Memorandum

Project Name: Resolute Bay Wastewater Treatment Facility Site Selection	Project #: FRE-00255934-A0	/File No: N/A
To: Bhabesh Roy	From: Boris Allard/Melanie Flack	
Date: January 20th, 2020		
Subject: Resolute Bay Wastewater Treatment Facility Memorandum		
Prepared By: Melanie Flack Reviewed By: Boris Allard		
Distribution: Bhabesh Roy, David Browne		

Introduction

EXP Services has been retained by the Department of Community and Government Services (CGS), Government of Nunavut (GN) to select the site for the Resolute Bay Wastewater Treatment Plant. We understand the need to update the previous work that was completed by EXP in 2012 in establishing a site for the wastewater treatment facility while maintaining input from the Hamlet and considering other site alternatives. This memo will highlight the work that has been done thus far on the project and include pertinent field notes, ESA information and meeting notes from EXP's visit to the Hamlet.

Population

The population must be determined when designing for the future of the hamlet. The population projections for this project were taken from the 2016 Census and the Nunavut Bureau of Statistics. It should be noted that the Nunavut Bureau of Statistics information was completed prior to the 2016 Census being performed, thus a combination of the two sources should be used – the known population from the Census combined with the percentage increase that is observed by the Bureau of Statistics.

Based on the Census, the 2011 population of Resolute Bay was 214 whereas in 2016, the population was 198. This 5 year difference yielded a 7.5% loss of population in the Hamlet. This contradicts the Bureau of Statistics, which indicates about a 0.6% increase of population every year on average, with some years not increasing in population at all. The following chart shows possible trends on there the population could go in the future.

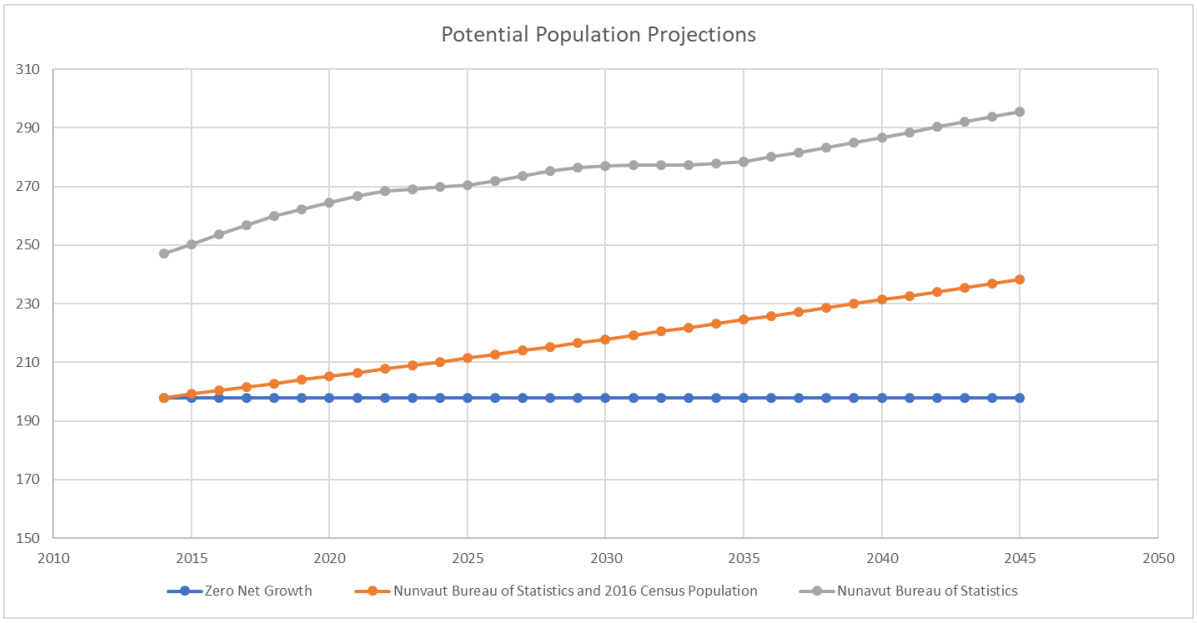


Figure 1-1: Population Projections to 2045

As the Census data is the most reputable source, it seems as though the population will fall between 198 and 238 persons in the year 2045.

System Requirements

Currently, there is one or two pumps at a given time to drive water from the pump station to the water storage tank on signal hill. When there is a single pump running, the flow rate is **175 USGPM** while when two pumps are running the flow rate is **220 USGPM.** This correlates with the Signal Hill drinking water project done by EXP, with a flow of 190 USGPM. Additional water is added to the wastewater collection pipe to prevent freezing. A flume is located in the existing Macerator building and was used to measure total wastewater flow, however this is not currently used. A wastewater treatment facility is to treat not only the wastewater generated by the Hamlet, but also the water volume used to mitigate freezing. The Airport Lagoon is also to be decommissioned and wastewater trucked to a receiving sanitary manhole near the water treatment plant.

Site Selection

There were many factors that needed to be assessed in order to choose the location for the wastewater treatment plant. These main factors were as follows:

1. Current uses of the receiving water
2. Location and distance to homes, recreation, zoning, water supplies, bodies of water, flood plain
3. Land ownership
4. Existing sensitive land uses (shellfish harvesting, swimming, drinking water, etc.);

5. Roads and
6. Service access
7. Potable water supply location compared to the Wastewater Treatment location
8. Potential odor impacts
9. Location of other outfalls

The following figure shows the area surrounding the proposed site.

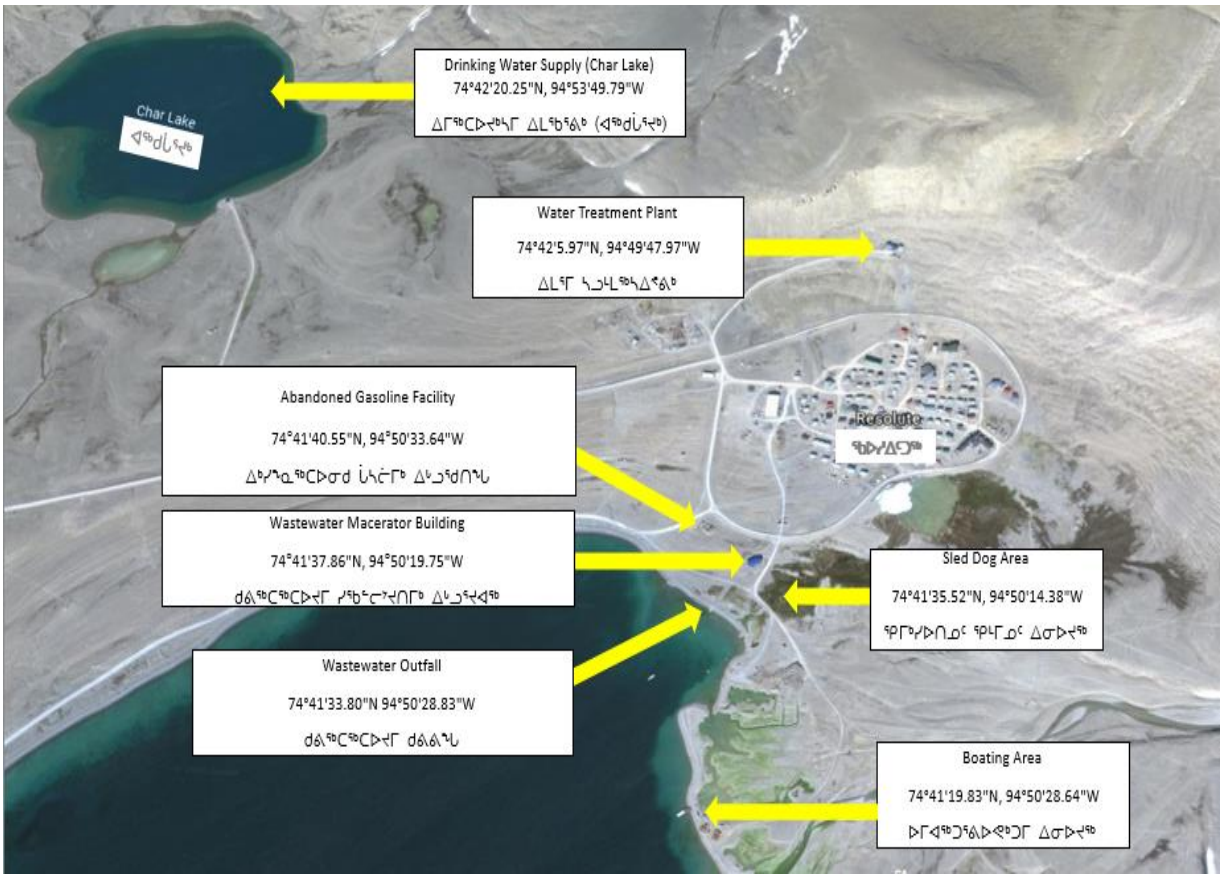


Figure 1-2: Resolute Bay and Surrounding Area

Based on the requirements, three potential sites were explored, as follows:

Figure 1-3: Three Possible Site Locations

In order to choose one of the sites shown above, a decision matrix was generated using the factors that were considered important in the decision making process. The decision matrix can be seen below.

Table 1-1: Decision Matrix

	Proximity to Existing Outfall	Environmental Safety	Cost of Infastructure Required	Distance from Residential Area	Road Accessibility	Effects on Quality of Drinking	
Importance	7	10	9	8	8	10	
Site #1	10	9	10	8	8	10	**478**
Site #2	8	8	8	9	7	10	436
Site #3	6	7	6	10	8	10	410

In this decision matrix, the importance of each category was rated from 1-10, with 10 being extremely important. In turn, each site was assigned a value between 1-10, where 10 means that that site fit the given criteria well. Once each site had been assessed in each category, the importance value for each category was multiplied by the value given to each site and these values were summed to give a total score for each site. The site with the highest score indicates that it performed the best overall in the categories of importance. Following this assessment, it was concluded that site #1 was the best choice to move forward with for the design.

Based on the criteria above, site #1 (approximately 74.6939892, -94.8390836) was chosen based on the following advantages:

- It is proposed to re-utilize the existing outfall location to avoid a new costly environmental impact study and possible additional infrastructure and construction work – thus reducing cost. The outfall also discharges on land.
- There is plenty of road accessibility for trucks and boats for unloading and transportation of materials such as equipment, supplies and chemicals required to construct and operate the wastewater treatment plant.
- All land that is part of the Hamlet of Resolute Bay on Cornwallis Island is owned by the Government of Nunavut, so land ownership is a non-issue.
- The current location is within proximity to the current macerator building. This anticipates that a wastewater treatment plant on the site would be acceptable and fall within the current property zoning.
- The Char Lake drinking water supply would remain almost 2 Km away from the proposed WWTP site which would have absolutely no impacts on the quality of the drinking water supply from a bacteria perspective.

All additional information about the selected site can be found in the Environmental Site Assessment (ESA).

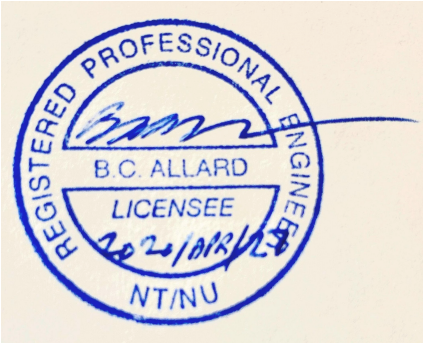
This document includes the following in the Appendix:

- Wastewater Testing Results from Caduceon
- Notes from December 2019 Site Visit
    - Meeting Notes from December 2nd Public Meeting
    - Meeting Notes from December 3rd Council Meeting
- Motion from the Council – Motion Paper Number 143-Dec 2019

Please note that during the site visit and discussions in Resolute of Dec 2-3, 2019, it was noted that there is at times odour from the Hamlet, and it is believed that the source of this is not necessarily from the Utilidor (as it is a new system and leaks have been addressed). The Utilidor is maintained on a regular basis by a local Contractor. However, it was noted that the laterals are not the Contractors responsibility and there are reported leaks in some of these connections from the buildings to the lateral then to the Utilidor. It was identified that the laterals and associated connection to the buildings are not part of the service contract for the Utilidor. Individual building occupants don't know how to address leaks or whom to contact to get these leaks fixed. This would lead untreated wastewater from the buildings which have problematic lateral connections to pool in low spots and eventually drain by the surface into adjacent ditches and eventually to the existing wetland located between the Hamlet and the proposed WWTP site (near the existing Macerator building). It is our opinion that if unaddressed, these overland flows may also contribute to the negative perception of effluent entering the Bay.

The existing 150mm sewer outfall was also noted to be exposed at low tide. Although not being part of the scope of the project, this does have an impact on the water license as it would be considered a 'surface discharge'. Extending the outfall may change this definition for the water license.

Submitted by:



Boris Allard
P.Eng, Project Manager
EXP Services Inc.

2020/04/23

Appendix

CADUCEON™ ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: --- **REPORT No. B19-16476**

Report To:
ATCO Structure & Logistics Services Ltd
PO Box 88, Hamlet of Resolute Bay
NU X0A 0V0 Canada
Attention: Philip Chubbs

Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa Ontario K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 06-Jun-19
DATE REPORTED: 20-Jun-19
SAMPLE MATRIX: Waste Water

JOB/PROJECT NO.: Resolute Bay (Sewage Outfall)
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		Sewer Outfall			
			Sample I.D.		B19-16476-1			
			Date Collected		02-Jun-19			
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Hardness (as CaCO3)	mg/L	1	SM 3120	17-Jun-19/O	136			
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	07-Jun-19/O	104			
pH @25°C	pH Units		SM 4500H	07-Jun-19/O	7.68			
Conductivity @25°C	µmho/cm	1	SM 2510B	07-Jun-19/O	352			
Total Suspended Solids	mg/L	3	SM2540D	17-Jun-19/K	5			
Chloride	mg/L	0.5	SM4110C	19-Jun-19/O	19.4			
Nitrite (N)	mg/L	0.1	SM4110C	19-Jun-19/O	< 0.1			
Nitrate (N)	mg/L	0.1	SM4110C	19-Jun-19/O	0.2			
Sulphate	mg/L	1	SM4110C	19-Jun-19/O	35			
Aluminum	mg/L	0.01	SM 3120	17-Jun-19/O	0.03			
Arsenic	mg/L	0.0005	EPA 200.8	12-Jun-19/O	< 0.0005			
Cadmium	mg/L	0.005	SM 3120	17-Jun-19/O	< 0.005			
Calcium	mg/L	0.02	SM 3120	17-Jun-19/O	40.7			
Chromium	mg/L	0.002	SM 3120	17-Jun-19/O	< 0.002			
Cobalt	mg/L	0.005	SM 3120	17-Jun-19/O	< 0.005			
Copper	mg/L	0.002	SM 3120	17-Jun-19/O	0.009			
Iron	mg/L	0.005	SM 3120	17-Jun-19/O	0.025			
Lead	mg/L	0.02	SM 3120	17-Jun-19/O	< 0.02			
Magnesium	mg/L	0.02	SM 3120	17-Jun-19/O	8.29			
Manganese	mg/L	0.001	SM 3120	17-Jun-19/O	0.003			
Mercury	mg/L	0.00002	SM 3112 B	14-Jun-19/O	< 0.00002			
Nickel	mg/L	0.01	SM 3120	17-Jun-19/O	< 0.01			
Potassium	mg/L	0.1	SM 3120	17-Jun-19/O	1.8			
Sodium	mg/L	0.2	SM 3120	17-Jun-19/O	15.6			
Zinc	mg/L	0.005	SM 3120	17-Jun-19/O	0.016			
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	14-Jun-19/K	0.54			
Phenolics	mg/L	0.002	MOEE 3179	13-Jun-19/K	< 0.002			

NOTE: Fecal Coliform passed acceptable holding time upon arrival at Lab.

Greg Clarkin , BSc., C. Chem
Lab Manager - Ottawa District

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

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Final Report

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Report To:
ATCO Structure & Logistics Services Ltd
PO Box 88, Hamlet of Resolute Bay
NU X0A 0V0 Canada
Attention: Philip Chubbs

Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa Ontario K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 06-Jun-19
DATE REPORTED: 20-Jun-19
SAMPLE MATRIX: Waste Water

JOB/PROJECT NO.: Resolute Bay (Sewage Outfall)
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		Sewer Outfall			
			Sample I.D.		B19-16476-1			
			Date Collected		02-Jun-19			
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
BOD(5 day)	mg/L	3	SM 5210B	07-Jun-19/K	14			
Total Organic Carbon	mg/L	0.2	EPA 415.1	14-Jun-19/O	6.3			
Oil & Grease-Total	mg/L	1.0	SM 5520	11-Jun-19/K	4.0			
Fecal Coliform	cfu/100mL	1	MOE E3371	06-Jun-19/O	20000			

NOTE: Fecal Coliform passed acceptable holding time upon arrival at Lab.

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Lab Manager - Ottawa District

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C.O.C.: --- **REPORT No. B19-19914**

Report To:
ATCO Structure & Logistics Services Ltd
PO Box 88, Hamlet of Resolute Bay
NU X0A 0V0 Canada
Attention: Philip Chubbs

Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa Ontario K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 04-Jul-19
DATE REPORTED: 16-Jul-19
SAMPLE MATRIX: Waste Water

JOB/PROJECT NO.: Resolute Bay (Sewage Outfall)
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		Sewer Outfall			
			Sample I.D.		B19-19914-1			
			Date Collected		16-Jun-19			
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Hardness (as CaCO3)	mg/L	1	SM 3120	15-Jul-19/O	81			
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	04-Jul-19/O	73			
pH @25°C	pH Units		SM 4500H	04-Jul-19/O	7.85			
Conductivity @25°C	µmho/cm	1	SM 2510B	04-Jul-19/O	168			
Total Suspended Solids	mg/L	3	SM2540D	05-Jul-19/K	3			
Chloride	mg/L	0.5	SM4110C	12-Jul-19/O	6.2			
Nitrite (N)	mg/L	0.1	SM4110C	12-Jul-19/O	< 0.1			
Nitrate (N)	mg/L	0.1	SM4110C	12-Jul-19/O	0.3			
Sulphate	mg/L	1	SM4110C	12-Jul-19/O	2			
Aluminum	mg/L	0.01	SM 3120	15-Jul-19/O	0.02			
Arsenic	mg/L	0.0005	EPA 200.8	08-Jul-19/O	< 0.0005			
Cadmium	mg/L	0.005	SM 3120	15-Jul-19/O	< 0.005			
Calcium	mg/L	0.02	SM 3120	15-Jul-19/O	22.9			
Chromium	mg/L	0.002	SM 3120	15-Jul-19/O	< 0.002			
Cobalt	mg/L	0.005	SM 3120	15-Jul-19/O	< 0.005			
Copper	mg/L	0.002	SM 3120	15-Jul-19/O	0.004			
Iron	mg/L	0.005	SM 3120	15-Jul-19/O	0.012			
Lead	mg/L	0.02	SM 3120	15-Jul-19/O	< 0.02			
Magnesium	mg/L	0.02	SM 3120	15-Jul-19/O	5.75			
Manganese	mg/L	0.001	SM 3120	15-Jul-19/O	0.004			
Mercury	mg/L	0.00002	SM 3112 B	09-Jul-19/O	< 0.00002			
Nickel	mg/L	0.01	SM 3120	15-Jul-19/O	< 0.01			
Potassium	mg/L	0.1	SM 3120	15-Jul-19/O	1.1			
Sodium	mg/L	0.2	SM 3120	15-Jul-19/O	5.1			
Zinc	mg/L	0.005	SM 3120	15-Jul-19/O	0.033			
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	08-Jul-19/K	0.39			
Phenolics	mg/L	0.002	MOEE 3179	11-Jul-19/K	< 0.002			

NOTE: Several parameters passed acceptable holding times upon arrival at Lab.

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Lab Manager - Ottawa District

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Attention: Philip Chubbs

Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa Ontario K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 04-Jul-19
DATE REPORTED: 16-Jul-19
SAMPLE MATRIX: Waste Water

JOB/PROJECT NO.: Resolute Bay (Sewage Outfall)
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		Sewer Outfall			
			Sample I.D.		B19-19914-1			
			Date Collected		16-Jun-19			
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
BOD(5 day)	mg/L	3	SM 5210B	05-Jul-19/K	< 3			
Total Organic Carbon	mg/L	0.2	EPA 415.1	08-Jul-19/O	3.7			
Oil & Grease-Total	mg/L	1.0	SM 5520	08-Jul-19/K	1.1			
Fecal Coliform	cfu/100mL	1	MOE E3371	04-Jul-19/O	< 10			

NOTE: Several parameters passed acceptable holding times upon arrival at Lab.

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Lab Manager - Ottawa District

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C.O.C.: --- **REPORT No. B19-23121**

Report To:
ATCO Structure & Logistics Services Ltd
PO Box 88, Hamlet of Resolute Bay
NU X0A 0V0 Canada
Attention: Philip Chubbs

Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa Ontario K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 29-Jul-19
DATE REPORTED: 06-Aug-19
SAMPLE MATRIX: Waste Water

JOB/PROJECT NO.: Resolute Bay (Sewage Outfall)
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		Sewer Outfall			
			Sample I.D.		B19-23121-1			
			Date Collected		24-Jul-19			
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Hardness (as CaCO3)	mg/L	1	SM 3120	02-Aug-19/O	114			
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	29-Jul-19/O	111			
pH @25°C	pH Units		SM 4500H	29-Jul-19/O	7.67			
Conductivity @25°C	µmho/cm	1	SM 2510B	29-Jul-19/O	352			
Total Suspended Solids	mg/L	3	SM2540D	30-Jul-19/K	35			
Chloride	mg/L	0.5	SM4110C	30-Jul-19/O	18.3			
Nitrite (N)	mg/L	0.1	SM4110C	30-Jul-19/O	< 0.1			
Nitrate (N)	mg/L	0.1	SM4110C	30-Jul-19/O	< 0.1			
Sulphate	mg/L	1	SM4110C	30-Jul-19/O	31			
Aluminum	mg/L	0.01	SM 3120	02-Aug-19/O	0.04			
Arsenic	mg/L	0.0005	EPA 200.8	31-Jul-19/O	< 0.0005			
Cadmium	mg/L	0.005	SM 3120	02-Aug-19/O	< 0.005			
Calcium	mg/L	0.02	SM 3120	02-Aug-19/O	34.5			
Chromium	mg/L	0.002	SM 3120	02-Aug-19/O	< 0.002			
Cobalt	mg/L	0.005	SM 3120	02-Aug-19/O	< 0.005			
Copper	mg/L	0.002	SM 3120	02-Aug-19/O	0.037			
Iron	mg/L	0.005	SM 3120	02-Aug-19/O	0.058			
Lead	mg/L	0.02	SM 3120	02-Aug-19/O	< 0.02			
Magnesium	mg/L	0.02	SM 3120	02-Aug-19/O	6.80			
Manganese	mg/L	0.001	SM 3120	02-Aug-19/O	0.004			
Mercury	mg/L	0.00002	SM 3112 B	02-Aug-19/O	< 0.00002			
Nickel	mg/L	0.01	SM 3120	02-Aug-19/O	< 0.01			
Potassium	mg/L	0.1	SM 3120	02-Aug-19/O	2.8			
Sodium	mg/L	0.2	SM 3120	02-Aug-19/O	13.7			
Zinc	mg/L	0.005	SM 3120	02-Aug-19/O	0.050			
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	31-Jul-19/K	2.28			
Phenolics	mg/L	0.002	MOEE 3179	01-Aug-19/K	0.004			

NOTE: Fecal Coliform passed acceptable holding time upon arrival at Lab.

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Lab Manager - Ottawa District

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2378 Holly Lane
Ottawa Ontario K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 29-Jul-19
DATE REPORTED: 06-Aug-19
SAMPLE MATRIX: Waste Water

JOB/PROJECT NO.: Resolute Bay (Sewage Outfall)
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		Sewer Outfall			
			Sample I.D.		B19-23121-1			
			Date Collected		24-Jul-19			
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
BOD(5 day)	mg/L	3	SM 5210B	29-Jul-19/K	15			
Total Organic Carbon	mg/L	0.2	EPA 415.1	30-Jul-19/O	4.6			
Oil & Grease-Total	mg/L	1.0	SM 5520	02-Aug-19/K	5.0			
Fecal Coliform	cfu/100mL	1	MOE E3371	29-Jul-19/O	5700			

NOTE: Fecal Coliform passed acceptable holding time upon arrival at Lab.

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Greg Clarkin , BSc., C. Chem
Lab Manager - Ottawa District

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Final Report

C.O.C.: --- **REPORT No. B19-30843**

Report To:
ATCO Frontec Ltd
PO Box 88, Hamlet of Resolute Bay
NU X0A 0V0 Canada
Attention: Philip Chubbs

Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa Ontario K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 26-Sep-19
DATE REPORTED: 07-Oct-19
SAMPLE MATRIX: Waste Water

JOB/PROJECT NO.: Resolute Bay (Sewage Outfall)
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		Sewer Outfall			
			Sample I.D.		B19-30843-1			
			Date Collected		23-Sep-19			
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Hardness (as CaCO3)	mg/L	1	SM 3120	04-Oct-19/O	113			
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	26-Sep-19/O	91			
pH @25°C	pH Units		SM 4500H	26-Sep-19/O	7.64			
Conductivity @25°C	µmho/cm	1	SM 2510B	26-Sep-19/O	311			
Total Suspended Solids	mg/L	3	SM2540D	01-Oct-19/K	35			
Chloride	mg/L	0.5	SM4110C	02-Oct-19/O	21.6			
Nitrite (N)	mg/L	0.1	SM4110C	02-Oct-19/O	< 0.1			
Nitrate (N)	mg/L	0.1	SM4110C	02-Oct-19/O	< 0.1			
Sulphate	mg/L	1	SM4110C	02-Oct-19/O	27			
Aluminum	mg/L	0.01	SM 3120	04-Oct-19/O	0.02			
Arsenic	mg/L	0.0005	EPA 200.8	30-Sep-19/O	< 0.0005			
Cadmium	mg/L	0.005	SM 3120	04-Oct-19/O	< 0.005			
Calcium	mg/L	0.02	SM 3120	04-Oct-19/O	34.5			
Chromium	mg/L	0.002	SM 3120	04-Oct-19/O	< 0.002			
Cobalt	mg/L	0.005	SM 3120	04-Oct-19/O	< 0.005			
Copper	mg/L	0.002	SM 3120	04-Oct-19/O	0.018			
Iron	mg/L	0.005	SM 3120	04-Oct-19/O	0.075			
Lead	mg/L	0.02	SM 3120	04-Oct-19/O	< 0.02			
Magnesium	mg/L	0.02	SM 3120	04-Oct-19/O	6.53			
Manganese	mg/L	0.001	SM 3120	04-Oct-19/O	0.003			
Mercury	mg/L	0.00002	SM 3112 B	02-Oct-19/O	< 0.00002			
Nickel	mg/L	0.01	SM 3120	04-Oct-19/O	< 0.01			
Potassium	mg/L	0.1	SM 3120	04-Oct-19/O	1.5			
Sodium	mg/L	0.2	SM 3120	04-Oct-19/O	12.1			
Zinc	mg/L	0.005	SM 3120	04-Oct-19/O	0.088			
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	30-Sep-19/K	0.61			
Phenolics	mg/L	0.001	MOEE 3179	30-Sep-19/K	< 0.001			

NOTE: Fecal Coliform passed acceptable holding time upon arrival at Lab.

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

Greg Clarkin , BSc., C. Chem
Lab Manager - Ottawa District

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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: --- **REPORT No. B19-30843**

Report To:
ATCO Frontec Ltd
PO Box 88, Hamlet of Resolute Bay
NU X0A 0V0 Canada
Attention: Philip Chubbs

Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa Ontario K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 26-Sep-19
DATE REPORTED: 07-Oct-19
SAMPLE MATRIX: Waste Water

JOB/PROJECT NO.: Resolute Bay (Sewage Outfall)
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		Sewer Outfall			
			Sample I.D.		B19-30843-1			
			Date Collected		23-Sep-19			
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
BOD(5 day)	mg/L	3	SM 5210B	27-Sep-19/K	18			
Total Organic Carbon	mg/L	0.2	EPA 415.1	02-Oct-19/O	3.2			
Oil & Grease-Total	mg/L	1.0	SM 5520	03-Oct-19/K	2.7			
Fecal Coliform	cfu/100mL	1	MOE E3371	26-Sep-19/O	96000			

NOTE: Fecal Coliform passed acceptable holding time upon arrival at Lab.

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

Greg Clarkin , BSc., C. Chem
Lab Manager - Ottawa District

Page 2 of 2.

Memorandum

Project Name: Resolute Bay Wastewater Treatment Facility	Project #: FRE-00255934-A0 /File No: N/a
To: Bhabesh Roy	From: Boris Allard
Date: December 3rd, 2019	
Subject: Resolute Bay Site Visit	
Prepared By: Boris Allard	
Distribution: Bhabesh Roy, Tony Whalen, Daryl Burke	

Present: Boris Allard (EXP), Bhabesh Roy (CGS) and driver.

Summary of Site Visit

- Visited Lagoon site west of the airport. This site is to be abandoned once the WWTP is constructed and commissioned. Comprised of a rectangular lagoon earthen berms and is originally sized for 600m3. 18 buildings wastewater is collected by sewer trucks and dump to the lagoon without pretreatment. Lagoon has and is expected to overflow at any point this Dec. Wastewater drains overland slowly onto the land, forms puddles and eventually migrates 3km to sea. Is not meeting treatment requirements and the only reason Bhabesh indicated that it is still allowed to function is that there is a new WWTP to be constructed.
- Visited Char Lake pump site.
- Pump building site is comprised of vertical turbine pumps, intake, boilers, gen set.
- Of particular note was all of the containment boxes and berms built around pits and around fuel supply systems to mitigate risk of fuel oil getting into Char Lake. This should be looked at closely to see if there are similar protection measures put in place in the new plant. Old pumphouse to be abandoned after new one commissioned.
- Bhabesh requires that O&M manuals be submitted soon on the new Char Lake site, as well as the Treatment site.
- Bhabesh indicated there are 8 or 9 new water treatment pre-packaged systems going in to other hamlets, similar look and feel so this makes it easier for operators to maintain. Operators are difficult to get and train and retain, and they move around.
- Visited Water Treatment Site. Residuals they aim for .4 or .5, in system they aim to maintain .2 (seems low to me). Exterior manhole could be used to receive trucked wastewater from the 18 buildings which are not on the Utilidor.
- Visited the abandoned large blue building by Macerator site. This is indeed abandoned. Bhabesh suspects it cannot be used for new WWTP as it no longer meets code.
- Macerator Building (shed). Had to shovel out as the door was covered at base by snow.
- Macerator did not seem to be operational. Took pictures. Macerator then turned on, and operator ATCO cleaned it out. There was a bucket full of white tissues which were removed.

- Noted that Macerator building fan was blocked off completely, so no ventilation activated, macerator has an open element to it exposing wastewater flow to the air, and there is an open heating element which does not appear explosion proof.
- There is an 8inch bypass, as well as a large flume which has not level reader capability. There used to be a chart recorder associated with level, but that is long abandoned. Wastewater quantity is estimated by water treatment flows.
- Wastewater is comprised mainly of clear water from Char Lake to prevent the utilidor sewer pipe from freezing. Bhabesh estimates that the ration of wastewater to water is 1:20. The BOD and COD are low, but still not meeting treatment requirements. I indicated to Bhabesh that this large flow will be a challenge to the mechanical system (or any wwtp system).
- Noted that the building macerator unit is open flow, and that the heater is exposed heating element, including thermostat. The fan is completely blocked off with insulation. There is not much smell at all (flow is diluted), but I did note to Bhabesh that this is definitely a hazard (explosion and to operators) as there is a ventilation issue. He is aware of this, but as there will be a new WWTP, there is no added monies to place into this building.
- Outfall is connected inside the building (transitions from 8inch line steel to HDPE). HDPE anchors are located outside of building (not seen as they are under snow and dirt).
- There is nothing on the other side of the macerator building.
- Concluded drive and went back to ATCO hotel.

Submitted by:

Boris Allard, FEC, P.Eng

EXP Services Inc.

2019/12/03

Encl: Photos from Site Visit

Memorandum

Project Name: Resolute Bay Wastewater Treatment Facility	Project #: FRE-00255934-A0 /File No: N/a
To: Bhabesh Roy	From: Boris Allard
Date: December 2nd, 2019	
Subject: Resolute Bay Council Meeting	
Prepared By: Boris Allard	
Distribution: Bhabesh Roy, Tony Whalen, Daryl Burke	

Time: 7:00 PM – 9:30 PM
Location: Hamlet Gymnasium
Present: EXP Boris Allard
CGS/GN Bhabesh Roy
Translator (also Councilor Susan)
Public: Elder, Hunter (George), 7 other community representatives, Philip (ATCO)

Meeting Minutes

Bhabesh Roy described the short history of the Utilidor system, recent upgrades, Char Lake water supply source, how the system is designed to work under gravity with the existing slope of the terrain, which leads to the existing Macerator building then to the outfall into the Sea.

Boris Allard described general process of siting a wastewater treatment plant;

- Property use
- Location with respect to electrical, roadways, utilidor, services, while considering distances from public buildings, houses, school etc.
- Location and separation from existing water supply (Char Lake)
- Location to existing outfall and macerator building
- Location with respect to existing watercourses, wetlands
- Location with respect to land use, cultural facilities and boat facilities

Reviewed 3 potential sites located: site 3 west; site 2 west of macerator and existing abandoned fuel site; site 1 near macerator. Other sites not considered due to use of shoreline by boats to the ease, then area by sled dog area, then wetland area. Site near macerator is preferred as site is downstream of utilidor, and adjacent to existing electrical and roadways for ease of servicing unit, as well as ease of construction access.

Question and Answer Period

Can outfall be extended? This is a possibility but is not in the current scope of the study. This will be dependent on the design process, as well as Waterboard direction and Regulatory acceptance.
Can there be a separation between treated effluent and receiving water (to be in keeping with Inuit cultural custom)? Receiving water source is the Sea. Yes, separation is possible if the outfall ends few meters up from the high water mark.
Why are we doing this WWTP now? The utilidor was built with provision for a WWTP, however at the time, the regulation was not requiring this level of additional treatment and the current macerator system met previous requirements. Today's regulation requires better effluent quality prior discharging into the sea.
How can we improve wastewater quality? By the addition of a new WWTP, and known WWTP technologies this will meet requirements of the current license.
How can we treat pharmaceuticals? This is a challenge for all types WWTP and municipalities, but not typically consider biomedical waste. This can be mitigated through education of public and good practices for domestic toilets/sink use.
How will operator training take place? And will it take place in Resolute? Training is to start during the construction process to involve operators such as shop drawing/ as-built drawing/ O&M manual input, and follow-up visits from the equipment supplier as technical support, even after care support.
Could ATCO be the maintenance provider? This is not determined yet. The facility would be part of the Utilidor system but could be added to contract, and this could be ATCO or other service maintainer/provider.
How many local jobs could be created? Approximately 3 operators are expected and they should be local.
Sampling frequency – what is it? What is the timing? Typical sampling point would be taken at influent (before treatment) then effluent just before outfall. Typing would be 4 times a year, then monthly inside the plant for both influent and effluent, and as directed by Water Board. Supplemental testing can be done in addition to this at any time. Some sample tests can be done locally, other testing samples will be sent to an external accredited lab in Ottawa.
Is it possible to also consider wetland treatment – in reference to the University of Dalhousie recommendations? Site location is only considering mechanical treatment at the present time. (existing blue building was originally for WWTP)
Can WWTP be located outside of the bay? Current cutting and hunting is located outside of the bay (and cutting of meats be done back in the bay).
The existing infrastructure outfall cannot be relocated outside the bay. Objective is to improve wastewater treatment with a new WWTP.
How do you protect the WWTP tank system from freezing? This would be a design consideration, and added heating, insulation, and protection to permafrost are all factors in this.
What type of emergency contingency plans could be in place? The design will have to be consider emergency contingency plans such as: power outages; emergency bypass; secondary devices and/or equipment in case of breakages (spare parts, motors, piping, valves);
Can the existing 'blue' building be re-used? (original purpose of this was for a WWTP but abandoned and is not believed to be adequate for a new facility. Blue building is not planned to be re-used.);

What would be the construction period? It is projected to be 2021-2022 (two years for construction), and this would depend on tendering and award dates.
Life expectancy of the WWTP what is typical? (25-30 years but also contingent on population growth). Some equipment may have to be replaced before 30 years such as motors/ bearings and regular maintenance will have to be made. Population growth also has an impact (if it changed from 2% to 5%). Designer to use growth charts from Census Canada and Nunavut statistics. WWTP uses modular systems which can be expanded or added onto to account for added treatment capacity.
Public education: how to mitigate or reduce risk of wastewater- There should there be public education to not put pharma products, pens or other debris in the wastewater. There should be public education program to minimize abuse of wastewater collection system. (facebook, school, etc)
How to build things to protect the environment? Design is to incorporate backup systems such that the environment not be polluted and thus improved from what is happening today.

Additional Comments

- Hamlet is very happy that there are plans on a wastewater treatment plant, and said 'about time' and pleased with progress.
- Hamlet is also very pleased in Utilidor system;
- It was noted that there are some sewage odors in the wetland area and outfall. This may be attributed to the connections between the homes and the utilidor having leaks as opposed to utilidor leaks.
- Existing outfall does have some deposits and causes odors from time to time. This is one of the reasons that hunters no longer use this area for cutting of meats from hunting.
- It was noted that if there was a WWTP today, it may take time for the existing outfall deposits to dissipate.
- General mood was very positive, some snacks were had.
- Public were thanked for participating and taking time out in the evening for the presentation and important infrastructure plan.
- Meeting was concluded at 9:30pm.

Submitted by:

Boris Allard, FEC, P.Eng

EXP Services Inc.

2019/12/02

Memorandum

Project Name: Resolute Bay Wastewater Treatment Facility	Project #: FRE-00255934-A0 / File No: N/a
To: Bhabesh Roy	From: Boris Allard
Date: December 3rd, 2019	
Subject: Resolute Bay Council Meeting	
Prepared By: Boris Allard	
Distribution: Bhabesh Roy, Tony Whalen, Daryl Burke	

Time: 7:00 PM – 9:30 PM
Location: Hamlet Council Chamber
Present: EXP Boris Allard, P. Eng.
CGS/GN Bhabesh Roy, P. Eng.
6 Councilors including Susan, Mayor, SOA- Kimberley

Minutes from Meeting

Bhabesh described in intro short history of Utilidor system, recent upgrades, Char Lake water supply source, how the system is designed to work with the existing slope of the terrain, which leads to the existing Macerator building then to outfall.
Boris described general process of siting a wastewater treatment plant;

- Property use
- Location with respect to electrical, roadways, utilidor, services, while considering distances from public buildings, houses, school etc.
- Location and separation from existing water supply (Char Lake)
- Location to existing outfall and macerator building
- Location with respect to existing watercourses, wetlands,
- Location with respect to land use, cultural facilities and boat facilities

Reviewed 3 potential sites located: site 3 west; site 2 west of macerator an; site 1 near macerator. Other sites not considered due to use of shoreline by boats to the ease, then area by sled dog area, then wetland area. Site near macerator is preferred as site is downstream of utilidor, and adjacent to existing electrical and roadways for ease of servicing unit, as well as ease of construction access.

Question and Answer Period

Who will own facility? The facility will be owned by the GN, however it could be taken over by the Hamlet.

Who will operate facility? A contractor would operate the facility. It could be the same contractor as the Utilidor system, but it can be independent completely. It is proposed that local people act as operators (total of up to three) to be trained for the facility.
Who pays for operating and maintenance costs? The GN pays for these costs.
Can the outfall be relocated? This is out of the scope of this study, but will be discussed with the GN departments examining the small craft proposal when it arrives.
Can the outfall be extended? This is out of the scope of this study, but will be discussed with the GN departments examining the small craft proposal when it arrives.
Has the GN received documentation relating to the proposed small craft harbour? GN is aware of work being done but has not received written submission by the Federal Government.
What is impact of relocating WWTP from proposed site 1 to other sites such as 2 or 3? There will be added capital costs, as well as additional O&M costs.
In the 1970's, was there consultation made with council at the time? This is a time period which predates Nunavut and this is not known.
How does the WWTP reduce risk of discharges? Ie backup systems materials, spares, SCADA, alarms… This will be considered during the design process. Equipment and materials selected such that operators can maintain the system without adverse effects on treatment, and also incorporate backup systems to mitigate failure events.
Is the proposed WWTP considered part of the Utilidor System? Yes, this is considered a part of the Utilidor system or an independent facility. However, this will be decided/announced during the design phase.
Why were sites 2 and sites 3 not further examined? Sites 2 and 3 are located away from the existing Utilidor system as well as the outfall, whereas Site 1 had more benefits than the other two (capital costs, as well as logistics)

Additional Comments

- Wastewater Treatment is important for the Hamlet and existing situation is incompatible with current needs (do not like to have raw wastewater dump into the environment);
- Current effluent quality is not meeting requirements of the new regulations;
- License to be amended from a category 'B" to category 'A' to satisfy waterboards current regulation;
- Council is accepting of site 1 considering outfall location change to accommodate small craft harbour proposal. Note that CGS has not received documentation at this time but will communicate request to other GN department.
- Council will require a written motion proposed for next council meeting (in December before holidays). However, they also would like for the small craft harbour proposal to consider relocating and/or extension of existing outfall.
- Council concerned with the visual aspect of the current outfall, as well as the abandoned 'blue' building.
- Existing outfall is noted to be exposed during low tide. This is in the current License as it is considered a surface outfall.

- It was noted that Resolute infrastructure is leading other communities with a new water pump house, water treatment facility and renewed utilidor system and now a proposed WWTP.

Submitted by:

Boris Allard, FEC, P.Eng

EXP Services Inc.

2019/12/03

Hamlet of Resolute Bay
Motion Paper

Motion Number: 143-Dec-2019 Date: December 12, 2019

Moved By: Susan Salluviniq

Seconded By: Jaslin Salluviniq

To approve the Wastewater Treatment site to be located at Site 1 as presented with the understanding that the location of the treatment site outflow will be directed in such a way that it will not interfere with the chosen Small Craft Harbour Location.

For: 5

Against: 0

Abstain: 1

✓ Carried

_____ Not passed

Mayor

Kimberley Young
Chief Administrative Officer