REGIONAL MUNICIPALITY OF WOOD BUFFALO

2016 Annual Report

MacDonald Island Wastewater System

Approval No.: 347355-00-00

Submitted to:

Alberta Environment and Parks

Submitted on:

February 27, 2016

February 27, 2017

Alberta Environment and Parks
Twin Atria
111 – 4999 98th Avenue
Edmonton, Alberta
T6B 2X3

RE: 2016 Annual Report for the Macdonald Island Wastewater System

Dear Sir/Madam:

On behalf of the Regional Municipality of Wood Buffalo, the Environmental Services Department is pleased to submit the 2016 Annual Report for the MacDonald Island Wastewater System, *Environmental Protection and Enhancement Act Approval 347355*.

Should you have any questions or concerns regarding the information contained within this report, please contact the undersigned.

Sincerely,

James Sacker
Manager, Wastewater Treatment Branch
Regional Municipality of Wood Buffalo

LIMITATIONS OF REPORT

NOTE: Please read the following:

DISCLAIMER

Sustainable Operations of the Regional Municipality of Wood Buffalo is pleased to provide Alberta Environment and Parks this Annual Report as required by the regulations. In preparing this report, Sustainable Operations collects and publishes the data from other municipal departments for inclusion in the document and does not separately verify, test or audit the data. Users are responsible for verifying the data prior to making decisions based on the information provided. If readers wish to obtain further information about or discuss the data reprinted herein, they are to direct their call to the Manager of Wastewater Department at (780) 788-1569.

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ENVIRONMENTAL SERVICES

Solid waste, potable water, and wastewater services, including their associated collection and distribution services, are provided in the Regional Municipality of Wood Buffalo (RMWB) by the Environmental Services (ES) Department. The mandate of the Department is to be an industry leader in providing diligent, reliable and efficient environmental services and protection while sustaining a workplace that is enjoyable, innovative and respected by its peers.

REGIONAL MUNICIPALITY OF WOOD BUFFALO

ENVIRONMENTAL SERVICES

Branches within the ES Department include: Water Treatment (WT), Wastewater Treatment (WWT), Underground Services (UGS), Trade Services, and Solid Waste & Landfill. In the beginning of 2015, Sustainability, formerly an ES Department, became its own department; Sustainable Operations. The department serves the community by improving the efficiency and strengthening the delivery of core municipal environmental services while protecting the natural environment. The department directly supports WWT by providing regulatory project and approval support. The ES branches that support the MacDonald Island Wastewater System are discussed in more detail in the following subsection.

WASTEWATER TREATMENT

The WWT Branch protects the environment by operating all municipal wastewater treatment and storm water treatment facilities to surpass regulatory standards. The WWT Branch is responsible for the following facilities:

- A Class IV Biological Nutrient Removal (BNR) wastewater treatment plant (WWTP) in Fort McMurray
- 19 Lift Stations and associated forced mains and appurtenances throughout the region
- Six wastewater lagoon systems in the region
- Class 3 Wastewater Heat Recovery Membrane (MBR) Wastewater Treatment Plant in Fort McMurray at MacDonald Island, currently sending treated wastewater to the sanitary system
- A new Class 3 Membrane Bioreactor (MBR) WWTP in Anzac to be commissioned after structural and equipment damage sustained from the Horse River Wildlife is assessed and mitigated

UNDERGROUND SERVICES

The UGS Branch ensures potable water is delivered to the customer in a sufficient, reliable and safe manner by operating and maintaining all municipal potable water distribution systems and surpasses regulatory standards. The UGS Branch also protects the environment by operating and maintaining all municipal wastewater collection systems. The UGS Branch is responsible for the operation, maintenance, and repairs to the following infrastructure:

- Class IV Wastewater Collection and Class IV Water Distribution systems in Fort McMurray,
- Rural water distribution and wastewater collection systems in Fort Chipewyan, Fort MacKay, Saprae Creek, Janvier, Anzac and Conklin,
- Water transmission lines leading from Fort McMurray to Anzac, and
- Bulk water delivery in Anzac, Conklin, Janvier, Draper, Saprae Creek, and Gregoire Lake Estates.

MACDONALD ISLAND WASTEWATER SYSTEM

The MacDonald Island Wastewater Treatment Plant is located at Fort McMurray MacDonald Island, 5 C.A Knight Way, in Fort McMurray. Wastewater from Shell Place and MacDonald Island Recreation Facility is treated by the Wastewater Treatment Plant. Commissioning of the plant began in 2015 once the plant was seeded and wastewater was produced starting May 2015. Treated wastewater produced in 2016 was not used for irrigation water and therefore an annual report summarizing the irrigation program is not required.

Approval number 347355-00-00 issued on December 12, 2014 under the *Environmental Protection and Enhancement Act* permits the operation of the wastewater treatment plant. The approval also prescribes the monitoring and reporting that is required to be provided to Alberta Environment and Parks (AEP).This report provides the information as required in the Annual Reporting section of the approval.

MACDONALD ISLAND WASTEWATER TREATMENT PLANT

PERSONNEL

WASTEWATER TREATMENT

WWT operators strive to ensure the protection of the environment and that RMWB's treated wastewater surpasses regulatory standards upon final discharge into the environment. As of November 2016, the WWT Branch had a total 20 full-time positions including one temporary position and three vacancies. The operations staff include: the manager, three supervisors, seven utility treatment technicians, three lab technicians, two septage inspectors, two equipment operators, one laborer, and an administration assistant, and a clerk typist. A year-end organizational chart is provided below.

WASTEWATER TREATMENT ORGANIZATIONAL CHART

UNDERGROUND SERVICES

RMWB's UGS staff operates and maintains all of the municipal potable water distribution systems in the Municipality. As of November 2016, the UGS Branch had a total of 47 full-time positions including seven temporary positions, three vacancies, and six vacant temporary positions. The UGS staff consists of the manager, two supervisors, three foremen, seven utility operators, three utility technicians, 14 equipment operators, 10 laborers, two planners (one utility and one metering) and two schedulers (one utility and one metering), nine meter technicians, and three clerks. The operations staff, other than those working in the metering section, are fully involved with operating the water distribution and wastewater collections systems listed above. A year-end organizational chart is provided below.

UNDERGROUND SERVICES ORGANIZATIONAL CHART

OPERATOR CERTIFICATION

The operators that are responsible for the MacDonald Island Wastewater System are supported by the Municipality to achieve the highest level of certification possible. Provided in the following tables are lists of the operators and their certifications.

WWT OPERATORS

Name	Position	Contact	Certification
	Wastewater Supervisor		WWIV, WWCI , COMPOST
	Wastewater Supervisor		WWIV, WTI,
	Utility Treatment Technician		WWIII, COMPOST
	Utility Treatment Technician		WWII, COMPOST
	Utility Treatment Technician		WWII
	Utility Treatment Technician		WWII
	Utility Treatment Technician		WWII, WT1
	Utility Treatment Technician		WWIV, WWTIII
	Utility Treatment Technician		WWII, WT1

UGS OPERATORS

Name	Position	Contact	Certification
	Manager		WDIV, WWCIV
	Supervisor		WDI, WWC I
	Supervisor		None
	Foreman		WDI, WWCII
	Foreman		WDII, WWCII
	Foreman		WDII
	Meter Technician		None
	Scheduler-Metering		None
	Utility Operator		WDIV, WWCIV,WTI
	Equipment Operator		None
	Utility Technician		None
	Utility Technician		WD II
	Equipment Operator		WWCI
	Meter Technician		WDI
	Utility Operator		WDII, WWCII
	Equipment Operator		None
	Scheduler		WDI, WWCII
	Utility Operator		None
	Utility Operator		WDII, WWCII

	Labourer		WDII
	Labourer		None
	Meter Planner		None
	Equip Operator		None
	Meter Technician		None
	Planner		WDIV, WWCIV
	Utility Operator		WDII, WWCII
	Equipment Operator		WD II, WWCII
	Labourer		WDII, WWCII
	Utility Technician		None
	Equipment Operator		WDI, WWCI
	Equipment Operator II		WDII, WWCII
	Equipment Operator		None
	Equipment Operator II		None
	Meter Technician		WDI
	Meter Technician		None
	Labourer		WDI
	Meter Technician		WDI
	Labourer		None
	Equipment Operator I		None
	Equipment Operator I		None
	Equipment Operator II		None
	Labourer		None
	Utility Operator		WDI, WWCI
	Equipment Operator I		None
	Utility Operator		WDII, WWCII
	Equipment Operator		WDI, WWCI

DISCHARGE SUMMARY

Treated wastewater was discharged from the MacDonald Island WWTP to Miskanaw Golf Course irrigation pond from Nov 9, 2015 to May 12, 2016, as authorized in writing by the Director of AEP on October 16, 2015.

On May 13, 2016 due to the limited resources available to monitor critical infrastructure due to the Horse River Wildlife, the RMWB began discontinued discharging treated wastewater to the irrigation pond and began discharging treated wastewater from the MacDonald Island WWTP to the Main Wastewater Treatment Plant through the collection system, located at 820 Memorial Drive.

INCIDENTS

In 2016, one incident was report to AEP; required monitoring listed in the approval was not met due to the Horse River Wildlife.

UGS WORK ORDERS

In 2016, there weren't any UGS work orders for maintenance required at the facility.

WASTEWATER QUALITY

TESTING

All routine wastewater quality analysis is performed at the Municipality's CALA accredited Wastewater Treatment Lab and any additional testing is performed at an accredited external lab. The Fort McMurray Wastewater Lab was successfully awarded accreditation through the Canadian Association for Laboratory Accreditation Incorporated (CALA) on May 10, 2013 and expires on October 5, 2018. Results of the 2016 wastewater quality monitoring are provided in the following tables.

WASTEWATER MONITORING – UNTREATED

2016	Stat	BOD (mg/L)	TSS (mg/L)	Flow (m3)*
Jan	Min	56.97	26.00	61.60
	Max	1,692.00	2,473.33	238.70
	Mean	499.69	177.62	4,381.50
Feb	Min	66.47	32.00	76.60
	Max	194.80	140.00	173.90
	Mean	102.49	57.70	3,784.1
Mar	Min	33.40	32.00	69.00
	Max	203.10	216.00	194.60
	Mean	137.89	70.60	3,862.00
Apr	Min	133.20	44.00	23.10
	Max	202.50	234.00	176.50
	Mean	157.78	65.67	3,244.90
May	Min	189.29	44.00	0.00
	Max	189.29	77.00	173.50
	Mean	189.29	59.00	1,369.30
Jun	Min	96.20	35.00	32.90
	Max	188.60	104.00	172.70
	Mean	151.30	57.090	2,628.50
Jul	Min	<2.00	32.00	0.00
	Max	276.10	104.00	132.50

	Mean	147.75	65.88	2,389.20
Aug	Min	106.20	37.00	0.00
	Max	222.80	288.60	262.90
	Mean	157.90	138.43	2,846.90
Sep	Min	54.43	22.00	14.70
	Max	266.70	640.00	222.30
	Mean	125.46	105.67	3,116.30
Oct	Min	166.40	28.00	9.40
	Max	390.00	868.00	198.80
	Mean	238.76	143.13	3,023.50
Nov	Min	164.70	64.00	6.90
	Max	288.00	225.00	196.00
	Mean	230.30	103.40	2,714.60
Dec	Min	71.20	47.00	0.00
	Max	279.10	392.00	222.50
	Mean	174.08	102.61	2,806.90

***Total Coliform & Fecal Coliform Counts expressed as Geometric Mean; Flow expressed as TOTAL for each Month.**

The RMWB monitored BOD and TSS influent parameters, which are subject to operational limits set out in the approval, more frequently than required. Additional monitoring completed in 2016 has been incorporated into the above table and factored into the min, max and mean calculations.

WASTEWATER MONITORING – TREATED

2016	Stat	CBOD (mg/L)	TSS (mg/L)	Total Coliform Counts	Total Fecal Coliform Counts	Flow (m3)
Jan	Min	<2.00	<3.00	<1.00	<1.00	40,205.60
	Max	20.80	7.20	770.00	<1.00	244,872.20
	Mean	4.35	3.35	4.75	1.0	4,041,721.70
Feb	Min	<2.00	<3.00	<1.00	<1.00	34,292.30
	Max	6.89	3.20	<1.00	<1.00	180,832.10
	Mean	2.38	3.02	1.0	1.0	3,454,116.1
Mar	Min	<2.00	<3.00	<1.00	<1.00	55,717.20
	Max	<2.00	<3.00	<1.00	<1.00	828,653.70
	Mean	<2.00	<3.00	1.0	1.0	4,217,094.0
Apr	Min	<2.00	<3.00	<1.00	<1.00	40,455.50
	Max	<2.00	4.00	11.00	1.00	188,251.50
	Mean	<2.00	3.09	1.8	1.0	3,107,362.8
May	Min					
	Max					
	Mean					

Jun	Min	**				
	Max					
	Mean					
Jul	Min					
	Max					
	Mean					
Aug	Min					
	Max					
	Mean					
Sep	Min					
	Max					
	Mean					
Oct	Min					
	Max					
	Mean					
Nov	Min					
	Max					
	Mean					
Dec	Min					
	Max					
	Mean					
Overall Min		**<2.00**	**<3.00**	**<1.00**	**<1.00**	**0.00**
Overall Max		**20.80**	**7.20**	**770.00**	**1.00**	**828,653.7**
Overall Mean (Total*)		**2.61**	**3.10**	**1.93**	**1.00**	**14,820,294.6**
LIMITS		**≤ 25 mg/L**	**≤ 25 mg/L**	**≤ 1000 mg/L per 100mL**	**≤ 200 mg/L per 100mL**	**N/A**

***Total Coliform & Fecal Coliform Counts expressed as Geometric Mean; Flow expressed as TOTAL for each Month.**
****Flow diverted to Fort McMurray Wastewater Treatment Plant, monitoring not required.**

SLUDGE DISPOSAL

To maintain a healthy biomass and SRT in the facility, Mixed Liquor Suspended Solids (MLSS) is wasted via the collection system to the Fort McMurray WWTP at 820 Memorial Drive as required.

CHEMICAL USAGE

A summary of the chemicals used to treat the effluent in 2016 is provided in the following table.

CHEMICAL USAGE

2016	NaClO (L)	NaOH (L)	Citric Acid (L)
Jan	12	0	0
Feb	1	0	6
Mar	0	0	6
Apr	0	0	0
May	0	0	0
Jun	0	0	0
Jul	2.16	0	12
Aug	23	0	12
Sep	1.8	0.55	20
Oct	22.4	1	10
Nov	3.6	0	0
Dec	6.6	0	0
Total	**72.56**	**1.55**	**66**

UNCOMMITTED HYDRAULIC RESERVE

In 2016, 16,845.81m3, or 46.15m3/d, of wastewater was treated at the MacDonald Island Wastewater Treatment Plant. This is approximately 20% of the design capacity of 227m3/d. The uncommitted reserve indicates the available, uncommitted capacity of the system (i.e. for future growth).

$$Cu = Cr – (L \times F \times P)/H$$

Where: Cr = hydraulic reserve capacity (m3/d)
= Design capacity – Avg. daily flow
= 227 – 46.15 = 180.85m3/d

L = number of unconnected approved lots = 0
H = number of households or residential connections = 0
P = existing connected population
F = wastewater average day flow per capita

$$Cu = 180m3/d – 0 = 180m3/d$$

The uncommitted hydraulic reserve was calculated for 2016 to be 180m3/d. There are no plans for future connections to be added to the system and capacity at the wastewater treatment plant is not a significant concern in the near future.

IMPROVEMENTS

The following is a list of operational improvements integrated into the system in 2016 and to be programmed and commissioned in 2017:

- Upgrading operating program to allow integration with the main Fort McMurray WWTP SCADA system
- Connect backhaul radio network
- Adding Influent flow meter to Influent Pump Station (IPS)
- Adding Wasting flow meter and automatic flush valve
- Chemscan on membrane permeate

SUMMARY

The Municipality remains committed to continuing provided high-quality wastewater services. Through continued investment by the Municipality, in staff, capital projects, and improved procedures, the Municipality aims to achieve its goal of full legislative compliance.