportation

Geddes Construction	250-765-1411 fax 250-765-9277
Kettle Valley Construction	250-491-0504 fax 250-491-4959
Bennett Contracting	250-491-0400
Serwa Bulldozing	250-860-2388
Danric Construction	250-763-4100
R & L Excavating	250-765-0330
Dobbin And Son	250-763-7077
Novatech	250- 765-1588
Mandrax Enterprise	250-769-3338
Ensign Bros.	250-769-7298

Village of Peachland	250-767-2647
City of Kelowna	250-469-8500

4.7.4 Rental Agencies

Winn Rentals	250-491-1991
Westside Rentals	250-769-7606

4.7.5 Farm Equipment Sales & Repair

Farmco Sales	250-765-8266
Kelowna Farm Equipment	250-765-8022
Prairie Coast Equipment	250-765-9765

4.7.6 Crane Service

Kelowna Crane Service	250-862-8188
Stump Busters Crane Service	250-863-0705
Dave's Crane & Equipment	250-764-7108
New West Industries	250-766-2271

4.7.7 Fuel Suppliers

Chevron Canada	250-763-3515
Petro Canada	250-491-0427
4 Refuel	1-888-473-3835

4.7.8 Electrical Equipment Suppliers

Gescan Electrical Distributors	250-860-2334
Guillevin Electric	250-860-2259
Wesco- Westinghouse	250-862-8200
Westburne Electric Supply	250-860-4988

4.7.9 Toilet Rental Service in R.D.C.O.

Fermco Rental and Sales Ltd. 2810-27A Ave., Vernon	250-542-4331
Interior Portable Rentals 3123 Addison Rd. Kelowna	250-765-1198

4.7.10 Truck Repair Shops in R.D.C.O.

Central Valley Truck Service Ltd.		250-765-7738
105 Adams Road, Kelowna	FAX	250-765-7705
Cookson Motors		250-763-2327
1150 Gordon Drive, Kelowna		
M & T Northside Services		250-763-4006
127 Ellis Street, Kelowna		

Appendix E

Sanitary Sewer Bylaw

SUMMARY:

The Sanitary Sewer/Storm Drain Regulation bylaw requires that all properties located within a sanitary sewer specified area must be connected to sewer. The bylaw sets out the connection standards and requirements for both sanitary sewer and storm drain systems and outlines the types of waste that may be discharged into the system.

This bylaw is a 'consolidated' version and includes amendments up to the date listed in the bylaw heading. It is placed on the Internet for convenience only, is not the official or legal version, and should not be used in place of certified copies which can be obtained through the Office of the City Clerk at City Hall. Plans, pictures, other graphics or text in the legal version may be missing or altered in this electronic version.

Bylaw No. 10549 deleted the Table of Contents.

CITY OF KELOWNA

BYLAW NO. 6618-90
REVISED: December 12, 2011

CONSOLIDATED FOR CONVENIENCE TO INCLUDE BYLAW NO. 7378, 7841 & 10549

SANITARY SEWER/STORM DRAIN REGULATION BYLAW

WHEREAS it is expedient that all real property that has shared in sewer extension costs and is capable of being served by a sanitary sewer, should be so served and connected;

AND WHEREAS there are possible components of sewage in various concentrations which are detrimental or costly to the operation and maintenance of the sewage or drain systems and must be prohibited;

AND WHEREAS it is deemed necessary and expedient to regulate the operation and use of the sanitary sewer and storm drain systems of the City;

BL10549 replaced the following:
AND WHEREAS pursuant to Section 8(2) and 8(3) of the Community Charter the Municipal Council may by bylaw regulate, prohibit and impose requirements in relation to municipal services;

NOW THEREFORE, the Municipal Council of the City of Kelowna, in Open Meeting Assembled, enacts as follows:

SECTION 1 - ADMINISTRATION AND GENERAL REQUIREMENTS

1.1 SCOPE

1.1.1 This bylaw provides for the regulation and use of sanitary sewers and storm drains.

1.1.2 This bylaw may be cited as "Sanitary Sewer/Storm Drain Regulation Bylaw, No. 6618-90".

1.1.3 The provisions of this bylaw shall apply to all direct or indirect discharges to any part of the public sewerage or drain system.

1.1.4 This bylaw, among other things, regulates the quantity and quality of discharged wastes and the degree of pre-treatment required; and provides for the approval of plans for waste treatment.

1.1.5 Nothing in this bylaw relieves any person or organization from complying with any provision of any Federal or Provincial legislation, or any other bylaw of the City of Kelowna.

1.2 DEFINITIONS

1.2.1 In this bylaw, unless the context otherwise requires, the following words and terms shall have the meanings hereinafter assigned to them:

B.O.D. or "biochemical oxygen demand" means the quantity of oxygen utilized in the biochemical oxidation of organic matter under standard laboratory conditions in five (5) days at 20°C, expressed in milligrams per litre as determined by the appropriate procedure in "Standard Methods".

Building Sewer means a pipe that is connected to a building drain one (1) metre outside a wall of a building and that leads to a public sewer or drain or a private sewage disposal system.

Catch Basin means an inlet structure to the City's storm drain system.

City means the City of Kelowna, in the Province of British Columbia.

BL10549 deleted definition of City Engineer.

BL10549 amended definition:
City Inspector means the Manager Building & Permitting Branch or duly authorized representative.

C.O.D. or "chemical oxygen demand" means the measure of the oxygen consuming capacity of inorganic and organic matter present in domestic or industrial wastewater as determined by the appropriate procedure described in "Standard Methods".

BL7841 adds the following definition:
Cooling Water means untreated water originating from heat exchangers or similar type units.

BL7841 added the definition for Director of Works & Utilities and BL10549 deleted the definition.

Domestic means resulting from natural processes and not produced by commercial or industrial activities.

Domestic Wastewater means the water carried wastes produced from non-commercial or non-industrial activities and which result from normal human living processes.

Effluent means the liquid outflow of any facility designed to treat or convey wastewater.

Flammable liquid means any liquid having a flash point below 38°C and having a vapour pressure not exceeding 280 kPa at 38°C.

Garbage means solid wastes from domestic and commercial preparation, cooking, and dispensing of food, and from the handling, storage and sale of produce.

Grab Sample means an aliquot of a sampled stream or discharge collected at one particular time and place.

Grease means an organic substance recoverable by procedures set forth in "Standard Methods" and includes but is not limited to hydrocarbons, esters, fats, oils, waxes and high molecular carboxylic acids.

Industrial wastewater means all water carried wastes and waste-water excluding domestic wastewater and uncontaminated water, and includes all wastewater from any processing, institutional, commercial, or other operation where the wastewater discharged includes wastes of non-human origin.

BL10549 added definition for Manager:
Manager means the City's Manager of Utility Services, along with other City staff, who oversee the day-to-day-operation of the Sanitary Sewer and Storm Drainage systems, and administers this bylaw.

Municipal/Municipality means the City of Kelowna.

Municipal Council means the duly elected Officials of the City of Kelowna.

Offal means waste portions of food, animals, fowl or fish.

BL7841 amended definition:
One-operating-day Composite Sample (one day sample) means a composite sample discharge consisting of flow proportioned samples collected at consecutive one-hour intervals over the duration of one operating day as outlined in Schedule "E", attached to and forming part of this bylaw.

Person includes any person, a corporation, partnership or party, and the personal or other legal representative of a person to whom the context can apply according to law.

Pesticide means an organism or material that is represented, sold, used or intended to be used to prevent, destroy, repel or mitigate a pest and includes:

(a) a plant growth regulator, plant defoliator or plant desiccant; and

(b) a control product, other than a device that is a control product under the Pest Control Products Act (Canada).

pH means logarithm, to the base 10, of the reciprocal of the concentration of Hydrogen ions in moles per litre of solution.

Plumbing Code means any regulation made by the Lieutenant Governor of the Province of British Columbia, in accordance with Section 740 of the Municipal Act.

Plumbing fixture means a receptacle, appliance, apparatus or other device that discharges sewage or clear-water waste, and includes a floor drain.

Regional District means the Regional District of Central Okanagan.

Sanitary Sewer Specified Area means an area of land within the City, defined by bylaw adopted by the Municipal Council, which is designated to receive works or service from the municipality.

Sanitary Sewer System means all sewerage works and all appurtenances thereto, including sewer mains, service connections, pumping stations, treatment plants, lagoons and sewer outfalls laid within any highways, municipal right-of-way or easement and owned and operated by the Municipality and installed for the purpose of conveying, treating and disposing of domestic municipal wastes and industrial wastes.

Septic Tank means any device or structure designed for the temporary storage of wastewater.

Service Connection means a pipe at property line connecting a sanitary sewer or storm drain to a building sewer, storm building sewer or to land on which building or structures are situated.

BL7841 deletes the definition for Sewage Control Manager in its entirety.

Sewage treatment plant means any arrangement of devices and structures used for treating wastewater.

Sewer means a pipe, including manholes and other appurtenances other than a service connection, in the sewer system.

BL7841 added definition:

Special Waste means a substance that is defined as "Special Waste" as interpreted by the Waste Management Act.

BL10549 amended definition:

Standard Methods means the Standard Methods for the Examination of Water and Wastewater (21stth Edition, 2005, or current edition at the time of testing, as published by the American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF).

BL7378 amended definition:

Storm Drain System means a storm sewer system and all works and appurtenances thereto including mains, ditches, catch basins, pumping stations, drywells and outfalls laid within any highway, municipal right-of-way, or easement owned and operated by the Municipality for the purpose of conveying and disposing of rainwater, and/or ground water and/or uncontaminated wastewater.

Storm Water means water originating from rainwater, snow melt, and/or ground water including roof drain water and foundation drain water.

Suspended Solids means the solid matter according to particle size, expressed in milligrams per litre, in a liquid as determined according to "Standard Methods".

Two-Hour Composite Sample means a composite sample consisting of equal portions of 8 Grab Samples collected at consecutive 15-minute intervals.

Uncontaminated Wastewater means water such as spent cooling water, dechlorinated water discharged from a swimming pool, water used in street cleaning.

Wastewater means the water-borne wastes of the municipality derived from human or industrial sources including domestic wastewater and industrial wastewater, but does not include rain water, ground water, or drainage of uncontaminated water.

Watercourse means:

(i) the bed and shore of a river, stream, lake, creek, lagoon, swamp, marsh or other natural body of water; or

(ii) a channel, ditch, reservoir or other man-made surface feature;

whether they contain or convey water continuously or intermittently.

1.3 CONNECTION REQUIREMENT

1.3.1 The owner of every parcel of real property within a Sanitary Sewer Specified Area, for which a service connection to the sanitary sewer system can be, or has been made, and upon which a building or structure containing a plumbing fixture is situate, shall connect such building or structure to the service connection.

BL10549 amended the following:

1.3.2 In the event of any owner failing to make the required connection within sixty (60) days of being notified in writing by the City to do so, the Manager may order the required connection be made by City workmen or others at the Owner's expense and the expenses incurred shall become a lien on the land or real property on or for which the charge is imposed, done or provided and the City may recover the expenses in a similar manner to municipal taxes and the expenses shall be subject to the same penalty and interest additions as municipal taxes.

BL10549 amended the following:

1.3.3 The Manager may allow any owner of real property outside of an existing Sanitary Sewer Specified Area to connect into the existing sanitary sewer system on the basis of the following:

(a) the owner paying all costs of extending the City's sanitary sewer system including sewer development charges;

(b) the owner paying a share of an existing or future proposed specified area cost including administration and bylaw amendment costs.

In either case, approval must be granted by Municipal Council.

1.4 APPLICATION FOR SANITARY SEWER OR STORM DRAIN CONNECTION

BL10549 amended the following:

1.4.1 (a) A Property owner must make application to the City to install a Service Connection to the City Sanitary sewer or Storm Drain System in the form prescribed for that purpose by the City.

(b) At the time of making the application referred to in section 1.4.1 (a), the Property owner shall pay an installation fee equivalent to the estimated cost of installing the Service connection, as determined by the Manager.

(c) After completion of the installation of the Service connection, the actual cost of the installation shall be determined by the Manager and any variation of more than 10% or $500.00 whichever is greater from the fee paid under section 1.4.1 (b), shall be refunded by or be payable to the City, as applicable.

(d) The applicant or an agent on his behalf must also obtain a plumbing permit and pay a sewer or drainage development charge unless such charge has been collected under the Development Cost Charge Bylaw requirements.";

1.5 SERVICE CONNECTIONS STANDARDS

BL10549 amended the following:

1.5.1 Every service connection shall be installed in accordance with the standards contained in the Subdivision, Development & Servicing Bylaw No. 7900 as amended or revised and shall be installed prior to the installation of every building sewer or storm building sewer. The City shall not be responsible to meet the elevation or connect to an existing building or storm building sewer installed by the owner prior to installation of the sewer connection. Building owners shall be required to meet the sewer or drain connection elevation.

1.6 BUILDING AND STORM BUILDING SEWER AND INSPECTION

BL10549 amended the following:

1.6.1 Every building sewer or storm building sewer shall be constructed at the cost of the owner in accordance with the standards contained in the Subdivision, Development & Servicing Bylaw No. 7900, as amended or revised, and to the requirements of the British Columbia Plumbing Code and the Kelowna Plumbing Regulation Bylaw No. 5968-87. The Manager may require conformity with Bylaw No. 7900 in the case of larger or special situations.

1.6.2 The owner shall notify the City Inspector as soon as the work for which a connection permit has been issued is ready for inspection and no building sewer or storm building sewer work shall be covered until it has been inspected and approved.

1.6.3 If upon inspection it is determined that any building sewer or storm building sewer work is defective, or that such work was not ready for inspection after notification as required by Article 1.6.2, the owner shall file a further Notice of Inspection, together with the required fee to cover the cost of such extra inspection.

1.6.4 The building sewer or storm building sewer shall be repaired and maintained by the property owner or occupant at their expense. The service connection will be repaired and/or replaced by the City as deemed appropriate, but the maintenance such as unplugging or clearing a blockage will be the responsibility of the property owner or occupant.

BL10549 amended the following:

1.6.5 Where any building sewer or storm building sewer is abandoned, the owner or occupant shall notify the City Inspector, and, upon receiving proper authorization, the owner or occupant shall block and/or seal the service connection. The service connection shall be blocked at the property line, or at the sewer main, as specified by the Manager, and the costs of such work shall be borne by the property owner or occupant.

1.7 INTERFERENCE WITH SEWER AND DRAIN SYSTEM

BL10549 amended the following:

1.7.1 No person shall do any work upon, or interfere in any way with the sanitary sewer or storm drain system without the written permission of the Manager.

BL10549 amended the following:

1.7.2 No person shall enter or work upon the sewer system without meeting the applicable confined space entry, street regulations or other safety requirements, required by the Workers' Compensation Act, being Chapter 492 of the R.S. B.C 1996 and amendments thereto.

1.8 SEWER AND DRAIN RATES

1.8.1 All sanitary sewer and storm drain rates and charges are levied and administered by a separate bylaw.

1.9 SEPTIC TANKS

BL10549 amended the following:

1.9.1 No septic tank shall be connected to the storm drain system. No septic tank shall be connected to the sanitary sewer without the express written approval of the Manager.

1.9.2 No person shall permit any sludge or deposit contained in any septic tank to enter into the sanitary sewer or storm drain system. All sludge or septic tank deposits shall be disposed of at the Regional District's disposal facility.

1.10 RIGHT OF ENTRY

BL10549 amended the following:

1.10.1 The Manager and anyone authorized by him is hereby authorized to enter upon any property or premises at any reasonable time in order to ascertain whether or not the regulations contained in this bylaw have been complied with.

BL10549 amended the following:

1.10.2 Any person interfering with or obstructing the entry of the Manager or his duly authorized representative into any premises, after that person has identified himself, shall be guilty of an offense under this bylaw and shall be liable to the penalties provided herein.

BL10549 amended the following:

1.10.3 No person shall hinder or prevent the Manager or his duly authorized representative from entering and making reasonable inspection of any building or premises whenever necessary to secure compliance with, or prevent a violation of any provisions of this bylaw.

SECTION 2 - WASTE DISCHARGE

2.1 PROHIBITED WASTES

BL10549 amended the following:

2.1.1 No person shall discharge or permit to be discharged into any pipe, main, conduit, manhole, street inlet, gutter or aperture draining into the sanitary sewer system or storm drain system:

(a) Any gasoline, benzene, naphtha, alcohol, fuel, oil, solvents, acetone or flammable or explosive liquid, solid or gas.

(b) Any pesticides, insecticides, herbicides or fungicides save and except chemicals contained in storm water emanating from trees or vegetation treated in accordance with the INTEGRATED PEST MANAGEMENT ACT, SBC 2003, and amendments thereto.

(c) Any corrosive, noxious or malodorous gas, liquid, or substance which either singly or by interaction with other wastes, is capable of:

(i) creating a public nuisance or hazard to life;

(ii) preventing human entry into a sewer or pump station; or

(iii) causing damage to the sewerage system.

(d) Radioactive material - except within such limits as are permitted by license issued by the Atomic Energy Control Board of Canada.

(e) Any material from a cesspool.

(f) Any solid or viscous substance capable of obstructing wastewater flow or interfering with the operation of the sewerage system or treatment facilities. These substances include but are not limited to ashes, cinders, grit sand, mud, straw, grass clippings, insoluble shavings, metal, glass, rags, feathers, tar, asphalt, creosote, plastics, wood, animal paunch contents, offal, blood, bones, meat trimmings and waste, fish or fowl head, shrimp, crab or clam shells, fish scales, entrails, lard, mushrooms, tallow, baking dough, chemical residues, cannery or wine waste, bulk solids, hair and fleshings, spent grain and hops, whole or ground food or beverage containers, garbage, paint residues, cat box litter, slurries of concrete, cement, lime or mortar.

(g) Any storm water or uncontaminated wastewater into the sanitary sewer system.

(h) Any domestic wastewater or industrial wastewater into the storm drain system.

(i) Any waste, liquid or material classified as a 'Hazardous Waste' pursuant to the provisions of the ENVIRONMENTAL MANAGEMENT ACT, S.B.C., 2003, and amendments thereto.

2.2 STANDARDS FOR RESTRICTED WASTES

2.2.1 Sanitary Sewer System

No person shall discharge or permit to be discharged into any pipe, main, conduit, manhole, street inlet, gutter, or aperture draining into the sanitary sewer system:

(a) any non-domestic waste having a B.O.D. in excess of 500 milligrams per litre as analyzed in a one-operating day Composite Sample, 1000 milligrams per litre as analyzed in a 2-hour Composite Sample, and 2000 milligrams per litre as analyzed in a Grab Sample;

(b) any non-domestic waste having a C.O.D. in excess of 750 milligrams per litre as analyzed in a one-operating-day Composite sample, 1500 milligrams per litre as analyzed in a 2-hour Composite sample, and 3000 milligrams per litre as analyzed in a Grab sample.

(c) any non-domestic waste which contains suspended solids in a concentration that is in excess of 600 milligrams per litre as analyzed in a one-operating-day Composite Sample, 1200 milligrams per litre as analyzed in a 2-hour Composite Sample, and 2400 milligrams per litre as analyzed in a Grab Sample;

(d) any garbage that has been ground, comminuted or shredded by a garbage disposal unit;

(e) any non-domestic liquid or vapour having a temperature higher than 65° Celsius;

(f) any non-domestic waste which contains oil and grease in a concentration that is in excess of 150 milligrams per litre as analyzed in a one-operating day Composite Sample, 300 milligrams per litre as analyzed in a 2-hour Composite Sample, and 600 milligrams per litre as analyzed in a Grab Sample, and any non-domestic waste which contains oil and grease derived from a petroleum source in a concentration that is in excess of 15 milligrams per litre as analyzed in a one-operating-day Composite Sample, 30 milligrams per litre as analyzed in a 2-hour Composite Sample, and 60 milligrams per litre as analyzed in a Grab Sample;

(g) any substance which may solidify or become viscous at temperatures above 0° Celsius;

(h) any non-domestic waste which has a pH lower than 5.0 or higher than 11.0 as determined by a Grab Sample of the discharge, or less than 5.5 or higher than 10.5 as determined by a two-hour Composite Sample.

(i) any water or waste that will by itself or with other water or wastes in the sewerage system, release noxious gases, or create any other condition deleterious to the pipe, gaskets, structures or treatment processes;

(j) any water or waste containing dyes or colouring materials which pass through a sewage works and discolour the sewage works effluent, with the exception of dyes used by the City for testing purposes;

(k) any water or waste containing a hazardous or a toxic or poisonous substance in sufficient quantity to injure or interfere with any sewer, sewage treatment equipment and sewage treatment process, to constitute a hazard to humans or animals, or to create any hazard in the receiving waters or the effluent of the sewage treatment plant.

(l) any material which exerts or causes:

(i) unusual concentrations of inert suspended solids, such as, but not limited to, fuller's earth;

(ii) unusual concentrations of dissolved solids such as but not limited to sodium chloride, calcium chloride or sodium sulphate;

(m) any water or waste added for the purpose of diluting wastes which would otherwise exceed applicable maximum concentrations;

(n) any non-domestic waste which, at the point of discharge into a sewer, contains any substance, in a combined or uncombined form, with a concentration in excess of the levels set out below. All concentrations are expressed as total concentrations, which include both the dissolved and undissolved substances.

Substance	Expressed as	Concentration in milligrams per litre		
		One Day Composite Sample	Two Hour Composite Sample	Grab Sample
Aluminum	Al	50.0	100.0	200.0
Arsenic	As	1.0	2.0	4.0
Boron	B	50.0	100.0	200.0
Cadmium	Cd	0.2	0.4	0.8
Chromium	Cr	4.0	8.0	16.0
Cobalt	Co	5.0	10.0	20.0
Copper	Cu	2.0	4.0	8.0
Cyanide	Cn	1.0	2.0	4.0
Iron	Fe	10.0	20.0	40.0
Lead	Pb	1.0	2.0	4.0
Manganese	Mn	5.0	10.0	20.0
Mercury	Hg	0.05	0.1	0.2
Molybdenum	Mo	1.0	2.0	4.0
Nickel	Ni	2.0	4.0	8.0
Phenols	-	1.0	2.0	4.0
Phosphorus	P	12.5	25.0	50.0
Silver	Ag	1.0	2.0	4.0
Sulphate	SO^4	1500.0	3000.0	6000.0
Sulphide	S	1.0	2.0	4.0
Tin	Sn	5.0	10.0	20.0
Zinc	Zn	3.0	6.0	12.0

BL10549 amended the following:

Note: More restrictive guidelines may be required by the Manager if he considers there is some detrimental effect on the City's treatment plant, infrastructure or workmen.

(o) any water or waste containing substances in such concentrations that are not amenable to treatment or reduction by the sewage treatment process employed, or are amenable to treatment only to such a degree that the sewage treatment plant effluent cannot, during normal operation, meet the requirement of any other agency having jurisdiction over discharges to the receiving waters.

BL7378 amended Sub-Section (p):

(p) any material or substance (e.g. enzymes and/or bacteria) that alters the structure of the waste(s) but does not reduce the loading (C.O.D.).

2.2.2 Storm Drain System

(a) No person shall discharge or allow or cause to be discharged into a storm drain, any substance except storm water and water resulting from the provision of municipal services such as street flushing and sweeping and fire extinguishing activities.

BL7378 and BL10549 amended Sub-Section 2.2.2(b):

(b) No person shall discharge or permit to be discharged into any pipe, main, conduit, manhole, street inlet, gutter or aperture draining into the storm drain system, any water or substance which:

(i) has a temperature differential of +/- 5 degrees of background;

(ii) may interfere with the proper operation of a storm drain;

(iii) may obstruct a storm drain, or the flow therein;

(iv) may result in a hazard to a person, animal, property or vegetation;

(v) may impair the quality of the water in any well, lake, river, pond, spring, stream, reservoir or other water or watercourse.

(vi) would exceed those parameters as listed in "BRITISH COLUMBIA APPROVED WATER QUALITY GUIDELINES, 2006 Edition" and amendments thereto, as published by the Ministry of Environment and Lands, Environmental Management Branch.

(vii) notwithstanding subsection 2.2.2 (b) (vi), induced suspended sediment concentrations should not exceed background levels by more than 25 mg/L at any time when background levels are between 25 and 250 mg/L. When background exceeds 250mg/L, suspended sediments should not be increased by more than 10% of the measured background level at any one time.

2.3 ACCIDENTAL DISCHARGES

BL10549 amended the following:

2.3.1 Every person responsible for, or aware of, the accidental discharge of prohibited substances into the sanitary sewer system or the storm drain system shall report the same forthwith to the Manager in order that the necessary precautions can be taken to minimize the deleterious effects of the discharge.

SECTION 3 - ADDITIONAL REQUIREMENTS FOR CONNECTION TO THE SEWERAGE SYSTEM

3.1 WASTEWATER TREATMENT FACILITIES

3.1.1 Any industrial wastewaters likely to damage or increase maintenance costs on the sewerage system or which may detrimentally affect the sewage treatment plant; or contaminate surface or sub-surface waters, shall be pre-treated to render them innocuous prior to discharge into a public sewer.

BL7378 and BL10549 amendedSection 3.1.2:

3.1.2 Discharges of liquid wastes exceeding the strength, nature, quantity or quality permitted by this bylaw, shall be pre-treated in a facility designed, constructed and operated by the discharger so as to fulfill all of the requirements of this bylaw. The Manager may waive this requirement in lieu of surcharge billings for waste discharge with issuance of Waste Discharge Permits and the payment of the fees as outlined in Schedule "B", attached to and forming part of this bylaw.

BL10549 amended the following:

3.1.3 All details pertaining to the treatment process or processes, capacity, location, materials, equipment, methods of construction and all operational procedures and methods of process control of treatment facilities shall be approved by the Manager before any portion of such facilities is installed. The approval of such plans and devices shall not imply that the treatment process or processes will comply with the regulations and/or restrictions contained in this bylaw.

3.1.4 All wastewater treatment facilities must be kept clear of obstructions so as to provide immediate access for inspection and servicing.

3.2 DESIGN REQUIREMENTS FOR NON-RESIDENTIAL USES CONNECTING TO THE SEWERAGE SYSTEM

3.2.1 Where an owner or occupier of premises upon which an industrial or commercial activity is proposed or is carried on wishes to connect these premises to the sewerage system he shall comply with Article 3.2.3 herein.

3.2.2 Where an owner or occupier intends to expand an industrial or commercial activity so that the quantity, biochemical oxygen demand, chemical oxygen demand, suspended solids concentration or grease concentration of the sewage will be increased, he shall comply with Article 3.2.3 herein.

BL10549 amended the following:

3.2.3 Except as provided in Article 3.2.4, the owner shall supply to the Manager plans and reports certified by a professional engineer registered in the Province of British Columbia indicating:

(a) the proposed or existing development or addition, including flow schematic drawing,

(b) the daily volumes and peak discharges,

(c) the type of waste to be processed or discharged,

(d) the anticipated biochemical oxygen demand and the amount of suspended solids or grease,

(e) the pH factor and temperature of the wastewater,

(f) toxic chemicals contained in the wastewater,

(g) the proposed pre-treatment, including dimensions of the proposed facility,

(h) flow equalizing or mixing facilities,

(i) the location of sampling manhole,

(j) the monitoring equipment,

(k) any other information deemed necessary by the Manager.

BL10549 amended the following:

3.2.4 The Manager may deal with the application and make a decision thereon without the above information if in his opinion the nature of the application is such that a decision can be properly made without such information.

BL10549 amended the following:

3.2.5 Grease, oil and sand interceptors, or other Canadian Standards Association (CSA) certified devices approved by the Manager shall be installed as close to the source of the material as practical and provided upstream of the service connection on private property for all food preparation facilities including restaurants, canning operations, killing and processing facilities. They shall be so located as to be readily and easily accessible for cleaning and inspection and shall be maintained by the owner in continuously efficient operation such that all provisions of this bylaw are complied with at all times.

BL10549 amended the following:

3.2.6 Grease, oil and sand interceptors or other (CSA) certified devices approved by the Manager, shall be installed as close to the source of the material as practical and located upstream of the service connection on private property for all vehicle repair and maintenance facilities, and petroleum product storage or dispensing facilities. Interceptors, settling

tanks or sumps, filter systems, or other types of wastewater treatment works will be required for other types of industries or commercial establishments for the proper handling of liquid waste containing any flammable wastes, sand, grit or other harmful substances.

BL10549 amended the following:

3.2.7 Separate sand traps and oil and grease interceptors or other (CSA) certified devices approved by the Manager, shall be provided upstream of the service connection on private property for all establishments which provide car, vehicle, or equipment washing facilities. Sand traps shall be located upstream from the oil and grease interceptors, and shall have a minimum liquid depth of 1 metre, minimum length to width ratio of 5:1, and a maximum overflow rate under peak flow conditions of 8 L/min/m2.

BL10549 added the following:

3.2.8 All such wastewater treatment works required by sections 3.2.6 and 3.2.7 shall be so located as to be readily and easily accessible for cleaning and inspection, and shall be maintained by the owner at their expense in a continuously efficient operation such that wastewater discharges remain compliant with this bylaw, at all times. Sand, silt and other contaminants shall be removed from traps and sumps before these materials occupy 25 percent of the liquid depth. Accumulated oil and grease or other contaminants shall be removed often enough to prevent these materials from escaping to the sewer.

BL10549 added the following:

3.2.9 For indoor facilities or facilities that are covered and do not collect storm water, these types of wastewater treatment works required by section 3.2.6 and 3.2.7, shall be connected to the sanitary sewer (where available). For facilities exposed to the weather and which may collect storm water, these types of wastewater treatment works required by section 3.2.6 and 3.2.7, shall be connected to an on-site storm drainage system. Direct service connections to the City storm systems are not permitted.

3.3 VOLUME CONTROL

BL10549 amended the following:

3.3.1 Where wastewater is discharged into the sewerage system in volumes which are highly variable or unusual, the owner or occupier shall ensure that discharges do not exceed the limits established by the Manager. The owner or occupier of the premises shall take such measures, as required by the Manager, to equalize the discharge volumes and strengths.

BL10549 amended the following:

3.3.2 Equipment necessary to comply with clause 3.3.1 shall be provided, maintained and operated by the owner or occupier of such premises in a manner satisfactory to the Manager.

SECTION 4 - CONTROL OF INDUSTRIAL WASTES

4.1 SPECIAL CONTROL MANHOLES

BL10549 amended the following:

4.1.1 Any property owner or occupier discharging or likely to discharge wastewater to the public sewer which may exceed the STANDARDS FOR RESTRICTED WASTES, as deemed by the Manager, shall have installed a control manhole at an accessible location and suitable for the inspection and sampling of the discharged waters.

BL10549 amended the following:

4.1.2 The design and location of the control manhole shall be approved by the Manager. Construction shall comply with the approved design.

4.1.3 The control manhole shall be installed and maintained at the sole expense of the owner of the premises and shall be accessible at all times to the Inspector.

4.1.4 All industrial wastewater discharged to public sewers shall first pass through the control manholes.

BL10549 amended the following:

4.1.5 The control manhole shall conform with the City's standard sewer manhole STD-200 except that the barrel diameter shall be 1200 mm instead of 1050 mm. The standard cast iron frame and cover will be acceptable.

The control manhole shall be located on a straight run of service extending from 3 metres upstream of the manhole to 2 metres downstream. The section of service on which the manhole is located shall have a gradient not exceeding 2 percent. A permanent style Palmer Bowlus flume flow meter shall be installed as an integral part of the control manhole, and shall be sized to suit the peak design flows.

4.1.6 Where installation of a control manhole is not possible, an alternative device or facility may be substituted if approved by the Manager.

4.2 MONITORING OF WASTEWATER

BL10549 amended the following:

4.2.1 Should any testing of wastewater show that it is not in compliance with this bylaw, the Manager, in addition to any other provision of this bylaw may direct the owner to so comply with the bylaw and may, in addition, direct the owner at his expense to install such monitoring and recording equipment as the Mnager deems necessary and supply the results of such monitoring to the Manager, as required.

BL7378 and BL10549 amended Section 4.2.2:

4.2.2 All tests, measurements, analyses and examinations of wastewater, its characteristics or contents shall be carried out in accordance with "Standard Methods." Initial testing shall be arranged and paid for by the discharger. Additional testing or re-testing of wastewater, made necessary by non-compliance with this bylaw, or at the request of the Manager, shall be carried out at the cost of the discharger.

BL7841 and BL10549 amended Section 4.2.3:

4.2.3 Sampling shall be carried out by methods acceptable to the Manager. Normally the analyses will be performed on samples composited by volume as per Schedule "E" attached to and forming part of this bylaw. Values for pH will be determined from samples composited over a short period of time.

4.3 CONTROL OF WASTE DISPOSAL

BL10549 amended the following:

4.3.1 The Manager ties may at any time require a person who intends to dispose of wastes of liquid, semi-liquid or solid nature to show proof that these wastes are being stored and subsequently disposed of in a place and manner which is acceptable to the Manager the information must also include method of packaging, storing and transporting of the waste.

BL10549 amended the following:

4.3.2 The Manager may require a person to provide an analysis, prepared by a qualified chemist, of the waste referred to in Article 4.3.1.

SECTION 5 - PROTECTION OF PUBLIC SEWERAGE OR DRAIN SYSTEM

5.1 DISCONNECTION OF SEWER OR STORM DRAIN

BL10549 amended the following:

5.1.1 Where any wastewater which:

(a) creates an immediate danger to any person, or

(b) endangers or interferes with the operation of the sewerage system or drainage system is discharged to the sewerage or drainage system.

The Manager may, in addition to any action provided for in this bylaw, disconnect, plug or seal off the sewer or drain line discharging the unacceptable wastewater into the sewerage or drainage systems or take such other action as is necessary to prevent such wastewater from entering the sewerage or drainage system.

In addition or as an alternate action, the Manager may order the shut-off of water service to the subject property.

BL10549 amended the following:

5.1.2 The unacceptable wastewater described in article 5.1.1 may be physically prevented from being discharged into the sewerage or drainage system until evidence satisfactory to the Manager has been produced to ensure that no further discharge of hazardous wastewater will be made to the sewerage or drainage system.

5.1.3 The owner or occupier of the land from which the wastewater, described in Article 5.1.2 herein, is being discharged shall pay the costs incurred by the City in taking all necessary action relative to the sewer disconnection and/or re-connection.

5.1.4 The costs incurred in Article 5.1.3 shall be in addition to and not in substitution for any fine or other penalty to which the owner or occupier of the premises in question may be subject pursuant to the provisions of this bylaw.

5.1.5 The sewer or drain shall not be reconnected until the costs in Article 5.1.3 are paid.

5.2 RECOVERY OF COSTS FOR DAMAGE TO THE PUBLIC SEWERAGE OR DRAIN SYSTEM

5.2.1 Where any person contravenes any provision of this bylaw and thereby causes damage to the sewerage or drainage system, such person shall be liable to the City for all costs incurred in making repairs or taking remedial action.

5.2.2 If such costs are not paid forthwith after demand, the City may recover the same by action in any court of competent jurisdiction.

SECTION 6 - PENALTIES

6.1 PENALTIES

6.1.1 Every person who violates any of the provisions of this bylaw or who suffers or permits any act or thing to be done in contravention of or in violation of any of the provisions of this bylaw or who neglects to do or refrains from doing anything required to be done pursuant to any of the provisions of this bylaw, or who does any act which violates any of the provisions of this bylaw shall be guilty of an offence and each day during which such violation occurs or is allowed to continue shall constitute a separate offence.

6.1.2 Every person guilty of an offence against this bylaw shall be liable under summary conviction to a penalty of up to $2,000.00 for each offence.

SECTION 7 - MASCULINE/SINGULAR

7.1 Wherever the masculine is used throughout this bylaw, it shall also mean the feminine; and wherever the singular is used throughout this bylaw, it shall also mean the plural.

SECTION 8 - FORCE AND EFFECT

8.1 This bylaw shall come into force and take effect on the date of its adoption by the Municipal Council of the City of Kelowna.

Read a first time by the Municipal Council this 18th day of December, 1990.

Read a second time by the Municipal Council this 18th day of December, 1990.

Read a third time by the Municipal Council this 18th day of December, 1990.

Reconsidered, finally passed and adopted by the Municipal Council of the City of Kelowna this 15th day of January, 1991.

"James H. Stuart"
Mayor

"R.A. Beauchamp"
City Clerk

BL10549 deleted "Service Application" in its entirety.

BL7378, BL7841 and BL10549 amended Schedule "B" and Schedule "C":

SCHEDULE "B"

SANITARY SEWER/STORM DRAIN REGULATION BY-LAW NO. 6618-90

1. The Waste Discharge Permit fees required under this by-law shall be paid to the City of Kelowna.

2. The holder of a validated "Temporary Waste Discharge Permit" (Schedule "C" attached to and forming part of this bylaw) or "Waste Discharge Permit" (Schedule "D" attached to and forming part of this bylaw) is required to notify the issuing authority when the discharge period has terminated. If the discharge needs to continue, then an application for a new "Temporary Waste Discharge Permit" or "Waste Discharge Permit" must be submitted together with the application fee.

3. Waste Discharge Permit Fees:

   3.1 A Waste Discharge Application Fee of $100.00, plus applicable taxes shall be paid upon application for a "Temporary Waste Discharge Permit" or "Waste Discharge Permit".

   3.2 For authorized discharges to the sanitary sewer there will be a surcharge to cover the costs of treatment, plus applicable taxes. The surcharge is based upon flow and load.

   3.3 The surcharge for authorized discharge to the sanitary sewer shall be based on the City of Kelowna "Sewerage System User Bylaw, 1972 No. 3480" and amendments thereto.

BL10549 added Schedule C-1 Temporary Waste Discharge Permit and Schedule C-2 Temporary Storm Discharge Permit.

City of Kelowna

Wastewater Treatment
951 Raymer Avenue
Kelowna, BC V1Y 4Z7
250 469-8891
kelowna.ca

Temporary Waste Discharge Permit

SCHEDULE C-1

CONTACT INFORMATION

Applicant Name:	
Address:	
Phone:	Fax:
Email:	

PERMIT NUMBER:
Sanitary Sewer/Storm Drain Regulation By-Law No. 6618-90

Contact:	
Title:	
Phone:	Email:

DISCHARGE INFORMATION

Nature or type of wastewater (brief description)	
Discharge Location - Storm Drain or Sanitary Sewer:	
Estimate the total discharge and units of measure: (if applicable)	
How was discharge measured	
Permit Fee $100.00 + $12.00 (HST) Surcharge Fee Calculation (if applicable)	
Expiration date of permit or period of discharge:	

Specify the parameters of concern expected to be present in the discharge *(to be completed by City Staff)*

	Parameter	Parameter	Maximum Allowable Concentration	Units
i	Phosphorous	P	60	mg/L
ii	Copper	Cu	8	mg/L
iii	Zinc	Zn	12.5	mg/L
iv	pH	pH	6-9	
v				
vi				
vii				

Attach analytical results (as determined by certified laboratory) for all contaminants and corresponding volumes of substances noted above.	Does discharge contain constituents in concentration that meet or exceed Special Waste criteria as defined under the Special Waste Regulation of the Waste Management Act of British Columbia ☐ Yes ☐ No

I, _____ declare that the information given on this form is correct and accurate to the best of my knowledge.

Dated: _____ Signature: _____

Approved by Source Control Technician: _____

RETAIN COPY OF THIS PERMIT ON SITE AT ALL TIMES

City of Kelowna

Civic Operations
951 Raymer Avenue
Kelowna, BC V1Y 4Z7
250 469-8896
kelowna.ca

Temporary Storm Discharge Permit

SCHEDULE C-2

CONTACT INFORMATION

Applicant Name:	
Address:	
Phone:	Fax:
Email:	

PERMIT NUMBER:
Sanitary Sewer/Storm Drain Regulation By-Law No. 6618-90

Contact:	
Title:	
Phone:	Email:

DISCHARGE INFORMATION

Brief description of water to be discharged	
Discharge Location	
Estimate the total discharge and units of measure (if applicable)	
How was discharge measured	
Permit Fee $100.00 + $12.00 (HST)	Total: $112.00
Expiration date of permit or period of discharge:	

Specify the parameters of concern expected to be present in the discharge *(to be completed by City Staff)*

	Parameter	Result	Background	Maximum Acceptable Concentrations
i				
ii				
iii				
iv				
v				

Analysis must be completed by City Staff or a Certified Laboratory. If a certified lab is used results must be attached.

I, declare that the information given on this form is correct and accurate to the best of my knowledge.

Dated: Signature:

Approved by Water Quality Technician:

RETAIN COPY OF THIS PERMIT ON SITE AT ALL TIMES

BL7841 added and BL10549 replaced Schedule "D":

Issued _____
Waste Discharge Number WDP _____

City of Kelowna

Department Name -optional
1435 Water Street
Kelowna, BC V1Y 1J4
250 469-8500
kelowna.ca

Waste Discharge Permit
BYLAW NO. 6618-90 SCHEDULE D

Under the provisions of the City of Kelowna's Sanitary Sewer/Storm Drain Regulation Bylaw No. 6618-90

_____
name

hereinafter referred to as the Permittee, is authorized to discharge Non-Domestic Waste to SANITARY OR STORM SEWER located at _____.
(address)

This WASTE DISCHARGE PERMIT has been issued under the terms and conditions, including definitions, prescribed in the City of Kelowna's Sanitary Sewer/Storm Drain Regulation Bylaw No. 6618-90 hereinafter referred to as the BYLAW and in the attached Appendices 1, 2, 3, 4 and 5 for discharge sources and works existing or planned on _____.
(date)

Issued _____
Waste Discharge Number WDP _____

BL10549 amended the following:

Appendix 1

This Appendix sets out the standard conditions, engineering units, and the requirements for emergency procedures.

A. STANDARD CONDITIONS

1. Except as otherwise provided in this WASTE DISCHARGE PERMIT, hereinafter referred to as the "Permit", all terms and conditions stipulated in the Bylaw shall apply to this Permit.

BL10549 amended the following:

2. The terms and conditions of this Permit may be amended, by the Manager pursuant to the Bylaw.

3. Definitions contained within Bylaw No. 6618-90 apply to this Permit.

B. ENGINEERING UNITS

BL10549 amended the following:

The engineering units specified in this Permit are in accordance with the Metric System of measure. Approximately equivalent values for the British System can be calculated using the following conversion factors:

IGPD	220	=	1 M3/day
IGPM	0.22	=	1 l/min
cfs	35.31	=	1 m3/s
ppm	1	=	1 mg/L
lb	2.205	=	1 kg"

Where:

m^3 =	cubic metres	IGPD =	Imperial gallons per day
L =	litres	IGPM =	imperial gallons per minute
mg =	milligrams	cfs =	cubic feet per second
kg =	kilograms	ppm =	parts per million
min=	minutes	lb =	pounds
s =	seconds		

C. MAINTENANCE AND OPERATION OF WORKS AND PROCEDURES

Pollution control works and procedures associated with maintaining the discharge criteria and/or the monitoring requirements specified in the Permit shall be employed at all times during the discharge of industrial/commercial wastes to sewer. All such works and procedures shall be inspected regularly and maintained in good working condition.

Issued _____
Waste Discharge Number WDP _____

BL10549 amended the following:

D. EMERGENCY PROCEDURES

a) In the event of an emergency or condition which prevents the continuing operation of any pollution control works or procedures designated by this Permit or results, or may result in a violation of any discharge criteria specified in this Permit, the Permittee shall notify the City of Kelowna at 250 469-8577 (Fire Hall dispatch - 24 hours) at the first available opportunity, and shall undertake appropriate remedial action as soon as possible.

E. BY-PASSES

BL10549 amended the following:

The discharge of wastes which by-pass any pollution control works or are not in accordance with procedures designated by the Permit is prohibited, unless prior approval of the Manager is obtained and confirmed in writing.

F. DISCHARGE MONITORING

BL10549 amended the following:

1. Additional discharge measurement, sampling, analysis and reporting shall be undertaken by the Permittee when required by the Manager.

BL10549 amended the following:

2. All sampling, measurements, tests and analyses of waste discharges shall be carried out in accordance with the latest edition of "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, or an alternate method approved by the Manager. Samples shall be analyzed by an independent agency at the expense of the discharger, unless other arrangements have been approved by the Manager.

BL10549 amended the following:

G. pH MONITORING

Enforcement of pH levels, as listed in Appendix 3 of the Permit, shall be based on GRAB SAMPLE. The Permittee should be aware that pH levels measured in a Composite Sample will provide an average pH of the waste stream and will not indicate the total range of pH in the effluent. The Permittee is encouraged to do periodic GRAB SAMPLE pH analyses to ensure permit compliance.

Issued _____

Waste Discharge Number WDP _____

BL10549 amended the following:

Appendix 2

This Appendix sets out requirements for the monitoring of the discharge of Non-Domestic Waste from a _____. Any changes in method or location of monitoring must be authorized, in writing, by the Manger.

A. DISCHARGE SAMPLING AND ANALYSES

The Permittee shall carry out the following sampling and analysis program, to commence on _____.

1. Continuous Discharges

(a) Effective _____, the Permittee shall measure or estimate, using an approved flow monitoring device or method, the daily discharge during each month of operation. The following information shall be recorded:

Total flow for the month (m3)
Number of operating days during the month
Average daily flow for the month (m3/day)
Maximum daily flow for the month (m3/day)

BL10549 amended the following:

(b) One Composite Sample, in accordance with Schedule E of Bylaw No. 6618-90, shall be collected from Sample Point _____, as described in Appendix 2, Section B, during one normal operating day once per _____. The Composite Sample shall consist of equal portions of discrete samples collected on a minimum frequency of _____ over the period of discharge to SEWER. This sample shall be analyzed for the following parameters:

_____

The sample start and stop times shall be recorded.

(c) The Discharge flow for the periods that the Composite Sample specified in Section _____ are collected shall be recorded.

BL10549 amended the following:

(d) During the period that the Composite Sample described in Section _____ is taken, one GRAB SAMPLE shall be collected from Sample Point _____, as described in Appendix 2, Section B. This GRAB SAMPLE shall be analyzed for the following parameters:

The sample date and time shall be recorded.

2. Batch Discharges

(a) The Permittee shall maintain a log of each batch discharge to SEWER. For each month of operation, the following information shall be reported for each batch discharge:

Type of batch discharge
Volume (m3)
Date on which discharging occurred

The discharge log shall be kept available for inspection for a minimum period of one year.

Issued _____
Waste Discharge Number WDP _____

BL10549 amended the following:

(b) _____ GRAB SAMPLE(s) shall be collected from one batch discharge from the Sample Point _____, as described in Appendix 2, Section B, once per _____. This sample shall represent the quality of the total batch and shall be analyzed for the following parameters:

_____

The sampling dates and times shall be recorded.

BL10549 amended the following:

(c) _____ GRAB SAMPLE(s) shall be collected from one batch discharge from the Sample Point _____, as described in Appendix 2, Section B, once per _____. This sample shall represent the quality of the total batch and shall be analyzed for the following parameters:

_____

(d) The Discharger shall record the total volume of each batch discharge from which the samples specified in Sections _____ are collected.

B. LOCATION OF APPROVED SAMPLE POINTS

The approved sample points are as follows, and as shown on the attached schematic of approved sample points and treatment processes. Sample point _____ is considered to be the point of discharge to SEWER.

SAMPLE POINT NO.	DESCRIPTION
Sample Point 1	_____
Sample Point 2	_____

Issued _____
Waste Discharge Number WDP _____

PHOTOGRAPH OF APPROVED SAMPLING POINT
SUPPLIED BY PERMITTEE

Issued _____
Waste Discharge Number WDP _____

BL10549 amended the following:

Appendix 3

This Appendix sets out requirements for the quantity and quality of the discharge of Non-Domestic Waste from a _____. Where a compliance program has been specified, existing works or procedures must be maintained in good operating condition and operated in a manner to minimize the discharge of contaminants during the interim period until the net works have been installed.

AUTHORIZED DISCHARGE CHARACTERISTICS

1. AUTHORIZED RATE OF DISCHARGE

   The Permittee shall not exceed the following:

2. AUTHORIZED DISCHARGE CRITERIA

   a) The Permittee shall not discharge PROHIBITED WASTE as defined in Section 2.1 of the Bylaw.

   b) The Permittee shall not discharge RESTRICTED WASTE as defined in Section 2.2 of the Bylaw with the following exceptions:

Parameter	Authorized Range or Maximum Concentration	Compliance By

   c) The Permittee shall not discharge SPECIAL WASTE as defined in Section 2.1 of the Bylaw.

   d) The Permittee shall not discharge STORM WATER or COOLING WATER as defined in Section 2.1 of the Bylaw.

Issued _____
Waste Discharge Number WDP _____

BL10549 amended the following:

Appendix 4

This Appendix sets out the waste sources, works and procedures for the authorized discharges to SEWER. The Manager may require that further works be installed if the existing works, in his opinion, do not provide an acceptable level of treatment. New works or alterations to existing works must be approved, in principle, by the Manager. New waste sources must be authorized, in writing, by the Manager.

AUTHORIZED WORKS AND PROCEDURES

The authorized waste sources, works and procedures to treat and/or control the waste discharge are:

	SOURCE	COMPLETION DATE	WORKS & PROCEDURES
1.	_____	_____	_____
2.	_____	_____	_____

Issued _____
Waste Discharge Number WDP _____

BL10549 amended the following:

Appendix 2

REPORTING REQUIREMENTS FOR WASTE DISCHARGE PERMIT

The Permittee is required to submit the following reports to the Manager:

BL10549 amended the following:

a) By not later than _____ and at three month intervals thereafter, the Permittee shall submit a report detailing the results of the discharge sampling and analysis program for the preceding _____ as specified in Appendix 2, Sections _____.

BL10549 amended the following:

b) By not later than _____, the Permittee shall submit a written report outlining the specifications of the flow monitoring device or method used to determine the flow rate as described in Appendix 2, Section A.1 of this Permit.

Additional reporting shall be undertaken by the Permittee when required by the Manager.

Issued _____
Waste Discharge Number WDP _____

BL7841 added a new Schedule "E":

Schedule "E"

City of Kelowna

Evaluation of Wastewater

Flow Proportioned Sampling

Proper sampling techniques are essential for accurate testing in evaluation of wastewater. To be representative of the entire flow, samples should be taken where the wastewater is well mixed.

An instantaneous grab sample represents conditions at the time of sampling only, and cannot be considered to represent a longer time period, since the character of a wastewater is usually not stable.

A composite sample is a mixture of individual grabs proportioned according to the wastewater flow pattern. Compositing is commonly accomplished by collecting individual samples at regular time intervals, for example, every hour on the hour, and by storing them in a refrigerator or ice chest; coincident flow rates are read from an installed flow meter or are determined from some other flow recording device. A representative sample is obtained by mixing together portions of individual samples relative to flow rates at sampling times.

Composite samples representing specified time periods are tested to appraise plant performance and loadings. Weekday specimens collected over a 24-hour period are most common. Average daily BOD, TSS, and Oil & Grease data are used to calculate plant yield treatment efficiencies. Integrated samples during the period of peak flow, usually 8 to 12 hr. depending on influent variation, allow determination of maximum loadings on treatment units.

Example:

Hourly samples were taken of wastewater entering a treatment system. The following equations illustrate the portions to be used from the hourly grabs to provide composite samples for the 24-hr duration and during the period of maximum 8-hr loading, between 9 A.M. and 5 P.M. The composite sample volumes needed for laboratory testing are approximately 2500 ml.

$$\text{The portion of sample needed per unit of flow} = \frac{\text{total volume of sample desired}}{\text{average flow rate} \times \text{number of portions}}$$

$$\text{Portion for the 24 - hr period} = \frac{2500 \text{ ml}}{720 \text{ gpm} \times 24} = 0.15 \text{ ml / gpm}$$

$$\text{Portion for the 8 - hr period} = \frac{2500 \text{ ml}}{100 \text{ gpm} \times 8} = 0.3 \text{ ml / gpm}$$

Calculations for the portions of hourly samples to be used in compositing are tabulated as follows:

		Portions of Hourly Samples in Millilitres for:					
Time	Flow (gpm)	24-hr Composite					8-hr Composite
Midnight	490	0.15	x	490	=	74	
1 A.M.	420	0.15	x	420	=	63	
2 A.M.	360	0.15	x	360	=	54	
3 A.M.	310	0.15	x	310	=	47	
4 A.M.	290	0.15	x	290	=	43	
5 A.M.	310	0.15	x	310	=	46	
6 A.M.	390	0.15	x	390	=	58	
7 A.M.	560	0.15	x	560	=	84	
8 A.M.	620	0.15	x	620	=	93	
9 A.M.	900	0.15	x	900	=	135	0.3 x 900 = 270
10 A.M.	1040	0.15	x	1040	=	156	0.3 x 1040 = 310
11 A.M.	1130	0.15	x	1130	=	170	0.3 x 1130 = 340
Noon	1160	0.15	x	1160	=	174	0.3 x 1160 = 350
1 P.M.	1120	0.15	x	1120	=	168	0.3 x 1120 = 340
2 P.M.	1060	0.15	x	1060	=	159	0.3 x 1060 = 320
3 P.M.	1000	0.15	x	1000	=	150	0.3 x 1000 = 300
4 P.M.	950	0.15	x	950	=	143	0.3 x 950 = 290
5 P.M.	910	0.15	x	910	=	136	
6 P.M.	870	0.15	x	870	=	130	
7 P.M.	810	0.15	x	810	=	121	
8 P.M.	760	0.15	x	760	=	114	
9 P.M.	690	0.15	x	690	=	103	
10 P.M.	630	0.15	x	630	=	94	
11 P.M.	540	0.15	x	540	=	81	
Total composite sample volumes						2596 ml	2520 ml

Appendix F

Ministry of Environment Operational Certificate

BRITISH COLUMBIA
The Best Place on Earth

January 9, 2013

Tracking Number: 6761
Authorization Number: 12211

REGISTERED MAIL

City of Kelowna
1435 Water Street
Kelowna BC V1Y 1J4

Dear City:

Enclosed is Amended Operational Certificate 12211 issued under the provisions of the *Environmental Management Act*. Your attention is respectfully directed to the terms and conditions outlined in the operational certificate. An annual fee will be determined according to the Permit Fees Regulation.

This operational certificate does not authorize entry upon, crossing over, or use for any purpose of private or Crown lands or works, unless and except as authorized by the owner of such lands or works. The responsibility for obtaining such authority rests with the City. It is also the responsibility of the City to ensure that all activities conducted under this authorization are carried out with regard to the rights of third parties, and comply with other applicable legislation that may be in force.

This decision may be appealed to the Environmental Appeal Board in accordance with Part 8 of the *Environmental Management Act*. An appeal must be delivered within 30 days from the date that notice of this decision is given. For further information, please contact the Environmental Appeal Board at (250) 387-3464.

Ministry of Environment | Environmental Protection Division | 102 Industrial Pl. Penticton, BC V2A 7C8 | Okanagan Region Telephone: (250) 490-8200 Facsimile: (250) 490-2231

Administration of this operational certificate will be carried out by staff from the Okanagan Region. Plans, data and reports pertinent to the operational certificate are to be submitted to the Regional Director, Environmental Protection, at Ministry of Environment, Regional Operations, Okanagan Region, 102 Industrial Pl., Penticton, BC V2A 7C8.

Yours truly,

Sajid A. Barlas, Ph.D. , P.Ag.
for Director, *Environmental Management Act*
Okanagan Region

Enclosure

cc: Environment Canada

BRITISH COLUMBIA
The Best Place on Earth

MINISTRY OF ENVIRONMENT

OPERATIONAL CERTIFICATE

12211

Under the Provisions of the Environmental Management Act and in accordance with the approved City of Kelowna Liquid Waste Management Plan

CITY OF KELOWNA
1435 WATER ST
KELOWNA, BC
V1Y 1J4

is authorized to discharge effluent from a municipal sewage collection and treatment system located at Kelowna, British Columbia, to Okanagan Lake, and to discharge reclaimed water to the ground by irrigation subject to the conditions listed below. Contravention of any of these conditions is a violation of the *Environmental Management Act* and may result in prosecution.

This Operational Certificate supercedes and amends all previous versions of Operational Certificate ME 12211 issued under the *Waste Management Act*.

1. AUTHORIZED DISCHARGES

1.1 Authorized source

This section applies to the discharge of effluent from the Kelowna Wastewater Treatment plant. The site reference number for this discharge is E104955.

Date issued: January 28, 1994
Date amended: January 9, 2013
(most recent)

Sajid A. Barlas, Ph.D. , P.Ag.
for Director, *Environmental Management Act*
Okanagan Region

Operational Certificate Number: 12211

1.1.1 The estimated rate of effluent discharged from the wastewater treatment plant averaged on a monthly basis to the Okanagan Lake is as follows:

2010	34,500 m^3/day
2011	35,303 m^3/day
2012	36,122 m^3/day
2013	36,956 m^3/day
2014	37,806 m^3/day
2015	38,671 m^3/day
2016	39,553 m^3/day
2017	40,333 m^3/day
2018	41,125 m^3/day
2019	41,929 m^3/day
2020	42,747 m^3/day
2025	46,665 m^3/day
2030	50,454 m^3/day

For the purposes of permit fee calculations, the permit fees for the nominal year that begins on the anniversary date of the Operational Certificate must use the estimated flow value for the calendar year.

1.1.2 The characteristics of the discharge must be equivalent to or better than:

Biochemical Oxygen Demand	Maximum:	10 mg/L
Total Suspended Solids	Maximum:	10 mg/L
Total Phosphorus:		
Maximum Annual Average:		0.25 mg/L
Maximum Daily Concentration:		2.0 mg/L
(The Level to strive for is the Okanagan Lake background level).		
Total Nitrogen		
Maximum daily limit:		less than 10.0 mg/L
Annual Average:		6.0 mg/L
Faecal coliform:		50 CFU /100ml

1.1.3 The authorized works are a wastewater collection system, a biological nutrient removal tertiary treatment plant with backup chemical phosphorus removal facilities, sludge dewatering facilities, ultra-violet disinfection facilities, a deep lake effluent outfall to Okanagan Lake and related appurtenances approximately located as shown on Site Plan A.

Date issued: January 28, 1994
Date amended: January 9, 2013
(most recent)

Sajid A. Barlas, Ph.D. , P.Ag.
for Director, *Environmental Management Act*
Okanagan Region

1.1.4 The wastewater collection system services areas within the City and surrounding areas, as well as it receives treated effluent from the Brandt's Creek treatment plant.

1.1.5 The location of the wastewater treatment plant from which the wastewater is discharged is legally described as; Lot 1, District Lot 135, O.D.Y.D. Plan 12356, P.I.D. 009-424-946.

1.1.6 The location of the discharge to Okanagan Lake is legally described as the Plan of Statutory Right of Way over unsurveyed Crown Land (being the bed of Okanagan Lake) in the vicinity of District Lot 4780, O.D.Y.D.

1.2 Authorized source

This section applies to the discharge of effluent from a Reclaimed Water Irrigation System. The site reference number for this discharge is E236279.

1.2.1 There is no maximum authorized rate of reclaimed water that may be beneficially used for irrigation. Reclaimed water may be used for irrigation at agricultural rates in a manner to prevent effluent surfacing, overland flow and groundwater breakout.

1.2.2 The use of reclaimed wastewater for irrigation must be in accordance with the requirements of the Municipal Wastewater Regulation (MWR). For the purposes of permit fee calculations the following discharge factors have been assumed for the characteristics of the reclaimed water discharged from the wastewater treatment plant.

5 -Day Total Biochemical Oxygen Demand, 10 mg/L; and

Total Suspended Solids - 10 mg/L.

1.2.3 The authorized works are reclaimed water irrigation facilities and related appurtenances.

1.2.4 The location of the area where reclaimed water may be irrigated is described generally as the Kelowna area. Actual authorization for a specific parcel of land to be irrigated is contingent upon the submission of a "Plan of Irrigation", prepared by a suitably qualified person, of that particular parcel to the Director and his approval obtained in writing. Reclaimed water may be irrigated on the fenced area of the wastewater

treatment plant grounds. Annual report must indicate areas irrigated with reclaimed water.

2. GENERAL REQUIREMENTS

2.1 Maintenance of Works and Emergency Procedures

The City of Kelowna (the City) must inspect the authorized works regularly and maintain them in good working order. In the event of an emergency or condition beyond the control of the City which prevents effective operation of the authorized works or leads to unauthorized discharge, the City must comply with all applicable statutory requirements, immediately (within one business day) notify the Regional Director, Environmental Protection, and take appropriate remedial action for the prevention or mitigation of pollution. The Director may reduce or suspend operations to protect the environment until the authorized works have been restored and/or corrective steps have been taken to prevent unauthorized discharges.

2.2 Bypasses

The discharge of effluent which has bypassed the authorized treatment works is prohibited unless the prior approval of the Director is obtained and confirmed in writing.

2.3 Process Modifications

The Director must be notified prior to implementing changes to any process that may adversely affect the quality and/or quantity of the discharge.

2.4 Plans - New Works

2.4.1 Plans of modifications and/or extensions to the existing works must be signed and sealed by a Professional Engineer licensed to practice in the Province of British Columbia. The works must be constructed in accordance with such plans.

2.4.2 Copies of all "as-built" plans and specifications of any proposed modifications or additions to works authorized in this Operational Certificate must be retained by the City for perusal by the Director, or his/her delegate, upon request.

Date issued: January 28, 1994
Date amended: January 9, 2013
(most recent)

Sajid A. Barlas, Ph.D. , P.Ag.
for Director, *Environmental Management Act*
Okanagan Region

2.4.3 Plans for modifications of and/or extension to the existing Reclaimed Wastewater irrigation system must be signed and sealed by a Professional Engineer or Professional Agrologist suitably qualified and licensed to practice in the Province of British Columbia, or as otherwise acceptable to the Director.

2.4.4 Design and construct reclaimed water irrigation works in accordance with current agricultural best management practices and the "Code of Practice for Use of Reclaimed Water - a companion document to the Municipal Wastewater Regulation".

2.5 Qualified Professionals

All facilities and information, including works, plans, assessments, investigations, surveys, programs and reports, must be certified by qualified professionals.

3. GENERAL REQUIREMENTS - ALL DISCHARGES

3.1 Operation and Maintenance

3.1.1 Develop and maintain both an Operations and Maintenance Manual for the wastewater collection, wastewater treatment, reclaimed water utilization and wastewater disposal works. A copy of the Operations and Maintenance Manuals must be retained at the treatment plant for inspections by the Director or regional Environmental Protection staff.

3.1.2 Operate and maintain a system of preventative maintenance for the wastewater collection, wastewater treatment, effluent utilization and effluent disposal.

3.2 Facility Classification And Operator Certification

3.2.1 The City must operate, staff and maintain the existing wastewater treatment plant as an Environmental Operator Certification Program (EOCP) Level IV facility and have at least one designated chief operator. The chief operator(s) must maintain a class IV EOCP certification. Should there be any changes in the Chief Operator(s) the City must notify the Director within 30 business days of the change.

3.2.2 With respect to the 2010 plant expansion, the City must submit a facility update to the EOCP program to confirm the expanded facility and operator

classification requirements within 90 days of the issuance of this OC. That submission should be copied to the Director and include a specific request for a written response from the EOCP. Within 60 days of receiving the EOCP's written response, the City must provide a copy to the Director along with a submission documenting compliance or a plan to achieve compliance.

3.2.3 The City must log changes in certification levels of the other operating staff on an ongoing basis and submit an annual comparison of staff certification relative to EOCP requirements as part of the annual reporting requirements.

3.3 Liquid Waste Management Plan (LWMP) Review

The existing approved LWMP expires in 2030. The Waste Water Treatment plant capacity is approximately 70,000 m^3/day. Should either of these triggers occur, the City is required to update its Liquid Waste Management Plan, and provide the Director with an assessment of the various risks associated with the ongoing lake discharge. A Director may also require risk assessments prior to either trigger, subject to monitoring results that, in the Director's opinion, indicate potential human health and/or aquatic life concerns in the lake and/or the treated effluent prior to discharge or other environmental incidents that may warrant such assessment.

3.4 Water Management and Conservation

Establish a water management and conservation program and performance indicators to encourage a reduction in the volume of domestic, industrial and commercial wastewaters discharged to the wastewater collection system.

3.5 Wastewater Collection System - Infiltration, Inflow and Cross Connections

Inspect and maintain the Wastewater Collection System works so as to minimize the possibility of cross connections between the storm sewer and the sanitary sewer systems, to minimize infiltration of groundwater, to minimize inflow of water from basement sump pumps and roof drains, and minimize exfiltration of the collected wastewater from the collection system to the ground.

3.6 Sanitary Sewer Bylaw

Subject to being declared a Sewage Control Area under Section 23 of the *Environmental Management Act*, and in order to minimize the potential effect of heavy metals or other toxic materials in the effluent and/or sludge, the City must prepare, or review and if necessary update, and implement a Sanitary Sewer Bylaw to regulate the input of such wastes to the wastewater collection. The installation of devices to process household putrescible waste for disposal to the wastewater collection system should be prohibited. The City is responsible for enacting a suitable sampling and monitoring program in support of this bylaw.

The City is strongly advised to seek the active cooperation of the public through a proactive public education program.

3.7 Contingency Plan

Prepare a Contingency Plan that will address the appropriate course of action to be taken in any particular preconceived emergency situation. The plan must include toxic substances in plant influent, chlorine and sulphur dioxide leaks or spills and any potential point of concern in the collection, treatment and disposal systems. Attention is to be given to public safety and the protection of the environment. The plan is to be continually updated as necessary to reflect the current operation. A copy of the Contingency Plan must be forwarded to the Director.

3.8 Sludge Management Plan

The management of sludge produced by the subject operation, whether at the treatment plant site or at a site remote from the treatment plant site, must be in accordance with the Organic Matter Recycling Regulation (OMRR). Sludge sampling and testing must comply with the OMRR.

3.9 Odours

The City must provide measures to control odour from the sewage collection system and treatment plant operations by using the best available technology. Should any aspect of the operation give rise to objectionable odours, appropriate remedial measures may be required, when directed in writing by the Director.

Date issued: January 28, 1994
Date amended: January 9, 2013
(most recent)

Sajid A. Barlas, Ph.D. , P.Ag.
for Director, *Environmental Management Act*
Okanagan Region

3.10 **Fencing**

The City must erect and maintain a fence around the wastewater treatment plant and such other areas as required by the Director. The height and type of fencing must meet the approval of the Director.

3.11 **Signage**

The City must erect signage to meet the criteria in MWR.

3.12 **Disinfection - Ultraviolet**

3.12.1 Effluent to be discharged via the outfall pipe must undergo disinfection via ultraviolet. Multiple banks of lamps are to be maintained so as to be capable of full disinfection with one unit out of operation for cleaning. The faecal coliform level for effluent discharge to the lake is not to exceed 50 CFU /100 ml.

3.12.2 If chlorination is used for disinfection, maintain a total chlorine residual of 0.5 mg/L immediately prior to dechlorination. Operate the dechlorination facilities such that there is a total chlorine residual of 0.0 mg/L after dechlorination and prior to the discharge of the effluent to Okanagan Lake.

3.12.3 The City must erect a sign along the alignment of the outfall diffuser, above high water mark advising of the presence of an underwater pipe. The sign must have lettering at least 100 millimetres high and be clearly visible.

3.13 **Reclaimed water Irrigation**

3.13.1 Reclaimed water discharged to ground by irrigation is to comply with all requirements of MWR.

3.13.2 Reclaimed water utilized for irrigation outside the plant site may, in addition to the above, be required to carry a disinfectant residual within the irrigation system and otherwise comply with MWR.

Date issued: January 28, 1994
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(most recent)

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for Director, *Environmental Management Act*
Okanagan Region

3.14 Reclaimed water – Building Heating and Cooling

The Ministry supports the use of reclaimed water for heat pump applications for building heating and cooling purposes provided the total flow is returned for discharge to the environment via the authorized outfall or used for irrigation purposes. The returned heating and cooling water must not be altered unless authorised in writing by the Director. The City is required to notify the Director on each heating and cooling connection under consideration. The City is also required to monitor and report annually: the average and maximum daily flows and water temperatures provided to and returned from each connection, as well as the outfall temperature prior to and after the return of the cooling water.

4. MONITORING REQUIREMENTS

4.1 Sampling and Analytical Procedures

4.1.1 Proper care should be taken in sampling, storing and transporting the samples to adequately control temperature and avoid contamination, breakage, etc. Sampling must be carried out in accordance with the procedures described in the most recent edition of the "British Columbia Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples", or by suitable alternative procedures as authorized by the Director.

A copy of the above manual may be purchased from the Queen's Printer Publications Centre, P. O. Box 9452, Stn. Prov. Gov't. Victoria, British Columbia, V8W 9V7 (1-800-663-6105 or (250) 387-6409). A copy of the manual is also available for inspection at all regional Environmental Protection offices.

4.1.2 Analyses must be carried out in accordance with procedures described in the most recent edition of the "British Columbia Environmental Laboratory Methods Manual for the Analysis of Water, Wastewater, Sediment, Biological Materials and Discrete Ambient Air Samples", or by suitable alternative procedures as authorized by the Director.

A copy of the above manual may be purchased from the Queen's Printer Publication Centre, P. O. Box 9452, Stn. Prov. Govt. Victoria, British Columbia, V8W 9V7 (1-800-663-6105 or (250) 387-6409). The manual is also available for review at all regional Environmental Protection offices.

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Okanagan Region

Copies of the manuals mentioned above are available on-line at:
http://www.publications.gov.bc.ca

4.1.3 The City is required to follow the terms and conditions of the Environmental Data Quality Assurance Regulation. Ten percent of the samples collected must be duplicated to provide data quality assurance. Quality control information generated by the City's lab while analyzing parameters required by this Operational Certificate must also be provided with the data required to be reported.

4.2 Influent Sampling Program

4.2.1 Install and maintain a suitable sampling facility (EMS site number E236280) and obtain a grab sample of the plant influent once each month during a period of maximum daily flow for check analysis of nutrient levels, a proportional continuous sampler may be used, provided that prior approval has been obtained from the Director.

4.2.2 Obtain analyses of the influent sample for the following:

total phosphorus and ortho phosphorus, expressed as P in mg/L;
total nitrogen expressed as N in mg/L;
pH; and
Total Biological Oxygen Demand.

4.3 Effluent Sampling Program

4.3.1 Install and maintain a suitable sampling facility (EMS site number E104955) and obtain a grab sample of the effluent once daily during the period of maximum daily flow for subsequent in-house analysis, and once each month for check analysis of nutrient levels by a suitably accredited laboratory. A proportional continuous sampler may be used, provided that prior written approval has been obtained from the Director. Proper care should be taken in sampling, storing and transporting the samples to adequately control temperature and avoid contamination, breakage, etc.

4.3.2 Obtain analyses of the effluent sample for the following:

(a) total suspended solids (non-filterable residue), (monthly analysis), mg/L;

(b) 5-day Total Biochemical Oxygen Demand, (monthly analysis), mg/L;
(c) Chemical Oxygen Demand (C.O.D.) (weekly analysis), mg/L;
(d) faecal coliforms and E. Coli (monthly analysis), CFU /100 ml;
(e) total phosphorus (weekly composite) and ortho phosphorus (daily analysis), all expressed as mg/L P;
(f) total nitrogen, ammonia nitrogen, nitrate/nitrite nitrogen, organic nitrogen, and total Kjeldahl nitrogen, (weekly analysis), all expressed as mg/L N;
(g) pH, (daily analysis).

4.3.3 Occasional full chemical analysis of the main cations and anions and other characteristics may be required by the Director.

4.3.4 Provide and maintain a suitable flow measuring device and record once per day the effluent volume discharged to the Okanagan Lake and the volume utilized for irrigation over a 24-hour period. Record the flows for each calendar month and for each calendar year.

4.4 Sludge Sampling Program

4.4.1 Obtain a representative sample of the sludge being produced at the treatment plant at least once every 6 months (EMS site number E236281).

4.4.2 Obtain analyses consistent with OMRR for Class B biosolids (Column 3 of Schedule 4, Quality Criteria) of the sludge sample for the following:

(a) Arsenic, mg/kg;
(b) Cadmium, mg/kg;
(c) Chromium, mg/kg;
(d) Cobalt, mg/kg;
(e) Copper, mg/kg;
(f) Lead, mg/kg;
(g) Mercury, mg/kg;
(h) Molybdenum, mg/kg;
(i) Nickel, mg/kg;
(j) Selenium, mg/kg;
(k) Zinc, mg/kg;

4.4.3 Install and maintain a system for measuring and recording the volumes of

sludge produced, the location where the sludge was discharged, and the amount of sludge discharged at each location.

4.5 Integrated Stormwater Management

The City must undertake a "GAP" analysis of the City's current Integrated Stormwater Management (ISM) practices to assess their performance and effectiveness in protecting the receiving environment, particularly water quality and stream health. The City must implement recommendations from the GAP analysis, which will be reviewed by the City and the Ministry of Environment, and any changes to the current ISM practices deemed necessary by either the City or the Ministry must be implemented in a mutually agreed upon manner and time frame.

4.6 Groundwater and Spray Irrigation Monitoring Program

The City must have a Qualified Professional assess and develop an irrigation plan for any and all sites that utilize treated effluent for irrigation purposes. The irrigation plan must clearly document appropriate agronomic loading rates for each site. Each site and irrigation plan should be reassessed every five years or whenever major changes to the site occur and must include auditing of irrigation duration and application rates. The first such evaluation is required within two years of the issuance of this Operational Certificate.

4.7 Lake Sampling and Monitoring Program

A Lake Monitoring Program must be initiated consisting of the following components:

4.7.1 Sampling Sites

Establish two sampling sites, one downcurrent of the effluent diffuser within the initial dilution zone (EMS Site Number E222119: 49.862126; 119.507613) and the other in an appropriate location for background sampling (EMS Site Number 0500236: 49.862043; 119.513509) or as acceptable to the Director. At each site collect discrete samples at depths of one metre, five metres and ten metres, then at each ten metre interval including twenty, thirty two and forty five metre depths, during March May, July, and September of each year.

Date issued: January 28, 1994
Date amended: January 9, 2013
(most recent)

Sajid A. Barlas, Ph.D. , P.Ag.
for Director, *Environmental Management Act*
Okanagan Region

4.7.2 Analyses

Have the samples at 1, 5 and 10 metre depths analyzed (accredited lab) for the following:

(a) total, ortho and dissolved phosphorus , expressed as mg/L P;
(b) total nitrogen, ammonia nitrogen, nitrate/nitrite nitrogen, organic nitrogen, and total Kjeldahl nitrogen, all expressed as mg/L N;
(c) ecoli bacteria, expressed as CFU/100 ml;
(d) chlorophyll A, expressed as ug/L;
(e) sodium and chloride expressed in mg/L;
(f) dissolved oxygen, expressed in mg/L;
(g) temperature, expressed in degrees centigrade;
(h) pH; and
(i) phytoplankton taxonomy (cells/ml) to genus and species for dominant taxa and family for non-dominant taxa (1-10m composite sample).

Have the samples at 20, 32 and 45 metre depths analyzed (accredited lab) for the following:

(a) total, ortho and dissolved phosphorus , expressed as mg/L P;
(b) total nitrogen, ammonia nitrogen, nitrate/nitrite nitrogen, organic nitrogen, and total Kjeldahl nitrogen, all expressed as mg/L N;
(c) ecoli bacteria, expressed as CFU/100 ml;
(d) sodium and chloride expressed in mg/L;
(e) dissolved oxygen, expressed in mg/L;
(f) temperature, expressed in degrees centigrade;
(g) pH; and
(h) phytoplankton taxonomy (cells/ml) to genus and species for dominant taxa and family for non-dominant taxa (20-45m composite sample).

Measure and record water clarity using a secchi disk and underwater viewing box at each of the above sites.

The City must submit the proposed method of determining the locations to the Director for approval prior to the commencement of sampling.

Occasional full physical, biological, and chemical analysis of water, sediments and benthic organisms at the outfall location

and at reference locations may be required at the discretion of the Director.

Results of the analyses must be forwarded to the Director within 30 days following receipt of the results by the City. The results and trend analysis must also be included in the annual report.

4.8 Basin-wide Collaborative Lake Monitoring Program

The City will participate in the development, funding and implementation of an Okanagan Lake collaborative monitoring program as per the Okanagan Lake Collaborative Monitoring Agreement for 2012-2014 Memorandum of Understanding, as signed on January 31, 2012. (see Appendix A) This Program is intended to provide coordinated monitoring and reporting of Okanagan Lake water quality to guide Liquid Waste Management Planning. Funding mechanisms and scope of work will be developed collaboratively with all appropriate stakeholders. Lake monitoring required under Clause 4.7 will be waived by the Director for as long as the City participates in the basin-wide collaborative lake monitoring program.

4.9 Changes to Sampling and Monitoring Program

On the basis of findings during routine inspections and any other information related to the effect of the discharge on the receiving environment, the Director may allow reductions to, or require additional sampling and monitoring of the discharge and receiving environment.

5. REPORTING

5.1 General Reporting

5.1.1 Maintain the monitoring data required in Section 4 for inspection.

5.1.2 The influent/effluent water quality analyses and flow data is to be submitted to the Director such that they are received by the Director within 30 days of the results being completed in-house or being sent out by the testing agency.

5.1.3 Monitoring data must be submitted in an electronic and printed format satisfactory to the Director. All monitoring data must be entered into the

Environmental Monitoring System (EMS) electronically within sixty days of the end of a calendar year for the year's monitoring. Electronic Data Transfer information is available at:
http://www.env.gov.bc.ca/epd/ems_edt.html
and further information is available at:
http://www.env.gov.bc.ca/air/wamr/labsys/ems_wr/index.html.

5.2 Annual Reporting

Submit an annual printed and electronic report which includes a summary of the results of all monitoring programs as specified in this Operational Certificate, data interpretation and trend analyses.

5.2.1 This report is to be in a format which is suitable for review by the public and/or other government agencies.

5.2.2 The first report is due on or before within 120 days of the end of a calendar year for that year's monitoring. Raw data are to be attached as appendices to the report.

5.2.3 Maintain and submit records of the following as a part of the annual report:

5.2.4 Records of effluent water balance, which would include the plant influent flow, the volume of effluent discharged to the Okanagan Lake outfall, other volumetric information and the volume of effluent utilized for irrigation.

5.2.5 Records of the duration, intensity, acreage, location and type of reclaimed wastewater irrigation.

5.2.6 Records of efforts to reduce infiltration, inflow and cross connections.

5.2.7 Records of efforts to administer the Sanitary Sewer and Storm Sewer by-law(s). Include as an attachment, any amendments to the influent wastes by-law(s) that have been made during the past year.

5.2.8 Records of withdrawal of sludge from the wastewater treatment plant, records of analyses and the location(s) used for disposal and/or utilization.

Date issued: January 28, 1994
Date amended: January 9, 2013
(most recent)

Sajid A. Barlas, Ph.D. , P.Ag.
for Director, *Environmental Management Act*
Okanagan Region

5.2.9 Records of all nutrients reported in kilograms discharged to Okanagan Lake monthly and during the last calendar year.

5.2.10 Every three to five years, the City must conduct a review of the technology and treatment processes available and/or under development elsewhere, relative to the "level to strive for" total phosphorous concentration contained in section 1.1.2 of this Operational Certificate. The results of this review must be submitted to the Director with the annual report.

5.2.11 The City must review the requirements of section 3.14 of this Operational Certificate annually and include the information required there, in the annual report.

MEMORANDUM OF UNDERSTANDING

BETWEEN

**MINISTRY OF ENVIRONMENT
GOVERNMENT OF THE PROVINCE OF
BRITISH COLUMBIA**

AND

THE CITY OF KELOWNA

AND

THE REGIONAL DISTRICT OF CENTRAL OKANAGAN

AND

THE DISTRICT OF SUMMERLAND

RESPECTING

**THE *Okanagan Lake Collaborative Monitoring Agreement* for
2012-2014**

Date issued: January 28, 1994
Date amended: January 9, 2013
(most recent)

Sajid A. Barlas, Ph.D. , P.Ag.
for Director, *Environmental Management Act*
Okanagan Region

MEMORANDUM OF UNDERSTANDING

RESPECTING

Okanagan Lake Collaborative Monitoring Agreement
for years **2012** to **2014**

INDEX

Date issued: January 28, 1994
Date amended: January 9, 2013
(most recent)

Sajid A. Barlas, Ph.D. , P.Ag.
for Director, *Environmental Management Act*
Okanagan Region

BETWEEN:

Government of the Province of British Columbia
As Represented by
Michael Sokal, Impact Assessment Biologist of the
Environmental Protection Division
Ministry of Environment

(hereinafter referred to as the "MOE")

AND

City of Kelowna
As Represented by
Mike Gosselin, Supervisor Wastewater Treatment Operations

Regional District of Central Okanagan
As Represented by
Angela Lambrecht, Water and Wastewater Process Technologist

District of Summerland
As Represented by
Kevin McLuskey, Supervisor Wastewater Treatment Operation

(hereinafter referred to as the "local governments")

WHEREAS:

A. This Memorandum of Understanding (MOU) serves to enable collaboration of the MOE and the local governments to provide high quality, integrated and timely water quality information to enable sustainable environmental management of Okanagan Lake, and inform Liquid Waste Management Planning at the basin level.

B. The local governments will reimburse the Ministry for costs incurred as described in Section 3 and Appendix 1.

3

THE PARTIES AGREE AS FOLLOWS:

SECTION 1.0 INTERPRETATION

1.1 In this Memorandum of Understanding (MOU) each of the following terms will, unless the context otherwise requires, have the meaning set beside it:

(a) **"Costs,"** means all costs incurred by the Ministry of Environment to deliver the Collaborative Monitoring and Reporting Program set out in Appendix 1.

(b) **"Memorandum of Understanding,"** or **"MOU,"** means this agreement describing the delivery of a collaborative monitoring program on Okanagan Lake.

(c) **"MOE"** means Ministry of Environment, for the Province of British Columbia.

(d) **"local government"** means the City of Kelowna, Regional District of Central Okanagan, and District of Summerland and designates who are signatories to this MOU.

(e) **"Participants"** means representatives of each organization, either MOE or local governments, who are signatories to this MOU.

SECTION 2.0 AGREEMENT AUTHORITY

2.1 This MOU is entered into by the Ministry of Environment under the authority of the *Environment Management Act, Part 2 Section 14 Permits (1)(c)* allowing MOE to require the permittee (here the local governments) to monitor the effects of the introduction of waste into the environment. Where authorizations, permits or operational certificates under the *Environmental Management Act* enable a discharge to surface water, there is an expectation the discharger will provide monitoring information to demonstrate environmental condition.

4

SECTION 3.0 SUBJECT MATTER

3.1 Three Year Collaborative Monitoring and Reporting Program

3.1.1 A collaborative monitoring and reporting program is to replace receiving environment monitoring and environmental impact assessment programs required under existing Municipal Sewage Regulation Operational Certificates.

3.1.2 Monthly sample and associated field measurement collection from March through September, and analysis of water chemistry for 4 sites and plankton taxonomy for 2 sites on Okanagan Lake as per Appendix 1.

3.1.3 Annual reporting of Okanagan Lake trophic status, trends, and attainment of water quality objectives through the MOE or other suitable web sites.

3.2 Operational Certificates and Lake Monitoring

3.2.1 Lake monitoring requirements under the Operational Certificates ME 12211, PE 11652 and ME 13627 for the City of Kelowna, Regional District of Central Okanagan, and District of Summerland respectively, are waived while the named local governments participate in this Collaborative Monitoring MOU. The MOE will provide written confirmation following MOU sign-off. Other local governments with effluent discharges to Okanagan Lake may become participants under the terms of this MOU.

3.2.2 Effluent monitoring requirements and compliance with all other terms and conditions of the Operational Certificates will remain in effect.

3.3 Cost Estimates of Program:

3.3.1 Costs of this program include laboratory and sample collection costs.

3.3.2 Laboratory expenses are as per Appendix 1: $11,000 (full program 2 sites + 2 sites chemistry only: Okanagan Centre, Armstrong Arm)

3.3.3 Sample collection contract: $11,000

3.3.4 Total projected annual costs: $22,000 (costs based on 18M m3 effluent discharged per year = $0.0013/m3).

3.4 Roles and Responsibilities

3.4.1 The Ministry will contribute in-kind costs of program coordination and contract management for sample collection and reporting of results. For 2011, these costs included staff time of approximately 70 hours

5

Date issued: January 28, 1994
Date amended: January 9, 2013
(most recent)

Sajid A. Barlas, Ph.D. , P.Ag.
for Director, *Environmental Management Act*
Okanagan Region

(sampling 30, contract prep/monitoring 15, MOU prep 20, meetings 5), and $500 for laboratory costs.

3.4.2 The local governments agree to provide the Ministry with funds sufficient to cover costs as described in Section 5.0 and detailed in Appendix 1.

3.4.3 Representatives of MOE and local governments will form a Technical Advisory Group and will meet annually to review actions carried out under this MOU, and adjust the program from year to year as agreed.

3.4.4 The Technical Advisory Group may invite input from other agencies or institutions to further the intent of this MOU.

SECTION 4.0 SECURITY AND CONFIDENTIALITY

4.1 All information and documentation provided to, collected by, delivered to or compiled by ministry employees, in the performance of their duties and responsibilities will be dealt with subject to and in accordance with all applicable provisions of Federal, Provincial and Municipal Statutes, particularly the *Privacy Act*, R.S.C. 1985, c, P-21, and the *Access to Information Act*, R.S.C. 1985, c. A-1, and the *Freedom of Information and Protection of Privacy Act*, R.S.B.C. 2004, c.165.

SECTION 5.0 BASIS OF PAYMENT

5.1 The local governments will provide the MOE start-up costs for contract services and laboratory services.

5.2 Local government share of costs and maximum estimated annual costs are as follows:

City of Kelowna 50% or $11,000
Regional District of Central Okanagan 32% or $7000
District of Summerland 18% or $4000

5.3 When another municipal effluent discharge routinely occurs to Okanagan Lake, the monitoring requirements and costs will be re-evaluated and re-apportioned.

SECTION 6.0 METHOD OF PAYMENT

6

6.1 The local governments are responsible for providing funding in full, as per Section 5, before January 31 of years 2012 to 2014, by way of cheque to the **Minister of Finance for British Columbia** *c/o Senior Financial Officer of Corporate Services Division, Ministry of Environment, 102 Industrial Place, Penticton, BC, V2A 7C8.*

6.2 The MOE agrees to provide the local governments with a financial statement and an Annual Report.

6.3 Surplus funds at the end of the sampling season will be reviewed by the Technical Advisory Group and will be returned to local governments or reallocated through renewal of this MOU for the following year.

SECTION 7.0 LIABILITY

7.1 Each participant and personnel by association, waives all claims against the other participants in respect of damage caused to its personnel and/or its property by personnel or agents (excluding contractors) of that other participant arising out of, or in connection with the implementation of this MOU.

7.2 The provisions of sections 7.1 will survive the termination of this MOU for any reason whatsoever.

SECTION 8.0 DISPUTE RESOLUTION

8.1 Any new issue, matter of general concern or dispute arising from this MOU will be dealt with by Technical Advisory Group or their delegates.

8.2 The dispute or disagreement will not be submitted to a third party for resolution.

SECTION 9.0 TERM OF AGREEMENT

9.1 This MOU will begin January 31, 2012 and end December 31, 2014.

9.2 This MOU may be reviewed annually and amended by mutual written agreement by the Participants to this MOU.

9.3 Prior to the termination of this MOU, it may be renewed for an additional period on terms agreed to by participants to this MOU.

7

Date issued: January 28, 1994
Date amended: January 9, 2013
(most recent)

Sajid A. Barlas, Ph.D. , P.Ag.
for Director, *Environmental Management Act*
Okanagan Region

9.4 Any of the participants to this MOU may terminate participation in this agreement upon provision of sixty (60) days written notice to the other participants of their intention to terminate participation in this MOU.

9.5 On the date of termination of this MOU or termination of participation in this agreement, the lake monitoring requirements under local government operational certificates or permits as noted above, are reinstated. Regardless of the reason for termination or the participant who gives notice of termination, the MOE will not have any obligation to the local governments beyond the reimbursement of funds surplus to costs incurred by MOE to the effective date of termination.

SECTION 10.0 NOTICE

10.1 All official notices and communications pertinent to implementation of this MOU will be in writing and will be mailed or delivered. For the purposes of delivery of Notice, the addresses for delivery are:

For MOE
Ministry of Environment
Attention: Manager, Environmental Protection Division
Suite 401, 333 Victoria Street, Nelson B.C. V1L 4K3

For local governments
City of Kelowna
Attention: Mike Gosselin, Supervisor Wastewater Treatment Operations
951 Raymer Avenue, Kelowna, BC V1Y 4Z7

Regional District of Central Okanagan
Attention: Angela Lambrecht, Water and Wastewater Technologist
1450 K.L.O. Road, Kelowna, BC, V1W 3Z4

District of Summerland
Attention: Kevin McLuskey, Supervisor Wastewater Treatment Operation
13211 Henry Avenue Box 159 Summerland, BC, V0H 1Z0

Date issued: January 28, 1994
Date amended: January 9, 2013
(most recent)

Sajid A. Barlas, Ph.D. , P.Ag.
for Director, *Environmental Management Act*
Okanagan Region

SECTION 11.0 **SAVING PROVISION**

11.1 Nothing in this Memorandum of Understanding is in any way intended to replace or amend any obligation that participants are bound to, or required to perform by operation of law, unless otherwise noted in this MOU.

SECTION 12.0 **GENERAL**

13.1 This MOU reflects the good faith and spirit of cooperation of the participants but is not legally binding on any of the participants.

Signed on behalf of the MOE:

Michael Sokal
Ministry of Environment
Province of British Columbia

Jan. 31/12
Date

Signed on behalf of local governments:

Mike Gosselin
City of Kelowna

JAN 3 1 2012
Date

Angela Lambrecht
Regional District of Central Okanagan

Feb 3, 2012
Date

Kevin McLuskey
District of Summerland

Feb 6 2012
Date

9

Date issued: January 28, 1994
Date amended: January 9, 2013
(most recent)

Sajid A. Barlas, Ph.D. , P.Ag.
for Director, *Environmental Management Act*
Okanagan Region

APPENDIX 1

ESTIMATED COSTS FOR 2012

Parameter	lab 2011	# tests	parameter cost
Chloro a	$28.00	2	$56.00
Nitrogen Total	$10.00	2	$20.00
Nitrogen ammonia-diss	$5.00		$0.00
Nitrite-diss	$5.00		$0.00
NO2 + NO3-diss	$5.00	2	$10.00
Phos-Ortho? diss	$5.00	2	$10.00
Phos-Ortho? diss (LL)	$5.00		$0.00
Phos-Tot Diss	$10.00		$0.00
Phos-Tot	$10.00	2	$20.00
Taxonomy- Phytopl. (lab/cl/dom-sp/odom-gen) + biovolume	$347.20	1	$347.20
Taxonomy- Zoopl. (lab/cl/dom-sp/odom-gen) + biovolume	$280.00	1	$280.00

Chemistry & Chloro A		Plankton taxonomy	
# tests	cost	# tests	cost
Lab analysis/visit	$116.00	Lab analysis/visit	$627.20
# sites	4	# sites	2
# dates	6	# dates	6
Lab Total	$ 2,784.00	Lab Total	$ 7,526.40
QA 10%	278.40		
Museum est	3062.40		
Lab totals + 3%	10000.00		
Contract estimate	$ 22,000.00		
Funding	$ 22,000.00		
Balance	$ 199.40		

10

Date issued: January 28, 1994
Date amended: January 9, 2013
(most recent)

Sajid A. Barlas, Ph.D. , P.Ag.
for Director, *Environmental Management Act*
Okanagan Region

N

Site Plan

Kelowna Sewage Treatment Facility
951 Raymer Ave Kelowna BC
Lot 1, District Lot 135, O.D.Y.D. Plan 12356
PID. 009-424-946

Date issued: January 28, 1994
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(most recent)

Sajid A. Barlas, Ph.D. , P.Ag.
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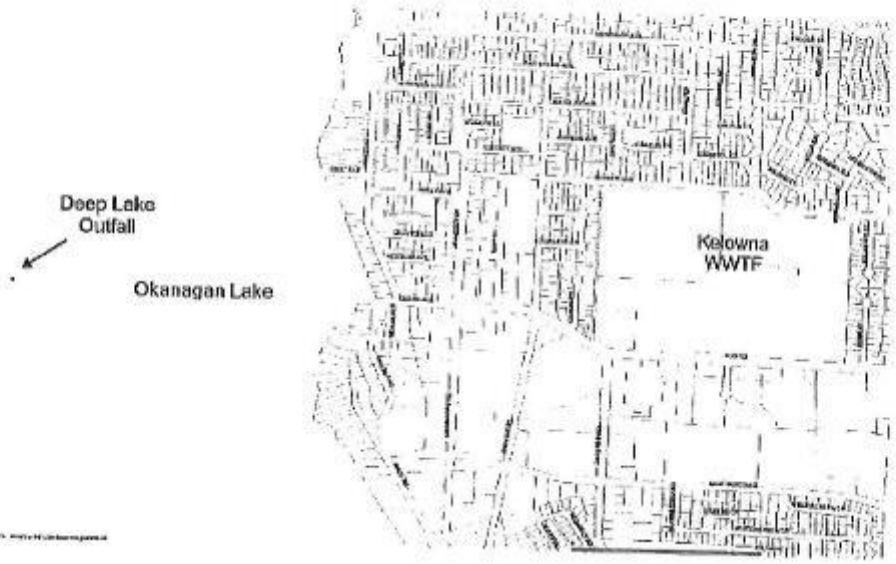
Okanagan Region

N

Location Map

Kelowna Sewage Treatment Facility
951 Raymer Ave Kelowna BC
Lot 1, District Lot 135, O.D.Y.D. Plan 12356
PID. 009-424-946



Date issued: January 28, 1994
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(most recent)

Sajid A. Barlas, Ph.D. , P.Ag.
for Director, *Environmental Management Act*
Okanagan Region

Operational Certificate Number: 12211