Annual Report -2016

Water Licence: 3BM-KUG 1520

Hamlet of Kugluktuk, NU

Date submitted: March 24, 2017

By: Shah Alam, P. Eng. E.P.
Municipal Planning Engineer,
Community and Government Services
Cambridge Bay, NU

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Building Nunavut Together
Nunavuliuqatigiingniq
Bâtir le Nunavut ensemble
Nunavut

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Department of Community and Government Services
Nunalingni Kavamatkunnilu Pivikhaqautikkut
Ministère des Services Communautaires et gouvernementaux

Kugluktuk Water Licence: 3BM-KUG 1520 — Annual Report 2016

March 24, 2017

Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1L0

Attention: Karen Kharatyan, PhD, A/ Manager of Licensing

RE: Annual Report 2016 - Hamlet of Kugluktuk Water Licence: 3BM-KUG 1520

Dear Mr. Karen,

The Hamlet of Kugluktuk is pleased to submit to Nunavut Water Board the enclosed file of "Annual Report 2016" of water uses and sewage solid waste disposal as required under the compliance of Water Licence; 3BM-KUG120. Copies of required tests reports are attached herewith for your reference.

The Licensee remains in operation of those facilities and adhere the compliance requirements with the help Community Support of CGS, Government of Nunavut. Samples test result shown excellent remediation of contamination parameters within allowable limit comprising BOD, TSS, E-coli and Toxicity components and quality control on effluent.

We summarized those conditions and requirements outlined in Part B through part H.

We hope that Nunavut Water Board will find this report and enclosed test results valuable to Annual Report in operating the Licence for water, sewage and solid waste facilities.

Best Regards,

Shah Alam, P. Eng. E.P.
Municipal Planning Engineer,
Government of Nunavut
Community and Government Services
Cambridge Bay, Nu

Enclosure: Annual Report 2015 NWB Form, effluent water sample results, compliance Part B-H
Cc: Donald LeBlanc, Senor Administrative Officer (SAO), Kugluktuk, NU
Baba Pedersen, Resource management Officer, AANDC
Sonia Aredes, Technical Advisor, NWB

P.O. Bag 200, Helen Maksagak Centre
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Kugluktuk Katimayeen
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Shah Alam, P. Eng., E.P.
Municipal Planning Engineer,
Government of Nunavut
Community and Government Services.
Cambridge Bay, Nu

Donald LeBlanc
Senior Administrative Officer
Hamlet of Kugluktuk
NU, X0B 0E0

Shah,
This will acknowledge, that I have reviewed the Annual Report 2016, Water Licence 3BM-KUG-1520 and here by authorize it to be submitted to Karen Kharatyan.

Thanks
Donald LeBlanc

Donald LeBlanc

TABLE OF CONTENTS

EXECUTIVE SUMMARY:

This Annual Report 2016 for the Hamlet of Kugluktuk (the Licensee) to the Nunavut Water Board (NWB) has been prepared to meet requirements of the Nunavut Water Board Licence 3BM-KUG 1520, Part B General Conditions, through part H conditions to the monitoring program. This report covers the period from 01 January to 31 December 2016.

Water intake from Coppermine River through twin intake pumps, and mobile shake (as convenient) and delivered in buried line to the treatment plant where treated in cartage filters followed by chlorination and truck-fill outside and supplied to household tank by Hamlet operated water trucks. Quantity of water was drawn approximately **61,711m3** which is about 13.82 % increase compared to previous year's intake volume of **54,215** m3, but still within the allowable limit **77,000** annually.

Sewage waste collected from household sewage tanks using hamlet operated vacuum trucks, hauled to community sewage lagoon and discharged at the designated dropping point. Raw sewage stayed inside the lagoon during the period Sep - June for almost 10 months freezing where they received primary treatment naturally. Annual decanting carried during July-August to reduce water quantity inside and make room for new candidate sewage waste. Samples collected from decanting point of monitoring station and tested at Taiga Laboratory Yellowknife for parameters compliance.

Waste batteries, drums of waste oil and paint were partly replaced inside the seacan placed at hazardous waste facility. Non-hazardous waste disposed at the solid waste facility using hamlet and compacted down with grader and covered with sand-gravels. Loose papers, boxes, waste cloths and light woods were burn with control burning process to reduce and safe from flown away.

Earthen buttress construction carried on berm toe at east side leak area that reported unauthorized discharged of effluent over the years. The lagoon was built with HDPE liner on inner sides and base in 2008 with capacity 126,000 m3. But, some bubbles developed to the base liner at location caused island type float. Some repair works done in 2011 to the liner including air released from bubbles, but couldn't eliminate completely since actual causes unknown. The consultant has inspected the leak, assessed the effluent quality and designed & supervised the buttress works. Remaining works of buttress and re-grading and fixing of berm crack, potholes and subsidence on other sides will be carried in summer 2017

Water system upgrade:

The new Water Treatment Plant construction is progressing to completion and expected operation in July 2017. With this addition, water intake and quality will be increased but no changes to supply but will increase the efficiency in water treatment and increase in supply as population increasing. Water intakes for Kugluktuk has been using two intake pump houses, a mobile shack for ice water as an alternate to regular pump house intake and a storage reservoir for temporary holding water before directing to treatment plant when salt intrusion increases. Issues on turbidity and excess salt wedge are causing higher cost for operation and frequency of filters change. Water samples are sending to EHO, Cambridge Bay for EC and FC test on a monthly basis and whenever necessary. No issues or concern to during this period.

ANNUAL REPORT-2016

YEAR BEING REPORTED: 2016

The following information is compiled pursuant to the requirements of Part B, Item 1 of Water Licence **3BM-KUG1520** issued to **Kugluktuk.**

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i) - iii) tabular summaries of all data generated under the “Monitoring Program”; monthly and annual quantities in cubic metres of freshwater obtained from all sources; monthly and annual quantities in cubic metres of each and all wastes discharged;

Attached are quantities of water used as reported in our Fluid Manager Water Delivery System and the estimated discharge of sewage waste based on quantities used.

Month Reported	Quantity of Water Obtained from all sources (Litres)	Quantity of Sewage Waste Discharged
January	5,185,759.40	
February	4,986,277.60	
March	4,971,808.50	
April	4,837,572.40	
May	4,801,533.20	
June	4,634,612.30	
July	5,007,002.40	
August	5,478,628.70	
September	5,436,606.70	
October	5,745,831.70	
November	5,366,084.10	
December	5,259,453.70	
ANNUAL TOTAL	**61,711,120.70**	

iv. a summary of modifications and/or major maintenance work carried out on the Water Supply and Waste Disposal Facilities, including all associated structures and facilities;

Water Supply:

- The new treatment plant construction carried during this period and almost completed, expected substantial completion in June 2017. The existing Cartage Filtration system will stay as additional component to the slow sand/CFS filtration and coagulation to refine the turbidity when needed. Two new truckfill facilities at the new plant will replace the existing truckfill facility.
- The new treatment plant include several tanks of two trains filtration system, raw water storage tank, backwash tank and treated water storage tank. The treatment plant comprised in two floors – treatment basins, pipes, pumps, electrical, mechanical and materials storage are on main floor, and operator office room, record room and storage room on the mezzanine floor (as seen in attached drawings). Water storage tanks, delivery system to treatment plant and backwash return are on side of the main building.
- Sewage leak prevention and berm protection measure buttress construction on the toe at the east side leak area of the lagoon has carried part, remaining work will be completed in summer 2017 with additional soil-gravel materials collection locally. Repair to bubbles on liner could not be eliminated, but not posing a threat to lagoon containment or capacity since annual decanting makes room for new candidate sewage water over the year.
- Some improvement on solid waste area carried with gravel pitching, grading and packing down loose waste inside. The waste facility operation remains active and monitors by the operator on time to time inspection, dump segregation and control burning to loose papers.

Water intakes system:

The water intake system to treatment plant comprises in several ways:

- **Intake though mobile shack:** ice water through a small pump placed on a mobile shack of wooden skid at the point of intake at reachable distance from the shoreline when high salt wedge in river bed water. Upgrading carried to the mobile intake line including HDPE insulated 3-inch pipe, setting of 15 HP pump inside the shake and stable position of the intake shake on float. This system uses almost 6-7 months of the year from Nov-May before the ice breaks up. Water collects from a depth of 3-4 m of ice surface to a distance available of water with no salt or less salt wedges. This intake water also has less turbidity then the river bed intake, thus reduce the number of cartage filters for the treatment plant.

- **New and old intake pump houses**: water intake from the higher depth using twin lines are mostly useful in summer and fall. These two pump houses are the main water intake system of permanent structures. No maintenance and upgrading needed during this period.

- **Storage reservoir**: uses mostly for diverting intake water through a temporary storing and allowing natural settling of salt wedge and larger suspended particles before sending to the treatment plant when high salt wedge and high turbidity noticed in river intake but mobile shake is not useful– this secondary facility uses generally in summer and fall. Reservoir bed was cleaned and pumped out sediment sludge during this period.

v. a list of unauthorized discharges and summary of follow-up action taken;

The Licensee is monitoring the ongoing leak issue at the east side and a buttress construction ongoing for the berm protection measure, expecting completion in summer 2017. With the part of buttress construction (50-60 % of design height), it appears a very minimal leak flow at the outer toe, which may be from surrounding area of the berm, or part of the leaked water from the lagoon, but an improvement is observed. A full leak stop may expect with the earthen buttress completed.
Annual decanting of sewage water onto wetland using a pump took place during the summer as part of annual monitoring of the lagoon, which can be repeated within the same fiscal year if needed as advised by the inspector. Effluent samples were taken from lagoon at the decant point to verify the requirement of BOD, E. coli, TSS and other basic parameters as identified in the licence. AANDC inspector was consulted for approval before the decanting start and updated with results.

vi. a summary of any abandonment and restoration work completed during the year and an outline of any work anticipated for the next year;

No abandonment of sewage facility but an improvement to berm protection at the east side of leak affected part, work continued and expected completion in summer 2017.

New water treatment plant is progressing to completion and expecting by July 2017. Once the new plant comes to operation, part of the current treatment system will be abandoned such as chlorination unit, water line connection to current plant and current truckfill facility.

vii. **a summary of any studies requested by the Board that relate to waste disposal, water use or reclamation, and a brief description of any future studies planned**;

Lagoon leak inspection and buttress construction work supervision were done by Stantec consultant. Sample of sludge materials down the buttress can be tested for closing, covering or repurposing the sludge-soil materials from the old sewage facility down the east berm at leak area. A study of the can be required of the part of wetland at this particular area as directed.

Paints and gasoline barrels (empty and partly filled), batteries and other hazardous materials at the land farm lined cell are requested to be managed in accordance to the guideline.

- The licensee has started replacing those hazardous substances such as batteries, paint peels, waste oils inside a seacan placed at the landfarm, shipping to 3rd party recipient when convenient to sealift barge and cost effective.
- The licensee will remove over-capacity sands and gravels from the land farm and will use to solid waste covering purposes in coming summer 2017, using Hamlet resources.

- Monitoring station signs be reinstalled where missing and requires replacement specifically at metal dump area, land farm and down the solid waste sump.

viii. any other details on water use or waste disposal requested by the Board by November 1st of the year being reported; and

No specific requests on facility issues, but the Licensee will submit information on completed works including documents, drawings, reports and study outcomes on sewage leak measures and water treatment plant.

ix. **Updates or revisions to the approved Operation and Maintenance Plans**

No changes to O&M manuals of sewage facility, solid waste as those are active and approved. O & M manual for water treatment will remain active until the new plant comes in operation-expecting late 2017.

ADDITIONAL INFORMATION THAT THE LICENSEE DEEMS USEFUL:

GN CGS has hired the consultant and contractor for the remediation of the leak issue at the lagoon, but no technique or attempt for the bubble removal at the lagoon liner. A report from the consultant has identified several options, and GN has chosen the best cost effective option to construct a buttress at the leak area, and re-grading other sides where pot holes, berm cracks and slope sub-sides. Based on the respond after this improvement work, remedial measure for long-term can be planned to keep the lagoon in full compliance.

The new water treatment plant comprised new technology, equipment, chemical filter media and computer system monitoring. Operation of this plant also will be required knowledgeable person and increased ability. The Hamlet will require increasing the operational budget with minimum level-II operator. A training plan for operator is underway for implementation in 2017.
Water samples from source Coppermine River and treated water from truck-fill were sent to EHO at Cambridge Bay on a monthly basis and as necessary for EC and FC tests. No concerns about E. coli or coliform in the water noticed.

FOLLOW-UP REGARDING INSPECTION/COMPLIANCE CONCERNS:

A new parking garage for the sewage trucks and water trucks and maintenance works in one building, and isolated by partition is expecting completion in summer 2017. With the increase in population and increase in water supply and sewage disposal, the Hamlet will require an addition of at least one water truck and one more sewage truck

Hamlet has been looking for an incinerator to be used at the solid waste facility, but the Hamlet is not in the position to spend money to get it. Hamlet is planning to start a recycle program for waste reduction towards solid waste facility.

Conditions and Compliances: Licence 3BM-KUG1520

Part B: General Conditions

- Tabular Form of Annual water consumptions are filled from daily water distribution and sewage quantity estimated from daily sewage disposal in the lagoon. No device Meter was used for volume measurements, however, truck-fill uses as precise for water, sewage and solid waste quantities round up.
- No modification to water supply or sewage disposal program. Water intake from the Coppermine River using pump houses and mobile shake as convenient and as needed.
- Sewage disposal carried in the engineered lagoon at the designated drop off point.
- The new water treatment plant construction is progressing to completion by July 2017.
- Decanting of sewage water from the lagoon cell to wetland (KUG-3) using a mechanical pump during July-August. Decanting could take more time when needed and convenient.
- Only restoration activity to the sewage lagoon at east side leak area, which connected part of the old sewage facility by leaked water flow towards the wetland.
- No changes of current active O&M manuals for water, sewage and solid waste.
- Berm protection buttress development on the east side berm toe at leak area and repair of cracks and subsidence of berms slope on south and west side are in progress.
- AANDC inspector has been contacted before decanting, sampling and facility inspection.
- Sampling and summer monitoring program continued during June - September and was available for sampling as described in the Compliance Plan. No other amendment required to the Compliance Plan. Sampling stations marked with GPS locator and signage with English letters and Inuktitut installed as needed.
- Only leaking issue on the east side at one location and no other leak spot or spill occurs and no reporting required during this period January – December 2016.
- Water intake point changes based on season where salt and turbidity issue in source water varies and intake system switches to mobile shack, pumps and reservoir. No adverse sign of salt and high turbidity noticed during this year and thus minimal uses of mobile shake.

Part C: Water Use:

- Water drawn from the Coppermine River using pump houses and auxiliary mobile shack as needed. The annual quantity of 61,711 cubic metres within allowable annual limit of 77,000 cubic metres. The annual intake quantity increases about 13.82% compare to last year due to increasing demand of water for increasing population and construction works in the community. This trend of increasing will may lead to a higher quantity from the current limit of 77,000 m3. The water source (Coppermine River) has sufficient water for intake with an allowable increase limit.
- Water intake system integrated a screen at the very last point to separate fish & debris, and thus protect the intake from any larger particles coming into the water.

Conditions and Compliances: Licence 3BM-KUG1520

Part D: Waste Disposal

- Raw sewage collect from household sewage tank by hamlet operated vacuum trucks and discharge into the lagoon at designated drop off location through discharge flute. Annual decanting carried from lagoon to wetland using a mechanical pump during July - August. An overflow pipe available for extra water in the case of snow break up towards outside.
- Samples of effluent water collected during the period July and August and tested at Taiga laboratory, Yellowknife. All samples results shown contaminant parameters within allowable limits, set out in the Licence.

Part E-G: Modification, construction, operation, A&R

- No modification to lagoon berm and waste facility. Improvement work carried to mobile water intake structures with insulated pipe and pump. The new water treatment building is progressing to completion with approved design and drawings. Expected operation in July 2017.
- No changes to A&R plan of sewage facility; scope of sludge removal be necessary when sludge thickness comes to a minimum 2 ft thickness for de-sludge and dry outside in a designated cell which is to be prepared.
- The old sewage facility abandonment report stated for reuse the land for sludge drying facility or land farm activities. The buttress construction works were carried at the close vicinity to the old lagoon berm; and thus require a push out the soil-sludge and piled on nearby to be repurposed the drainage of wetland around the area and stabilizing the solid waste berm.

Part H: Monitoring Program

- Annual monitoring of sewage & waste effluent carried from station KUG-2, KUG-3, KUG-4 and KUG-5 during July and August. Samples were taken from stations where available and convenient. Test results included in this report.
- Sewage truck operator keeps record for each load of sewage disposes-full load of sewage truck is 10,000 liters and 3 trucks in operation with one standby back up. A new truck inclusion in plan for next year.
- Location of sewage disposal identified to the east side close near to south-east corner and decanting location set at the north side. This facility keeps raw sewage away from quick mixing with waited sewage water in the lagoon for decanting.

Wastewater/Sewage parameters
Sample date: July 04, 2016

Parameter	MAC Limits	units	Results of sample taken on July 04, 2016						
			KUG-2	KUG -3	KUG-4	KUG-5			
Alkalinity $CaCo_3$		mg/L	209	235	73.2	259			
Conductivity		µS/cm	717	672	378	2460			
P^H	6-9		7.77	7.36	7.52	7.96			
TSS	180	mg/L	90	42	4	< 3			
Ammonia N2		mg/L							
BOD	120	mg/L	3	92	3				
CBOD		mg/L	3	93	3				
Organic carbon		mg/L							
Nitrate N2		mg/L	0.52		0.62	0.03			
Nitrite as N2		mg/L	<0.001		0.06	< 0.01			
Calcium		mg/L	84.4	10	18.6	282			
Chloride		mg/L	42.6	37.6	67.4				
Hardness		mg/L	370	56.8	123	973			
Magnesium		mg/L	38.6	7.7	18.5	65.4			
Potassium		mg/L	2.2	28.5	2.4	40.3			
Sodium		mg/L	14.5	36.1	40.1	202			
Sulphate		mg/L	94	10	10				
Fecal Coliform	$1x10^6$	CFU/100mL	< 1	$4.4x10^4$	57				
Oil and Grease	None	µg/L	none	none	none	none			
Aluminium		µg/L	311	237	224				
Arsenic	100	µg/L	0.5	0.5	0.8	0.8			
Cadmium	10	µg/L	< 0.1	< 0.1	< 0.1	<0.05			
Chromium	100	µg/L	1.1	0.7	0.6	0.1			
Cobalt	50	µg/L	0.5	0.5	0.5	0.5			
Copper	200	µg/L	5.1	40.8	1.5	0.2			
Iron		µg/L	585	523	1830				
Lead	50	µg/L	0.5	0.6	0.1	< 0.1			
Manganese		µg/L	256	38.2	238				
Nickel	200	µg/L	2.2	1.7	2.1	4.1			
Zinc	500	µg/L	603	51.0	< 5.0	0.8			
Mercury	0.6	µg/L				0.01			
PCB	1000	µg/L							
Phenols	20	µg/L				0.0043			
Hexane						< 2.0			

Monitoring Stations of sewage and solid waste sample collection

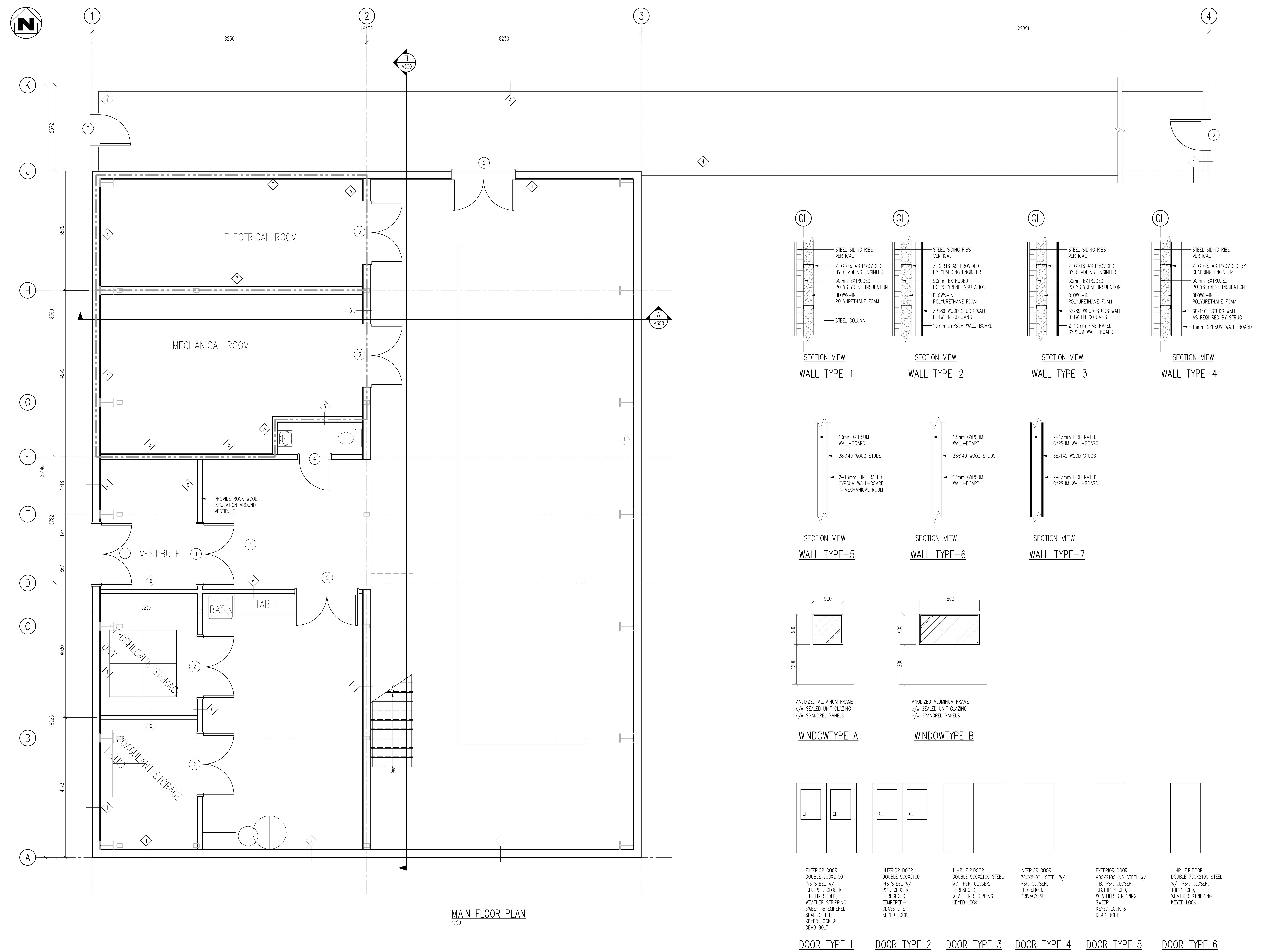
Sampling Station	Description	comments
KUG-1	Raw Water source intake location at Coppermine River	Volume of water intake annually
KUG-2	Discharge from Solid Waste water retention	Monitoring station, outside of solid waste facility
KUG-3	Discharge point from Sewage Disposal facility to wetland	Sampling point at sewage lagoon inside
KUG-4	Effluent outfall from wetland	Before meeting to Coronation Gulf
KUG-5	Effluent discharge and run-off from land farm	Sampling point outside of land farm collection sump

Appendix: A

Water Treatment Plant Drawing

Water Licence: 3BM-KUG 1520

Hamlet of Kugluktuk, NU



REVISIONS

NO.	DESCRIPTION	YYYY.MM.DD	BY	APP.
A	ISSUED FOR 100% REVIEW	2014.01.16	JK	TL

LEGEND:

- WALL TYPE SEE TYPICAL DETAIL
- DOOR TYPE SEE TYPICAL DETAIL
- WINDOW TYPE SEE TYPICAL DETAIL
- FIRE RATED WALL

DRAWING NO.	DESCRIPTION

REFERENCE DRAWINGS

FOR BEST PLOTTING RESULTS, BE SURE TO USE WILLIAMS ENGINEERING CANADA AUTOCAD PLOT CONFIGURATION FILES AVAILABLE FROM: www.williamsengineering.com

LEGEND

SECTION # / SOURCE / REFERENCE DWG.
DETAIL # / SOURCE / REFERENCE DWG.

PERMIT STAMP:

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ENGINEER'S SEAL:

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WILLIAMS ENGINEERING CANADA

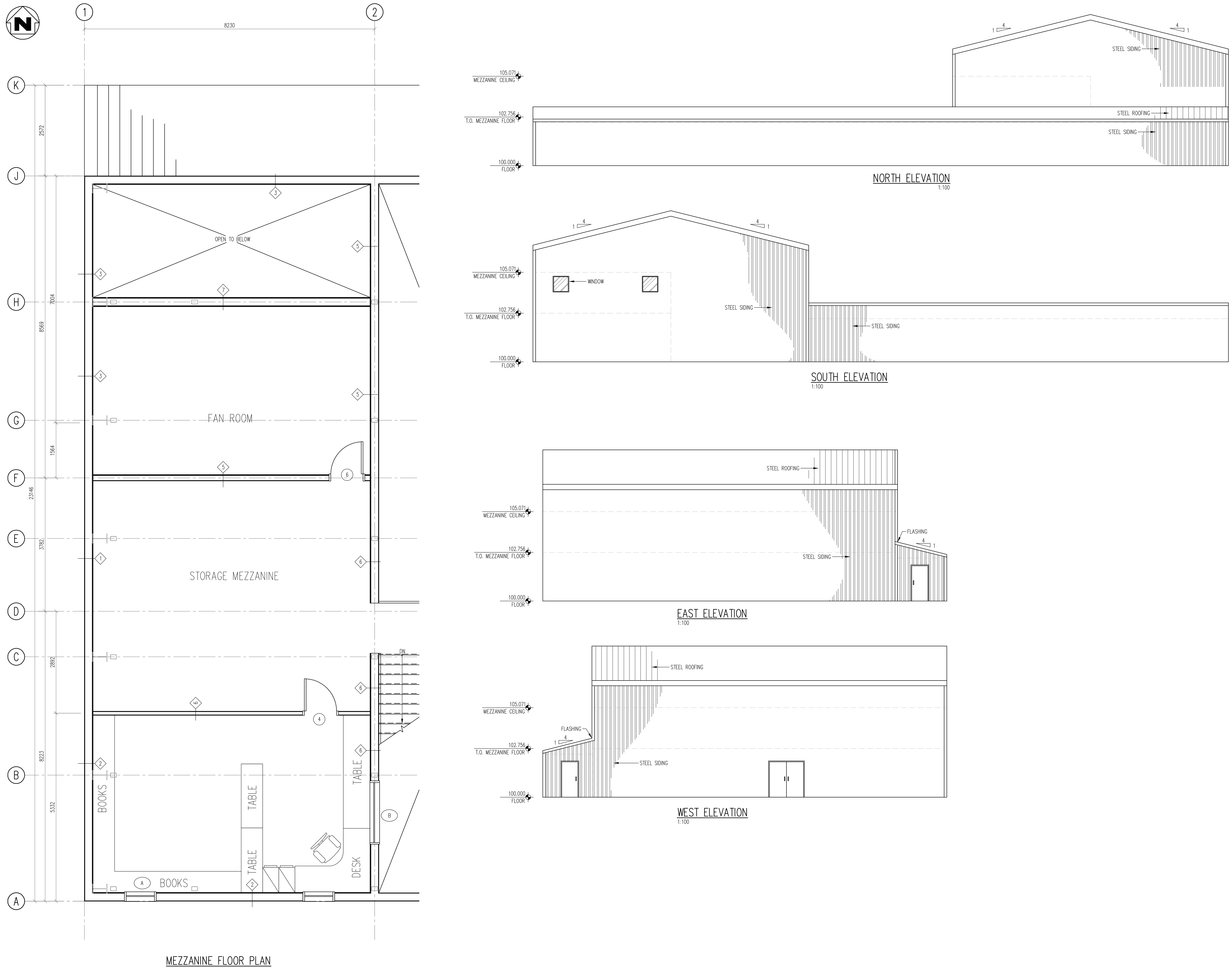
CLIENT:

Nunavut

JOB TITLE:
WATER SUPPLY IMPROVEMENTS
PHASE 2
WATER TREATMENT PLANT
KUGLUKTUK, NU

DWG. TITLE:
MAIN FLOOR PLAN
WALL, DOOR & WINDOW
SCHEDULE

DWN. BY: JK	DES. BY: TL	PROJ. MGR.: JH
PEER REVIEW: TL	DATE: (YY-MM-DD) 2014.01.16	SCALE: AS NOTED
CLIENT PROJ. #	04-4417	WE PROJ. # 13655.00
DWG # A100	REV. 3	A



MEZZANINE FLOOR PLAN
1:50

NORTH ELEVATION
1:100

SOUTH ELEVATION
1:100

EAST ELEVATION
1:100

WEST ELEVATION
1:100

REVISIONS

NO.	DESCRIPTION	YYYY.MM.DD	BY	APP
A	ISSUED FOR 100% REVIEW	2014.01.16	JK	TL

DRAWING NO.	DESCRIPTOR

REFERENCE DRAWINGS

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WILLIAMS ENGINEERING CANADA

CLIENT:

JOB TITLE: WATER SUPPLY IMPROVEMENTS
PHASE 2
WATER TREATMENT PLANT
KUGLUKTUK, NU

DWG. TITLE: MEZZANINE PLAN
ELEVATIONS

DWN. BY: JK	DES. BY: TL	PROJ. MGR.: JH
PEER REVIEW: TL	DATE: (YY-MM-DD) 2014.01.16	SCALE: AS NOTED
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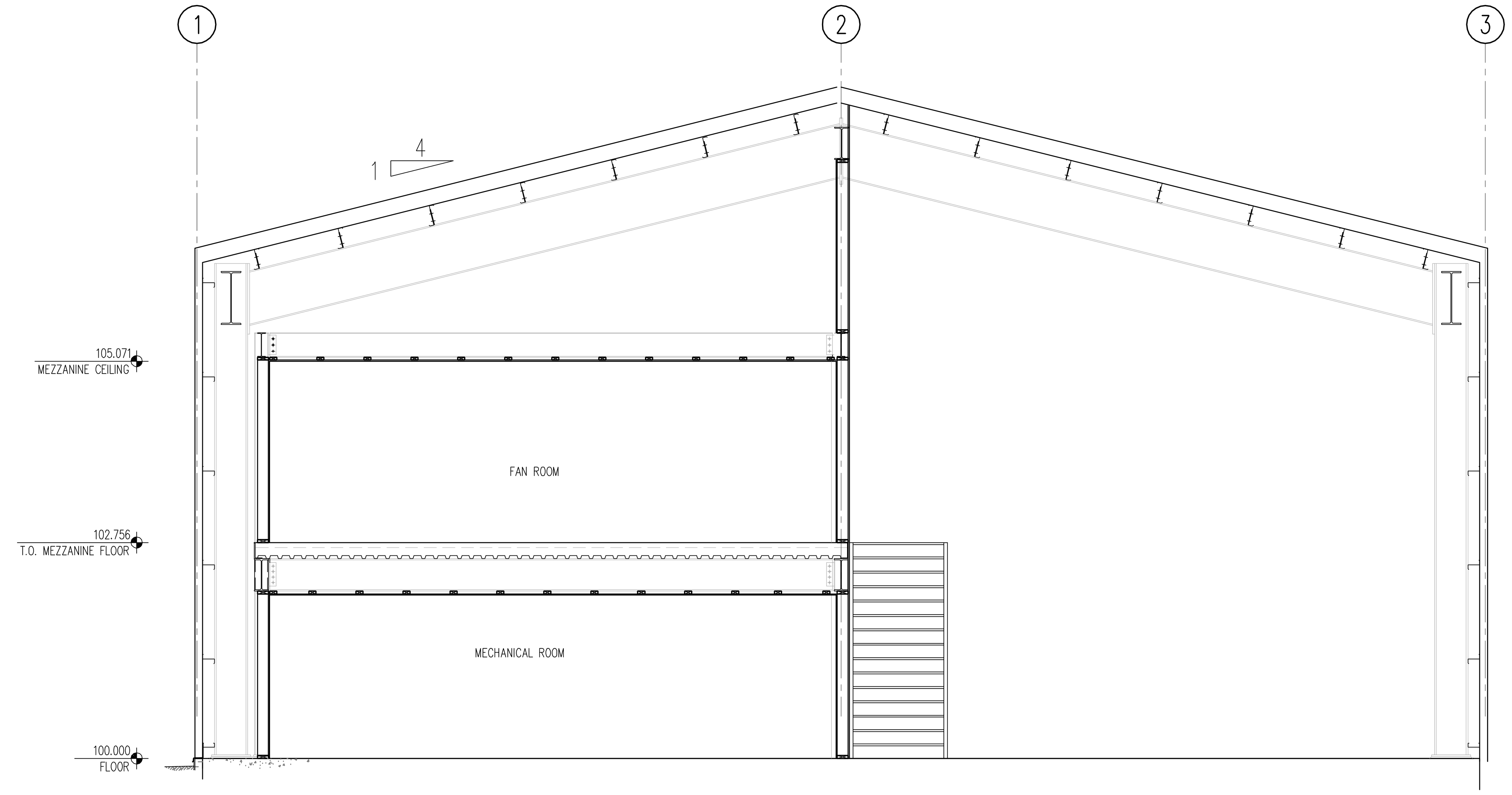

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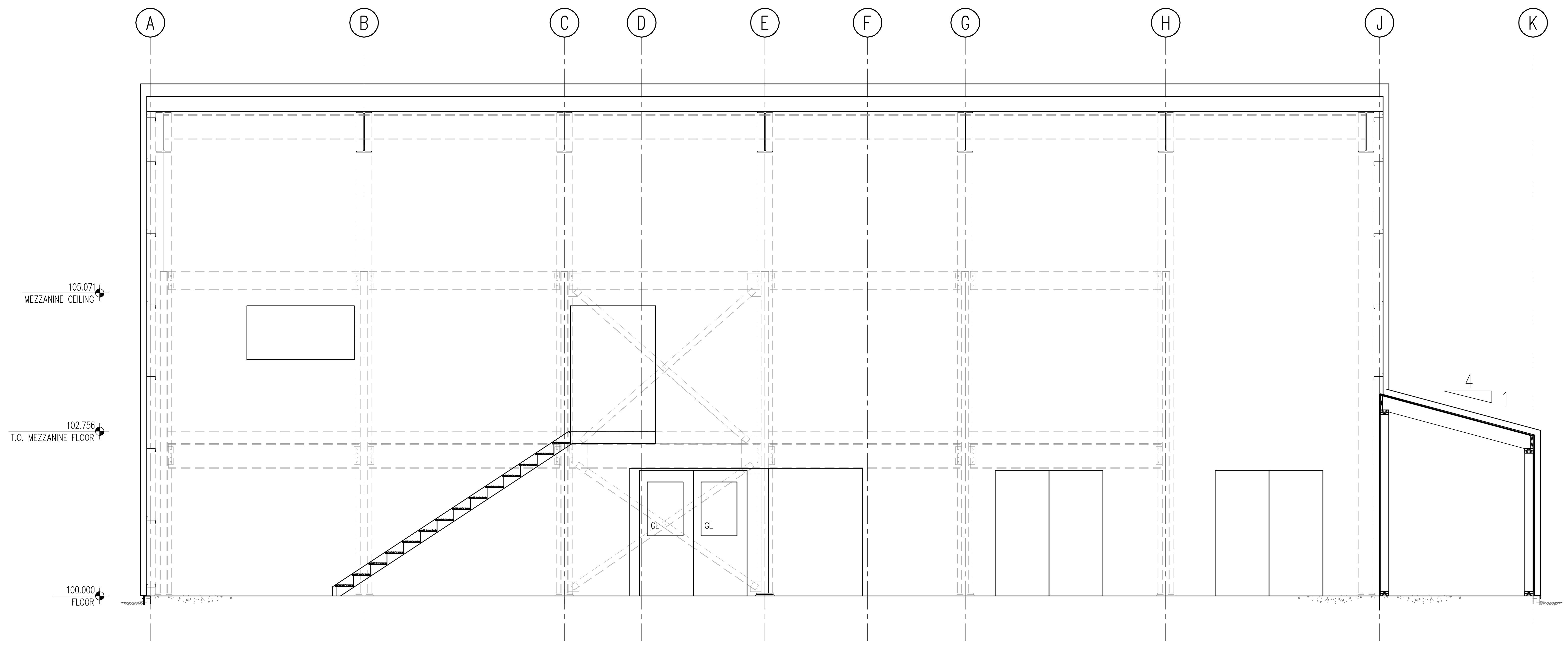

B SECTION
S300 1:50

REVISIONS

NO.	DESCRIPTION	YYYY.MM.DD	BY	APP.
A	ISSUED FOR 100% REVIEW	2014.01.16	JK	TL

DRAWING NO.	DESCRIPTOR

REFERENCE DRAWINGS

FOR BEST PLOTTING RESULTS, BE SURE TO USE WILLIAMS ENGINEERING CANADA AUTOCAD PLOT CONFIGURATION FILES AVAILABLE FROM: www.williamsengineering.com

LEGEND

SECTION # / SOURCE / REFERENCE DWG. (1 / A-001)
DETAIL # / SOURCE / REFERENCE DWG. (A / E-001)

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WILLIAMS ENGINEERING CANADA

CLIENT:

Nunavut

JOB TITLE: WATER SUPPLY IMPROVEMENTS
PHASE 2
WATER TREATMENT PLANT
KUGLUKTUK, NU

DWG. TITLE: SECTIONS & DETAILS

DWN. BY: JK	DES. BY: TL	PROJ. MGR.: JH
PEER REVIEW: TL	DATE: (YY-MM-DD) 2014.01.16	SCALE: AS NOTED
CLIENT PROJ. #: 04-4417		WE PROJ. #: 13655.00
DWG #: A200	3	REV #: A

KEYNOTES:

1. EXISTING WATER TREATMENT PLANT
2. EXISTING STORAGE TANKS
3. TRANSMISSION PIPELINE
4. EXISTING HOLDING POND
5. NEW WATER TREATMENT PLANT
6. PIPELINE TO/FROM EXISTING WATER TREATMENT PLANT
7. ACCESS VAULT
8. AUXILIARY INTAKE LOCATION
9. INTAKE PIPELINE
10. INTAKE LOCATION
11. RIVER ACCESS ROAD
12. EXISTING PUMPHOUSE
13. EXISTING ACCESS VAULT 2
14. PUMPHOUSE ACCESS ROAD
15. NEW ACCESS ROAD (105m)
16. OLD PUMPHOUSE
17. RF DRAINAGE POND APPROX LOCATION – FINAL LOCATION TO BE FIELD DETERMINED BY CONTRACTOR AND APPROVED BY ENGINEER TO ENSURE MIN PIPE SLOPE IS MAINTAINED.

UNIVERSAL TRANSVERSE MERCATOR (UTM) COORDINATES ZONE 11, CENTRAL MERIDIAN 117° WEST (NAD83)

STATION	NORTHING	EASTING	ELEVATION
ROCK BOLT	7524100.15	580654.79	7.196

ELEVATIONS ARE ORTHOMETRIC.
NAD83 SUITABLE FOR GRADING ONLY. BUILDING IS TO BE LAID OUT IN GROUND COORDINATES.
ROCK BOLT CONNECTS "OLD PUMPHOUSE" ROCK ANCHORS TO BEDROCK
REFERENCE POINT IS WESTERNMOST OF TWO ROCK BOLTS AT THIS LOCATION.

REVISIONS

NO.	DESCRIPTION	YYYY.MM.DD	BY	APP.
A	ISSUED FOR 33% REVIEW	2011.12.09	KR	
B	ISSUED FOR 50% REVIEW	2012.02.07	KR	
C	ISSUED FOR 75% REVIEW	2012.12.14	KR	
D	ISSUED FOR 100% REVIEW	2014.01.10	JDG	

DRAWING NO.	DESCRIPTOR

REFERENCE DRAWINGS

FOR BEST PLOTTING RESULTS, BE SURE TO USE WILLIAMS ENGINEERING CANADA AUTOCAD PLOT CONFIGURATION FILES AVAILABLE FROM: www.williamsengineering.com

LEGEND

SECTION # / SOURCE / REFERENCE DWG. — DETAIL # / SOURCE / REFERENCE DWG.

PERMIT STAMP:

PRELIMINARY ONLY
NOT FOR CONSTRUCTION
DATE (YYYY MM DD): 2014.01.10

ENGINEER'S SEAL:

YELLOWKNIFE OFFICE
P.O. Box 1529
2nd Floor 4902 49 Street
Yellowknife, NT X1A 2P2
Bus: (867) 873-2395
Toll Free: 1-800-263-2393
Fax: (867) 873-2547
info@williamsengineering.com
www.williamsengineering.com
WILLIAMS ENGINEERING CANADA

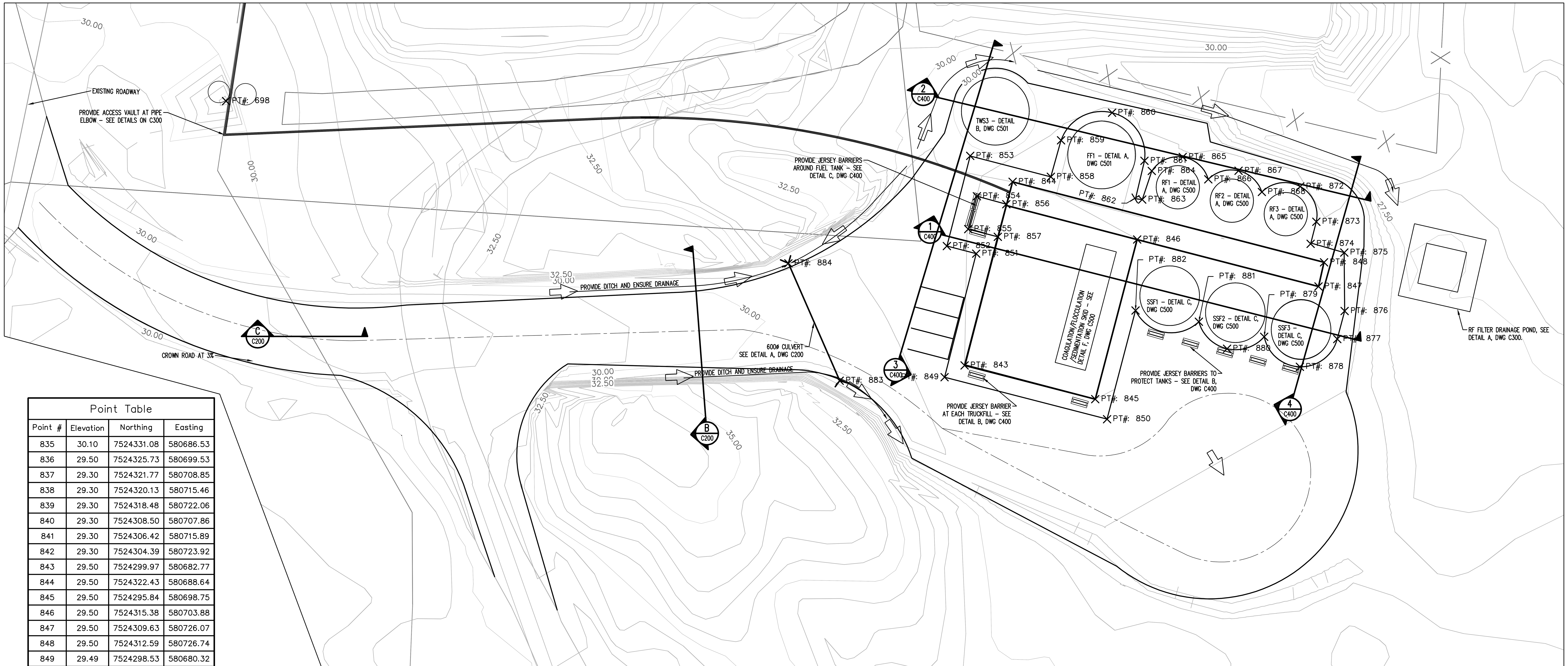
CLIENT: Nunavut

JOB TITLE:
WATER SUPPLY IMPROVEMENTS PHASE 2 WATER TREATMENT PLANT
KUGLUKTUK, NU

DWG. TITLE:
CIVIL SITE PLAN

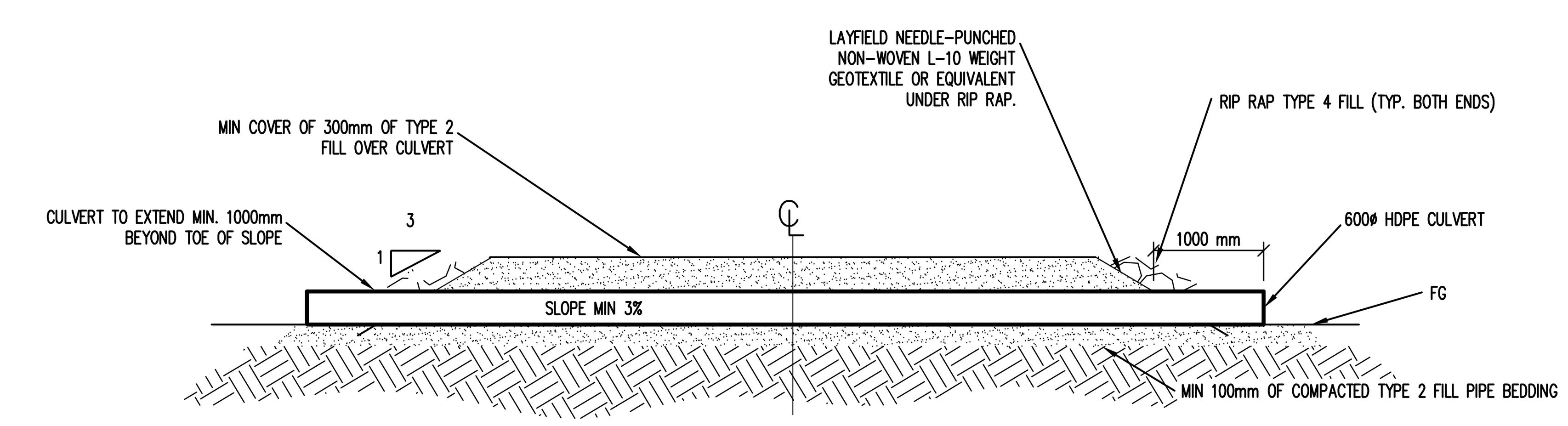
DWN. BY: KR	DES. BY: KR	PROJ. MGR.: WJVR
PEER REVIEW: JDG	DATE: (YY-MM-DD) 2014.01.10	SCALE: 1:1000
CLIENT PROJ. #		WE PROJ. # 04-4417

DWG # C100 | 5 | REV # D

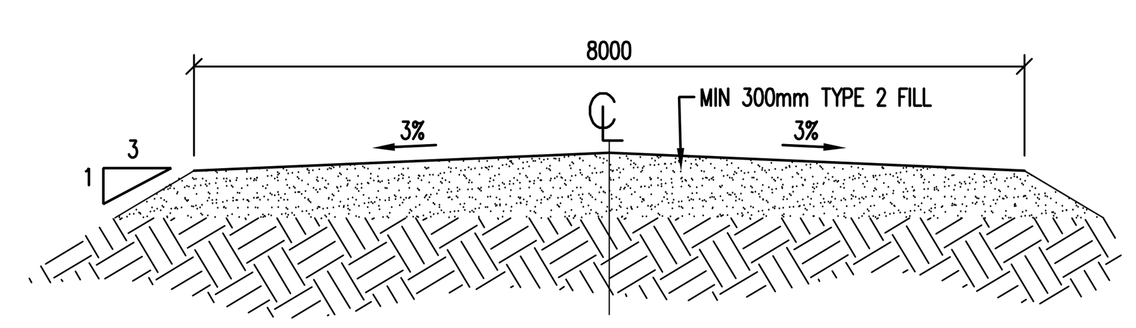


Point Table

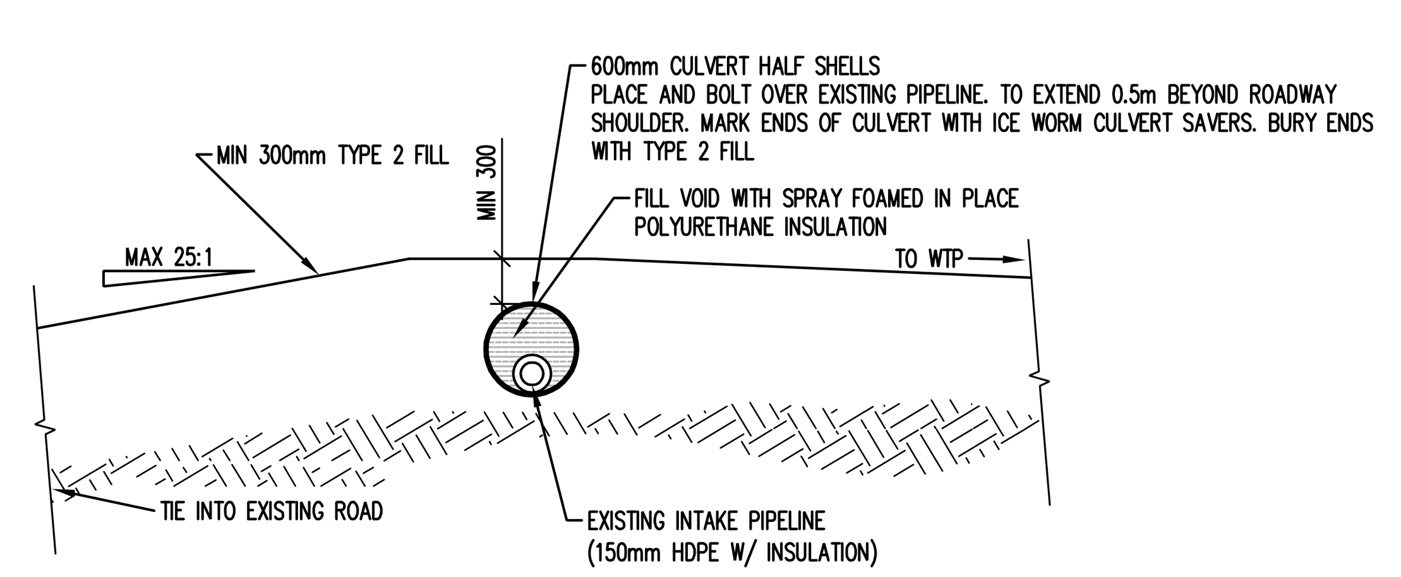
Point #	Elevation	Northing	Easting
835	30.10	7524331.08	580686.53
836	29.50	7524325.73	580699.53
837	29.30	7524321.77	580708.85
838	29.30	7524320.13	580715.46
839	29.30	7524318.48	580722.06
840	29.30	7524308.50	580707.86
841	29.30	7524306.42	580715.89
842	29.30	7524304.39	580723.92
843	29.50	7524299.97	580682.77
844	29.50	7524322.43	580688.64
845	29.50	7524295.84	580698.75
846	29.50	7524315.38	580703.88
847	29.50	7524309.63	580726.07
848	29.50	7524312.59	580726.74
849	29.49	7524298.53	580680.32
850	29.40	7524293.39	580700.19
851	29.40	7524313.65	580684.19
852	29.40	7524314.58	580680.60
853	29.59	7524325.61	580683.46
854	29.50	7524320.67	580684.27
855	29.50	7524316.64	580683.21
856	29.50	7524319.70	580687.86
857	29.50	7524315.71	580686.83
858	29.30	7524323.05	580693.31
859	29.30	7524327.51	580694.57
860	29.30	7524330.89	580700.81
861	29.30	7524325.01	580704.77
862	29.32	7524320.41	580703.58
863	29.10	7524320.26	580704.50
864	29.10	7524323.76	580705.67
865	29.11	7524325.47	580709.45
866	29.10	7524322.75	580712.58
867	29.10	7524323.79	580716.29
868	29.10	7524321.19	580719.14
872	29.10	7524321.86	580723.83
873	29.10	7524317.55	580725.79
874	29.11	7524314.85	580725.10
875	29.31	7524313.78	580729.21
876	29.10	7524306.62	580729.26
877	29.10	7524303.20	580728.36
878	29.10	7524299.80	580723.78
879	29.10	7524303.47	580719.42
880	29.10	7524302.01	580714.87
881	29.10	7524305.31	580711.42
882	29.10	7524306.69	580703.68
883	28.50	7524298.10	580667.49
883	28.50	7524298.10	580667.49
884	29.00	7524312.46	580661.21
884	29.00	7524312.46	580661.21



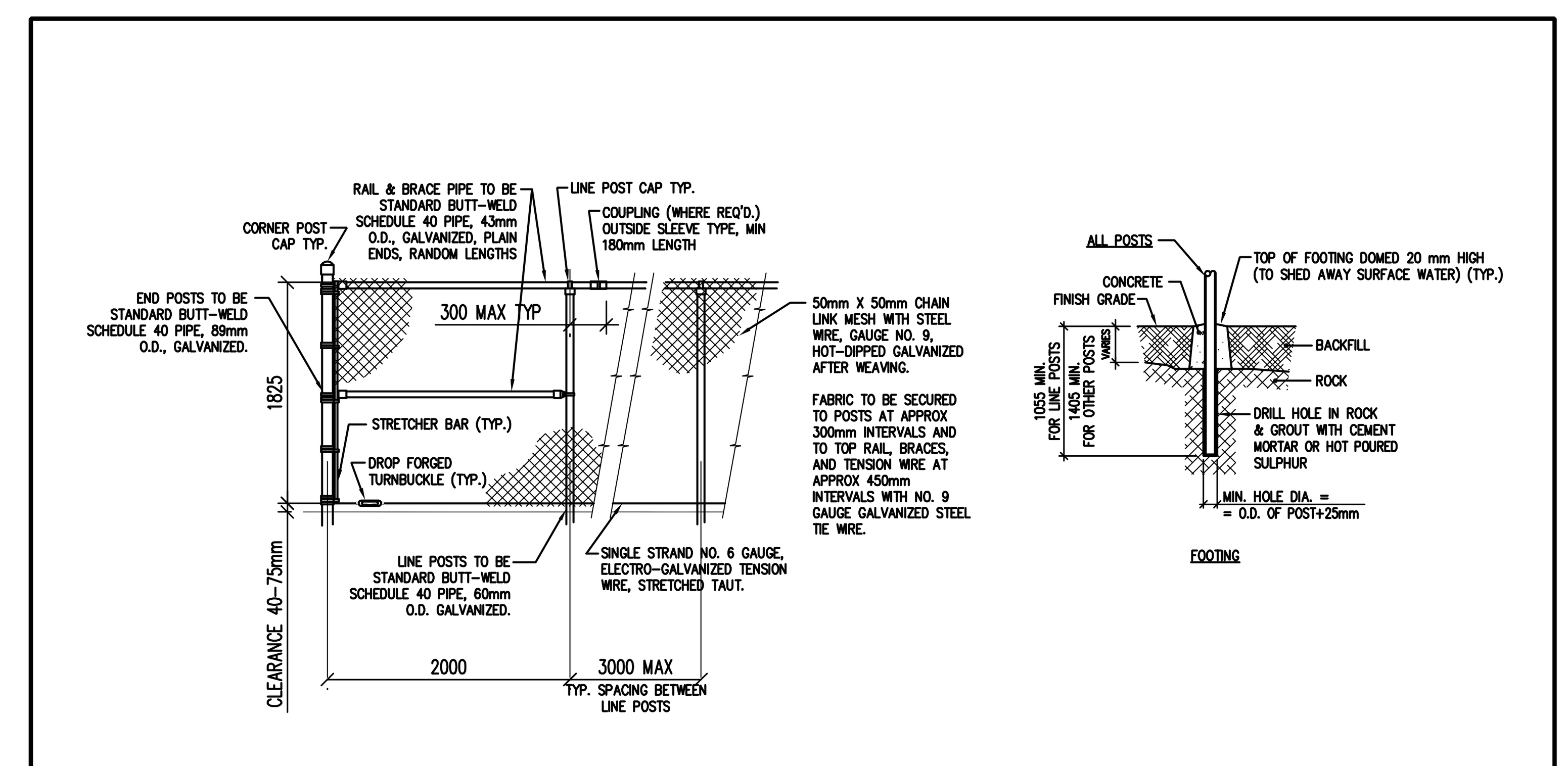
A CULVERT
C200 1:50



B ACCESS ROAD SECTION
C200 1:50



C INTAKE PIPELINE ROAD CROSSING
C200 1:50



D FENCE DETAILS
C200 1:50

REVISIONS			
NO.	DESCRIPTION	YYYY.MM.DD	BY
A	ISSUED FOR 75% REVIEW	2012.12.14	KR
D	ISSUED FOR 100% REVIEW	2014.01.10	JDG

NORTH
CONSTRUCTION NORTH
DRAINAGE DIRECTION

REFERENCE DRAWINGS

DRAWING NO.	DESCRIPTOR
C400	C400

FOR BEST PLOTTING RESULTS, BE SURE TO USE WILLIAMS ENGINEERING CANADA AUTOCAD PLOT CONFIGURATION FILES AVAILABLE FROM: www.williamsengineering.com

LEGEND

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WILLIAMS ENGINEERING CANADA

CLIENT: Nunavut

JOB TITLE:
WATER SUPPLY IMPROVEMENTS PHASE 2
WATER TREATMENT PLANT
KUGLUKTUK, NU

DWG. TITLE:
SITE GRADING

DWN. BY: KR/JDG	DES. BY: KR	PROJ. MGR.: WJVR
PEER REVIEW: JDG	DATE: (YY-MM-DD) 2014.01.10	SCALE: 1:150
CLIENT PROJ. #		WE PROJ. # 04-4417

DWG # C200 | 5 | REV # D

Appendix: B

Effluent samples results 2016

Water Licence: 3BM-KUG 1520

Hamlet of Kugluktuk, NU

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-873-2652

Taiga Batch No.:
160491

- PRELIMINARY REPORT -

Prepared For: Hamlet of Kugluktuk

Address: P.O. Box 271
Kugluktuk, NU,X0B 0E0

Attn: George Egotak **Facsimile:** 867-982-3060

Final report has been reviewed and approved by:

Judy Mah
Client Service Officer

NOTES:

- Test methods and data are validated by the laboratory's Quality Assurance Program. Taiga Environmental Laboratory is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) to ISO/IEC 17025 as a testing laboratory for specific tests registered with CALA.
- Routine methods are based on recognized procedures from sources such as
  - Standard Methods for the Examination of Water and Wastewater APHA AWWA WEF;
  - Environment Canada
  - USEPA
- Samples shall be kept for thirty (30) days after the final report is issued. All microbiological samples shall be disposed of immediately upon completion of analysis to minimize biohazardous risks to laboratory personnel. Please contact the laboratory if you have any special requirements.
- Final results are based on the specific tests at the time of analysis and do not represent the conditions during sampling.

ReportDate:
Print Date: *Monday, July 25, 2016*

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-765-6645 Fax: (867)-873-2652

Taiga Batch No.: 160491

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-2 **Taiga Sample ID:** 001

Client Project: Hamlet of Kugluktuk
Sample Type: Water
Received Date: 05-Jul-16
Sampling Date: 04-Jul-16
Sampling Time: 11:20
Location: KUG-2
Report Status: Preliminary

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Ammonia as Nitrogen		0.005	mg/L		SM4500-NH3:G	
Biochemical Oxygen Demand	3	2	mg/L	05-Jul-16	SM5210:B	
CBOD	3	2	mg/L	05-Jul-16	SM5210:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	209	0.4	mg/L	05-Jul-16	SM2320:B	
Conductivity, Specific (@25C)	717	0.4	µS/cm	05-Jul-16	SM2510:B	
pH	7.77		pH units	05-Jul-16	SM4500-H:B	
Solids, Total Suspended	90	3	mg/L	17-Jul-16	SM2540:D	
Major Ions						
Calcium	84.4	0.1	mg/L	19-Jul-16	SM4110:B	
Chloride	42.6	0.7	mg/L	19-Jul-16	SM4110:B	
Hardness	370	0.7	mg/L	19-Jul-16	SM4110:B	
Magnesium	38.6	0.1	mg/L	19-Jul-16	SM4110:B	
Nitrate as Nitrogen	0.52	0.01	mg/L	19-Jul-16	SM4110:B	

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Taiga Batch No.: 160491

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-2 **Taiga Sample ID: 001**

Nitrite as Nitrogen	< 0.01	0.01	mg/L	19-Jul-16	SM4110:B
Potassium	2.2	0.1	mg/L	19-Jul-16	SM4110:B
Sodium	14.5	0.1	mg/L	19-Jul-16	SM4110:B
Sulphate	94	1	mg/L	19-Jul-16	SM4110:B
Microbiology					
Coliforms, Fecal	< 1	1	CFU/100mL	05-Jul-16	SM9222:D
Organics					
Oil and Grease, visible	Non-visible			05-Jul-16	Visual Exam
Trace Metals, Total					
Aluminum	311	5	µg/L	11-Jul-16	EPA200.8
Arsenic	0.5	0.2	µg/L	11-Jul-16	EPA200.8
Cadmium	< 0.1	0.1	µg/L	11-Jul-16	EPA200.8
Chromium	1.1	0.1	µg/L	11-Jul-16	EPA200.8
Cobalt	0.5	0.1	µg/L	11-Jul-16	EPA200.8
Copper	5.1	0.2	µg/L	11-Jul-16	EPA200.8
Iron	585	5	µg/L	11-Jul-16	EPA200.8
Lead	0.5	0.1	µg/L	11-Jul-16	EPA200.8
Manganese	256	0.1	µg/L	11-Jul-16	EPA200.8
Nickel	2.2	0.1	µg/L	11-Jul-16	EPA200.8
Zinc	603	5	µg/L	11-Jul-16	EPA200.8

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Tel: (867)-765-6645 Fax: (867)-873-2652

Taiga Batch No.: 160491

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-3 **Taiga Sample ID:** 002

Client Project: Hamlet of Kugluktuk
Sample Type: Water
Received Date: 05-Jul-16
Sampling Date: 04-Jul-16
Sampling Time: 11:51
Location: KUG-3
Report Status: Preliminary

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Ammonia as Nitrogen		0.005	mg/L		SM4500-NH3:G	
Biochemical Oxygen Demand	92	2	mg/L	05-Jul-16	SM5210:B	
CBOD	93	2	mg/L	05-Jul-16	SM5210:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	235	0.4	mg/L	05-Jul-16	SM2320:B	
Conductivity, Specific (@25C)	672	0.4	µS/cm	05-Jul-16	SM2510:B	
pH	7.36		pH units	05-Jul-16	SM4500-H:B	
Solids, Total Suspended	42	3	mg/L	17-Jul-16	SM2540:D	
Major Ions						
Calcium	10.0	0.1	mg/L	19-Jul-16	SM4110:B	
Chloride	37.6	0.7	mg/L	19-Jul-16	SM4110:B	
Hardness	56.8	0.7	mg/L	19-Jul-16	SM4110:B	
Magnesium	7.7	0.1	mg/L	19-Jul-16	SM4110:B	
Nitrate as Nitrogen	0.18	0.01	mg/L	19-Jul-16	SM4110:B	
Nitrite as Nitrogen	< 0.01	0.01	mg/L	19-Jul-16	SM4110:B	
Potassium	28.5	0.1	mg/L	19-Jul-16	SM4110:B	

ReportDate:
Print Date: *Monday, July 25, 2016*

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-765-6645 Fax: (867)-873-2652

Taiga Batch No.: 160491

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-3 **Taiga Sample ID: 002**

Sodium	36.1	0.1	mg/L	19-Jul-16	SM4110:B
Sulphate	10	1	mg/L	19-Jul-16	SM4110:B
Microbiology					
Coliforms, Fecal	44000	1000	CFU/100mL	05-Jul-16	SM9222:D
Organics					
Oil and Grease, visible	Non-visible			05-Jul-16	Visual Exam
Trace Metals, Total					
Aluminum	237	5	µg/L	11-Jul-16	EPA200.8
Arsenic	0.5	0.2	µg/L	11-Jul-16	EPA200.8
Cadmium	< 0.1	0.1	µg/L	11-Jul-16	EPA200.8
Chromium	0.7	0.1	µg/L	11-Jul-16	EPA200.8
Cobalt	0.5	0.1	µg/L	11-Jul-16	EPA200.8
Copper	40.8	0.2	µg/L	11-Jul-16	EPA200.8
Iron	523	5	µg/L	11-Jul-16	EPA200.8
Lead	0.6	0.1	µg/L	11-Jul-16	EPA200.8
Manganese	38.2	0.1	µg/L	11-Jul-16	EPA200.8
Nickel	1.7	0.1	µg/L	11-Jul-16	EPA200.8
Zinc	51.0	5	µg/L	11-Jul-16	EPA200.8

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Print Date: *Monday, July 25, 2016*

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Tel: (867)-765-6645 Fax: (867)-873-2652

Taiga Batch No.: 160491

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-4 **Taiga Sample ID: 003**

Client Project: Hamlet of Kugluktuk
Sample Type: Water
Received Date: 05-Jul-16
Sampling Date: 04-Jul-16
Sampling Time: 12:04
Location: KUG-4
Report Status: Preliminary

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Ammonia as Nitrogen		0.005	mg/L		SM4500-NH3:G	
Biochemical Oxygen Demand	3	2	mg/L	05-Jul-16	SM5210:B	
CBOD	3	2	mg/L	05-Jul-16	SM5210:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	73.2	0.4	mg/L	05-Jul-16	SM2320:B	
Conductivity, Specific (@25C)	378	0.4	µS/cm	05-Jul-16	SM2510:B	
pH	7.52		pH units	05-Jul-16	SM4500-H:B	
Solids, Total Suspended	4	3	mg/L	17-Jul-16	SM2540:D	
Major Ions						
Calcium	18.6	0.1	mg/L	19-Jul-16	SM4110:B	
Chloride	67.4	0.7	mg/L	19-Jul-16	SM4110:B	
Hardness	123	0.7	mg/L	19-Jul-16	SM4110:B	
Magnesium	18.5	0.1	mg/L	19-Jul-16	SM4110:B	
Nitrate as Nitrogen	0.62	0.01	mg/L	19-Jul-16	SM4110:B	
Nitrite as Nitrogen	0.06	0.01	mg/L	19-Jul-16	SM4110:B	
Potassium	2.4	0.1	mg/L	19-Jul-16	SM4110:B	

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Tel: (867)-765-6645 Fax: (867)-873-2652

Taiga Batch No.: 160491

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-4 **Taiga Sample ID: 003**

Sodium	40.1	0.1	mg/L	19-Jul-16	SM4110:B
Sulphate	10	1	mg/L	19-Jul-16	SM4110:B
Microbiology					
Coliforms, Fecal	57	1	CFU/100mL	05-Jul-16	SM9222:D
Organics					
Oil and Grease, visible	Non-visible			05-Jul-16	Visual Exam
Trace Metals, Total					
Aluminum	224	5	µg/L	11-Jul-16	EPA200.8
Arsenic	0.8	0.2	µg/L	11-Jul-16	EPA200.8
Cadmium	< 0.1	0.1	µg/L	11-Jul-16	EPA200.8
Chromium	0.6	0.1	µg/L	11-Jul-16	EPA200.8
Cobalt	0.5	0.1	µg/L	11-Jul-16	EPA200.8
Copper	1.5	0.2	µg/L	11-Jul-16	EPA200.8
Iron	1830	5	µg/L	11-Jul-16	EPA200.8
Lead	0.1	0.1	µg/L	11-Jul-16	EPA200.8
Manganese	238	0.1	µg/L	11-Jul-16	EPA200.8
Nickel	2.1	0.1	µg/L	11-Jul-16	EPA200.8
Zinc	< 5.0	5	µg/L	11-Jul-16	EPA200.8

ReportDate:
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Tel: (867)-765-6645 Fax: (867)-873-2652

Taiga Batch No.: 160491

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-5 **Taiga Sample ID: 004**

Client Project: Hamlet of Kugluktuk
Sample Type: Water
Received Date: 05-Jul-16
Sampling Date: 04-Jul-16
Sampling Time: 11:30
Location: KUG-5
Report Status: Preliminary

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Ammonia as Nitrogen		0.005	mg/L		SM4500-NH3:G	
Biochemical Oxygen Demand		2	mg/L		SM5210:B	16
CBOD		2	mg/L		SM5210:B	16
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	259	0.4	mg/L	05-Jul-16	SM2320:B	
Conductivity, Specific (@25C)	2460	0.4	µS/cm	05-Jul-16	SM2510:B	
pH	7.96		pH units	05-Jul-16	SM4500-H:B	
Solids, Total Suspended	< 3	3	mg/L	17-Jul-16	SM2540:D	
Major Ions						
Calcium	282	0.1	mg/L	19-Jul-16	SM4110:B	
Hardness	973	0.7	mg/L	19-Jul-16	SM4110:B	
Magnesium	65.4	0.1	mg/L	19-Jul-16	SM4110:B	
Nitrate as Nitrogen	0.03	0.01	mg/L	19-Jul-16	SM4110:B	
Nitrate+Nitrite as Nitrogen	0.03	0.01	mg/L	19-Jul-16	SM4110:B	
Nitrite as Nitrogen	< 0.01	0.01	mg/L	19-Jul-16	SM4110:B	
Potassium	40.3	0.1	mg/L	19-Jul-16	SM4110:B	

ReportDate:
Print Date: *Monday, July 25, 2016*

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-765-6645 Fax: (867)-873-2652

Taiga Batch No.: 160491

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-5 **Taiga Sample ID: 004**

Sodium	202	0.1	mg/L	19-Jul-16	SM4110:B
Microbiology					
Coliforms, Fecal		1	CFU/100mL		SM9222:D
Organics					
Benzene	< 0.005	0.005	mg/L	12-Jul-16	EPA8260B
Ethylbenzene	< 0.005	0.005	mg/L	12-Jul-16	EPA8260B
Hexane Extractable Material	< 2.0	2.0	mg/L	11-Jul-16	EPA1664A
Oil and Grease, visible	Non-visible			05-Jul-16	Visual Exam
Toluene	< 0.005	0.005	mg/L	12-Jul-16	EPA8260B
Xylenes	< 0.005	0.005	mg/L	12-Jul-16	EPA8260B
Subcontracted Organics					
Phenols, Total	0.0043	0.001	mg/L	18-Jul-16	AB ENV.06537
Polychlorinated Biphenyls	< 0.00005	0.000050	mg/L	08-Jul-16	EPA3510
Trace Metals, Dissolved					
Cadmium	< 0.05	0.05	µg/L	11-Jul-16	EPA200.8
Chromium	0.1	0.1	µg/L	11-Jul-16	EPA200.8
Cobalt	0.5	0.1	µg/L	11-Jul-16	EPA200.8
Copper	0.2	0.2	µg/L	11-Jul-16	EPA200.8
Lead	< 0.1	0.1	µg/L	11-Jul-16	EPA200.8
Nickel	4.1	0.1	µg/L	11-Jul-16	EPA200.8
Trace Metals, Total					
Arsenic	0.8	0.2	µg/L	11-Jul-16	EPA200.8
Mercury	0.01	0.01	µg/L	11-Jul-16	EPA200.8

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Tel: (867)-765-6645 Fax: (867)-873-2652

Taiga Batch No.:
160491

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-5 **Taiga Sample ID: 004**

- DATA QUALIFERS -

Data Qualifier Descriptions:

16 *Test requested but no sample bottle received*

*** Taiga analytical methods are based on the following standard analytical methods**

SM - Standard Methods for the Examination of Water and Wastewater

EPA - United States Environmental Protection Agency

Appendix: C

TC, FC Test Reports 2016

Water Licence: 3BM-KUG 1520

Hamlet of Kugluktuk, NU

Kugluktuk

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Department of Health
Munaqhiliqiyitkut
Ministère de la Santé

LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: January 20, 2016

Reference Number 420-01-01

Source of water: Truck # 8030, Hamlet of Kugluktuk
Date & Time collected: January 19, 2016; 8:55 AM
Date & Time Received: January 19, 2016; 4:15 PM

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

REMARK:

Satisfactory

Wilfred Ntiamoah, MPH, CPHI(C)
Regional Environmental Health Officer
Kitikmeot Region - Dept. of Health
Helen Maksagak Centre, P.O. Box 83
Cambridge Bay, NUNAVUT, X0B 0C0
Phone: (867) 983-4236 |Email: wntiamoah@gov.nu.ca.

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Department of Health
Munaqhiliqiyitkut
Ministère de la Santé

LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: January 20, 2016

Reference Number 420-01-01

Source of water: Truck # 8012, Hamlet of Kugluktuk
Date & Time collected: January 19, 2016; 9:07 AM
Date & Time Received: January 19, 2016; 4:15 PM

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

REMARK:

Satisfactory

Wilfred Ntiamoah, MPH, CPHI(C)
Regional Environmental Health Officer
Kitikmeot Region - Dept. of Health
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Munaqhiliqiyitkut
Ministère de la Santé

LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: January 20, 2016

Reference Number 420-01-01

Source of water: Tank #3, Hamlet of Kugluktuk
Date & Time collected: January 19, 2016; 9:02 AM
Date & Time Received: January 19, 2016; 4:15 PM

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

REMARK:

Satisfactory

Wilfred Ntiamoah, MPH, CPHI(C)
Regional Environmental Health Officer
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Munaqhiliqiyitkut
Ministère de la Santé

LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: January 20, 2016

Reference Number 420-01-01

Source of water: Tank # 2, Hamlet of Kugluktuk
Date & Time collected: January 19, 2016; 9:00 AM
Date & Time Received: January 19, 2016; 4:15 PM

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

REMARK:

Satisfactory

Wilfred Ntiamoah, MPH, CPHI(C)
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LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: January 20, 2016

Reference Number 420-01-01

Source of water: Reservoir Water | Raw Water, Hamlet of Kugluktuk
Date & Time collected: January 19, 2016; 8:57 AM
Date & Time Received: January 19, 2016; 4:15 PM

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

REMARK:

Satisfactory

Wilfred Ntiamoah, MPH, CPHI(C)
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LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: February 11, 2016

Reference Number 420-02-01

Source of water: Truck # 8030, Hamlet of Kugluktuk
Date & Time collected: February 11, 2016; 9:20 AM
Date & Time Received: February 11, 2016; 4:20 PM

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

REMARK:

Satisfactory

Wilfred Ntiamoah, MPH, CPHI(C)
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LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: February 11, 2016

Reference Number 420-02-01

Source of water: Truck # 8012, Hamlet of Kugluktuk
Date & Time collected: February 10,, 2016; 9:10 AM
Date & Time Received: February 10, 2016; 4:20 PM

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

REMARK:

Satisfactory

Wilfred Ntiamoah, MPH, CPHI(C)
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LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: February 11, 2016

Reference Number 420-02-01

Source of water: Tank # 2, Hamlet of Kugluktuk
Date & Time collected: February 10, 2016; 9:05 AM
Date & Time Received: February 10, 2016; 4:20 PM

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

REMARK:

Satisfactory

Wilfred Ntiamoah, MPH, CPHI(C)
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LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: February 11, 2016

Reference Number 420-02-01

Source of water: Tank #3, Hamlet of Kugluktuk
Date & Time collected: February 10,, 2016; 9:07 AM
Date & Time Received: February 10, 2016; 4:20 PM

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

REMARK:

Satisfactory

Wilfred Ntiamoah, MPH, CPHI(C)
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LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: April 15, 2016

Reference Number 420-04-01

Source of water: Truck # 8030, Hamlet of Kugluktuk
Date & Time collected: April 14, 2016; 09:25 AM
Date & Time Received: April 14, 2016; 4:30 PM

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

REMARK:

Satisfactory

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LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: April 15, 2016

Reference Number 420-04-01

Source of water: Truck # 8012, Hamlet of Kugluktuk
Date & Time collected: April 14, 2016; 09:40 AM
Date & Time Received: April 14, 2016; 4:30 PM

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

REMARK:

Satisfactory

Wilfred Ntiamoah, MPH, CPHI(C)
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LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: April 15, 2016

Reference Number 420-04-01

Source of water: Residue top of Filter, Hamlet of Kugluktuk
Date & Time collected: April 14, 2016; 09:30 AM
Date & Time Received: April 14, 2016; 4:30 PM

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

REMARK:

Satisfactory

Wilfred Ntiamoah, MPH, CPHI(C)
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Kitikmeot Region - Dept. of Health
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LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: April 15, 2016

Reference Number 420-04-01

Source of water: Tank # 2, Hamlet of Kugluktuk
Date & Time collected: April 14, 2016; 09:20 AM
Date & Time Received: April 14, 2016; 4:30 PM

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

REMARK:

Satisfactory

Wilfred Ntiamoah, MPH, CPHI(C)
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LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: April 15, 2016

Reference Number 420-04-01

Source of water: Tank # 3, Hamlet of Kugluktuk
Date & Time collected: April 14, 2016; 09:15 AM
Date & Time Received: April 14, 2016; 4:30 PM

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

REMARK:

Satisfactory

Wilfred Ntiamoah, MPH, CPHI(C)
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LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: May 31, 2016

Reference Number 420-05-01

Source of water: Tank #3, Hamlet of Kugluktuk
Date & Time collected: May 31, 2016; 09:02 AM
Date & Time Received: May 31, 2016; 2:30 PM

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

REMARK:

Satisfactory

Wilfred Ntiamoah, MPH, CPHI(C)
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LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: May 31, 2016

Reference Number 420-05-01

Source of water: Truck # 8012, Hamlet of Kugluktuk
Date & Time collected: May 31, 2016; 09:30 AM
Date & Time Received: May 31, 2016; 2:30 PM

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

REMARK:

Satisfactory

Wilfred Ntiamoah, MPH, CPHI(C)
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LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: May 31, 2016

Reference Number 420-05-01

Source of water: Truck # 8030, Hamlet of Kugluktuk
Date & Time collected: May 31, 2016; 09:15 AM
Date & Time Received: May 31, 2016; 2:30 PM

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

REMARK:

Satisfactory

Wilfred Ntiamoah, MPH, CPHI(C)
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LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: August-18-2016

Reference Number 420-08-01

Source of water: Truck 8012, Hamlet of Kugluktuk
Date & Time collected: 17-08-2016, 9:40 AM
Date & Time Received: 17-08-2016 14:17 PM

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

Analyses interpretation

Satisfactory

Robert Savoury
Regional Environmental Health Officer
Kitikmeot Region - Dept. of Health
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Cambridge Bay, NUNAVUT, X0B 0C0
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Ministère de la Santé

LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: August-18-2016

Reference Number 420-08-01

Source of water:Tank # 2, Hamlet of Kugluktuk
Date & Time collected: 17-08-2016, 9:22 AM
Date & Time Received: 17-08-2016 14:17 PM

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

Analyses interpretation

Satisfactory

Robert Savoury
Regional Environmental Health Officer
Kitikmeot Region - Dept. of Health
Helen Maksagak Centre, P.O. Box 83
Cambridge Bay, NUNAVUT, X0B 0C0
Phone: (867) 983-4009 Email rsavoury@gov.nu.ca

LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: August-18-2016

Reference Number 420-08-01

Source of water:Tank# 3, Hamlet of Kugluktuk
Date & Time collected: 17-08-2016, 9:25 AM
Date & Time Received: 17-08-2016 14:17 PM

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

Analyses interpretation

Satisfactory

Robert Savoury
Regional Environmental Health Officer
Kitikmeot Region - Dept. of Health
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Cambridge Bay, NUNAVUT, X0B 0C0
Phone: (867) 983-4009 Email rsavoury@gov.nu.ca

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Department of Health
Munaqhiliqiyitkut
Ministère de la Santé

LABORATORY REPORT

Cambridge Bay Water Laboratory
Reporting Date: August-18-2016

Reference Number 420-08-01

Source of water: Truck 8030, Hamlet of Kugluktuk
Date & Time collected: 17-08-2016, 9:15 AM
Date & Time Received: 17-08-2016 14:17 PM

TOTAL COLIFORM AND E. COLI TESTING (Present / Absent; Coliert method).

1. TOTAL COLIFORM: **absent**
2. E. Coli: **absent**

Analyses interpretation

Satisfactory

Robert Savoury
Regional Environmental Health Officer
Kitikmeot Region - Dept. of Health
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Appendix: D

Pages from Water Licence

Water Licence: 3BM-KUG 1520

Hamlet of Kugluktuk, NU

"**Water Retention Area**" compromises the 'Water Retention Area' as identified on Nuna Burnside Project No. N-O 09755.0 Drawing No.1," *The Hamlet of Kugluktuk, Solid Waste Disposal Facility Improvements*", record drawing dated November 18, 2008;

"**Wetland Treatment Area**" comprises the 'Expanded Wetland Treatment Area' as identified on Nuna Burnside Project No. N-O 09755.0 Drawing No.2, "*The Hamlet of Kugluktuk Sewage Lagoon Plan*" and the "*Meandering Wetland Treatment Area*" as identified on Drawing No.3, *The Hamlet of Nunavut Kugluktuk Proposed Sewage Lagoon Sections* stamped and dated June 18, 2007.

3. Enforcement

a. Failure to comply with this Licence will be a violation of the *Act*, subjecting the Licensee to the enforcement measures and the penalties provided for in the *Act*;

b. All inspection and enforcement services regarding this Licence will be provided by Inspectors appointed under the *Act*; and

c. For the purpose of enforcing this Licence and with respect to the use of Water and deposit or discharge of Waste by the Licensee, Inspectors appointed under the *Act*, hold all powers, privileges and protections that are conferred upon them by the *Act* or by other applicable law.

PART B: GENERAL CONDITIONS

1. The Licensee shall file an Annual Report on the Appurtenant Undertaking with the Board no later than 31st of March of the year following the calendar year being reported, containing the following information:

a. tabular summaries of all data generated under the "Monitoring Program" as described under Part H
b. the daily, monthly, and annual quantities, in cubic metres, of freshwater obtained from Monitoring Station KUG-1;
c. the daily, monthly and annual quantities in cubic metres of sewage effluent discharged at Monitoring Station KUG-3;
d. the monthly and yearly quantities of authorized Waste – bulky metal, hazardous, wood and soil—accepted at the Solid Waste Facilities;
e. a summary of modifications and/or major maintenance work carried out on the Water Supply and Waste Disposal Facilities, including all associated structures and facilities;
f. a list of unauthorized discharges and summary of follow-up action taken;
g. a summary of any abandonment and restoration work completed during the year and an outline of any work anticipated for the next year, including a summary of the Old Sewage Lagoon (Decommissioned Sewage Disposal Facility) Facility's Inspection Report in accordance with Part G, Item 1;
h. any updates or revisions for manuals and plans *(Including Operations and*

Maintenance Plans, Spill Contingency, Abandonment and Restoration, QA/QC Plans) as required by changes in operation and/or technology;

i. a summary of any studies, reports and plans requested by the Board that relate to Water use, Waste disposal or reclamation, and a brief description of any future studies planned;

j. summary of any inspections completed by federal or territorial authorities, geotechnical or municipal engineers, on undertakings related to Water use, Waste disposal or reclamation activities; and

k. any other details on Water use or Waste disposal requested by the Board by November 1st of the year being reported.

2. The Licensee shall notify the NWB of any changes in operating plans or conditions associated with this project at least thirty (30) days prior to any such change.

3. The Licensee shall comply with the "Monitoring Program" described in this Licence, and any amendments to the "Monitoring Program" as may be made from time to time, pursuant to the conditions of this Licence.

4. The "Monitoring Program" and compliance dates specified in the Licence may be modified at the discretion of the Board.

5. The Licensee shall install flow meters or other such devices, or implement suitable methods required for the measuring of Water volumes as required under Part H, Item 1.

6. The Licensee shall, post the necessary signs, to identify the stations of the "Monitoring Program". All signage shall be in the Official Languages of Nunavut.

7. The Licensee shall, for all Plans submitted under this Licence, include a proposed timetable for implementation. Plans submitted, cannot be undertaken without subsequent written Board approval and/or direction. The Board or an Inspector may alter or modify a Plan if necessary to achieve legislative objectives and will notify the Licensee in writing of acceptance, rejection or alteration of the Plan.

8. The Licensee shall, for all Plans submitted under this Licence, implement the Plan as approved by the Board in writing.

9. The Licensee shall review the Plans referred to in this Licence, as required by changes in operation and/or technology, and modify the Plan accordingly. Revisions to the Plans shall be submitted in the form of an Addendum to be included with the Annual Report.

10. Every Plan to be carried out pursuant to the terms and conditions of this Licence shall become a part of this Licence, and any additional terms and conditions imposed upon approval of a Plan by the Board become part of this Licence. All terms and conditions of the Licence should be contemplated in the development of a Plan where appropriate.

11. The Licensee shall ensure a copy of this Licence is maintained at the site of operations at

all times. Any communication with respect to this Licence shall be made in writing to the attention of:

(a) Manager of Licensing:
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1J0
Telephone: (867) 360-6338
Fax: (867) 360-6369
Email: licensing@nwb-oen.ca

(b) Inspector Contact:
Manager of Field Operations, AANDC
Nunavut District, Nunavut Region
P.O. Box 100
Iqaluit, NU X0A 0H0
Telephone: (867) 975-4295
Fax: (867) 979-6445

12. The Licensee shall submit one paper copy and one electronic copy of all reports, studies, and plans to the Board. Reports or studies submitted to the Board by the Licensee shall include a detailed executive summary in Inuktitut.

13. The Licensee shall ensure that any document(s) or correspondence submitted by the Licensee to the NWB is received and acknowledged by the Manager of Licensing.

14. This Licence is assignable as provided for in Section 44 of the *Act*.

15. The expiry or cancellation of this Licence does not relieve the Licensee from any obligation imposed by the Licence, or any other regulatory requirement.

PART C: CONDITIONS APPLYING TO WATER USE

1. The Licensee shall obtain all freshwater for municipal purposes from the Coppermine River, as indicated in its Application.

2. The annual quantity of Water withdrawn for all purposes under Part C, Item 1 in this Licence shall not exceed seventy thousand (70,000) cubic metres *per year* at a maximum withdrawal rate of two-hundred and ninety-nine (299) cubic metres *per day*.

3. The Licensee shall equip all Water intake hoses with a screen of appropriate mesh size to ensure that fish are not entrained and shall withdraw Water at a rate such that fish do not become impinged on the screen.

4. Where the use of Water is of a sufficient volume that the source Water body may be drawn down, the Licensee shall submit to the Board for approval in writing, the

following:

a. details of Water volume involved;
b. hydrological overview of the Water body;
c. details of impacts; and
d. proposed mitigation measures.

5. The Licensee shall maintain the Water Supply Facility to the satisfaction of the Inspector.

6. The Licensee shall not remove any material from below the ordinary High Water Mark of any Water body unless approved by the Board in writing.

7. The Licensee shall not cause erosion to the banks of any body of Water and shall provide necessary controls to prevent such erosion.

8. The Licensee shall implement sediment and erosion control measures prior to and maintain as required during Hamlet operations, to prevent entry of sediment into Water.

PART D: CONDITIONS APPLYING TO WASTE DISPOSAL

1. The Licensee shall direct all Sewage to the Sewage Disposal Facility or as otherwise approved by the Board.

2. All Effluent discharged from the Sewage Disposal Facility at the Final Discharge Point at Monitoring Program Station KUG-3 end-of-pipe to the Wetland Treatment Area, shall not exceed the following Effluent quality limits:

Parameter	Maximum Concentration of any Grab Sample
BOD_5	120 mg/L
Total Suspended Solids	180 mg/L
Faecal Coliforms	1 x 10^6 CFU/100 mL
Oil and grease	No visible sheen
pH	Between 6 and 9

3. All Effluent discharged from the Old Sewage Lagoon, Monitoring Station KUG-6 shall not exceed the Effluent quality limits set under Part D, Item 2.

4. The Licensee shall maintain at all times a Freeboard limit of at least 1.0 metre, or as recommended by a qualified Geotechnical Engineer and as approved by the Board in writing, for all dams, dykes, or structures intended to contain, withhold, divert or retain Water or Waste.

5. The Sewage Disposal Facility shall be maintained and operated, to the satisfaction of an Inspector and in such a manner as to prevent structural failure.

6. All discharge of Effluent at Monitoring Program Station KUG-5, from within the perimeter of the Landfarm Facility, shall not exceed the following Effluent quality limits:

Parameter	Maximum Concentration of any Grab Sample (µg/L)
pH	6 to 9 (units)
Oil and Grease	5,000 and no visible sheen
TSS	15,000
Lead (dissolved)	1
Phenols	20
Benzene	370
Toluene	2
Ethylbenzene	90

7. The Licensee shall provide at least ten (10) days' notice to an Inspector, of the intent to discharge Effluent from the Old Sewage Disposal Facility or the Landfarm Facility.

8. The Effluent under Part D, Item 7 shall be discharged at a minimum distance of thirty-one (31) metres from the ordinary High Water Mark of any water body and where direct or indirect flow into a water body is not possible and no additional impacts are created.

9. The Licensee shall, prior to the removal of any treated soil for future use, confirm with the Government of Nunavut, Environmental Protection Service that the soils have been treated to meet all legislatively-required Treatment Objectives for its intended use.

10. The Licensee shall dispose of all Solid Wastes in such a manner as to prevent the deposition of such waste in to water.

11. The Licensee shall not open burn plastics, wood treated with preservatives, electric wire, Styrofoam, asbestos or painted wood to prevent the deposition of Waste materials of incomplete combustion and/or leachate from contaminated ash residual, from impacting any surrounding Waters, unless otherwise approved by the Board in writing.

12. The Licensee shall segregate and store all hazardous materials and/or Hazardous Waste in such a manner as to prevent the deposit of Waste into Water, until such time that the material have been removed for proper disposal at an approved facility.

PART E: CONDITIONS APPLYING TO MODIFICATIONS AND CONSTRUCTION

1. The Board has, with the issuance of this Licence, approved the amendment to the Water Supply Facility.

2. The Licensee shall submit to the Board for approval in writing, for-construction design drawings, stamped and signed by a qualified Engineer registered in Nunavut, at least sixty (60) days prior to the construction of any dams, dykes or structures intended to

contain, withhold, divert or retain Water or Wastes.

3. The Licensee may, without written consent from the Board, carry out Modifications to the Water Supply Facility and Waste Disposal Facilities provided that such Modifications are consistent with the conditions and scope of this Licence and the following requirements are met:

   a. the Licensee has notified the Board in writing of such proposed Modifications at least sixty (60) days prior to beginning the Modifications;
   b. such Modifications do not place the Licensee in contravention of the Licence or the *Act*;
   c. the Board has not, during the sixty (60) days following notification of the proposed Modifications, informed the Licensee that review of the proposal will require more than sixty (60) days; and
   d. the Board has not rejected the proposed Modifications.

4. The Modifications for which all of the conditions referred to in Part E, Item 3, have not been met, may only be carried out upon written approval from the Board.

5. The Licensee shall, within ninety (90) days of completion of Modification or Construction of facilities and/or infrastructure associated with the project, submit to the Board a Construction Summary Report along with stamped as-built plans and drawings, providing explanation to reflect any deviations from the for construction drawings, taking into account construction and field decisions and how they may affect the performance of engineered facilities.

6. The Licensee shall submit to the Board for approval in writing, at least sixty (60) days prior to the construction of the new Water Treatment Plant (WTP), for-construction design drawings of the new WTP, stamped and signed by a qualified Engineer.

7. The Licensee shall within ninety (90) days of completion of modifications of the Water Supply Facility, submit to the Board for review and written acceptance a Construction Summary Report along with as-built plans and drawings of the new Water Intake Facility and the new Water Treatment Plant, stamped and signed by a qualified Engineer.

8. All activities shall be conducted in such a way as to minimize impacts on surface drainage and the Licensee shall immediately undertake any corrective measures in the event of any impacts on surface drainage.

9. The Licensee shall implement and maintain sediment and erosion control measures prior to and during activities carried out under this Part, to prevent negative impacts to Water resulting from the release of sediment and to minimize erosion.

10. With respect to earthworks, the Licensee shall not deposit debris or sediment into or onto any Water body. These materials shall be disposed of at a distance of at least thirty-one (31) metres from the ordinary High Water Mark in such a fashion that they do not enter

the Water.

11. The Licensee shall only use material that is free of contaminants, for construction, operation, and maintenance activities and that is obtained from approved sources, demonstrated not to be potentially acid generating and metal leaching.

PART F: CONDITIONS APPLYING TO OPERATION AND MAINTENANCE

1. The Licensee shall submit to the Board for approval in writing, within ninety (90) days of issuance of the Licence, an updated Sewage Treatment Facility Operation and Maintenance Manual. The updated Manual shall include:

    a. a Monitoring Program, which reflects the current operating and monitoring conditions of the Licenced Facilities;
    b. the Temperature Monitoring Program for the Sewage Lagoon Dyke; and
    c. the GPS coordinates of the Monitoring Stations.

2. The Board has approved the "Spill Contingency Plan" (SCP), dated November 28, 2014, which was submitted as additional information with the Application. The Licensee shall submit to the Board for review within ninety (90) day of the date of Licence issuance an addendum to the SCP to include:

    a. a detailed description of the secondary containment used as spill prevention measure during fuel or hazardous substance transfer at the Licenced Facilities.

3. The Licensee shall submit to the Board for approval in writing, within ninety (90) days of issuance of the Licence, an updated Solid Waste Facility Operation and Maintenance Plan prepared in accordance with the "Guidelines for the Preparation of an Operation and Maintenance Manual for Sewage and Solid Waste Disposal Facilities in the Northwest Territories" (1996). The updated Plan shall take into consideration the comments received during the renewal application review process for expired Licence No. 3BM-KUG0914 including the following information:

    a. SWF Monitoring Plan: updated sampling locations, parameters and timing required
    b. a plan for the inspection, management and monitoring for the sewage sludge, which also identifies the remediation objectives for sewage sludge treated in the Landfarm Facility

4. The Licensee shall submit to the Board for approval in writing, within ninety (90) days of beginning operations, a Water Supply Facility (WSF) Operation and Maintenance Manual. The WSF Operation and Maintenance Manual should include an Operations and Maintenance Manual for the updated Water Treatment Facility and also include the " Kugluktuk Water Intake Operations and Maintenance (O&M) Manual" dated October 2014 and submitted as additional information with the Application.

5. An inspection of all engineered facilities related to the management of Water and Waste shall be carried out by an Engineer at a minimum of once annually, and before commissioning any engineered facility related to the management of Water and Waste. The Engineer's report shall be submitted to the Board within sixty (60) days of the inspection, including a cover letter from the Licensee outlining an implementation plan to address each of the Engineer's recommendations.

6. An inspection of all engineered facilities related to the management of Water and Waste shall be conducted by a Geotechnical Engineer in accordance with the *Canadian Dam Safety Guidelines*, at least one (1) year prior to the expiry of the Licence, during the open Water period (June/July/August). The Geotechnical Engineer's report shall be submitted to the Board for review within sixty (60) days of the inspection, including a cover letter from the Licensee outlining an implementation plan to address the Engineer's recommendations.

7. The Licensee shall perform more frequent inspections of the engineered facilities at the request of an Inspector.

8. If during the period of this Licence, an unauthorized discharge of Waste occurs, or if such a discharge is foreseeable, subject to the Act and the Nunavut adopted *Consolidated Spill Contingency Planning and Reporting Regulations* (R- 068-93), the Licensee shall:

    a. employ the appropriately approved Spill Contingency Plan for the Hamlet of Kugluktuk. Take whatever steps are immediately practicable to protect human life, health and the environment;
    b. report the incident immediately via the NWT/NU 24-Hour Spill Reporting Line at (867) 920-8130 and to the AANDC Manager of Field Operations at (867) 975-4295; and
    c. for each spill occurrence, submit to the Inspector not later than thirty (30) days after initially reporting the event, a detailed report that provides the necessary information on the location (including the GPS coordinates), amount and type of spilled product, initial response action, remediation/clean-up, status of response (ongoing, complete), proposed disposal options for dealing with contaminated materials and any preventative measures to be implemented.

9. The Licensee shall, in addition to Part F, Item 9, regardless of the quantity of releases of harmful substances, report to the NWT/NU Spill Line if the release is near or into a Water body.

PART G: CONDITIONS APPLYING TO ABANDONMENT AND RESTORATION

1. The Licensee shall submit to the Board for approval in writing, within ninety (90) days following the date of issuance of this Licence, an updated Abandonment and Restoration Plan for the Old Sewage Lagoon. The Plan shall include, but not be limited to:

    a. an implementation schedule for the Plan;

b. sludge treatment method and disposal options;
c. Effluent treatment and disposal;
d. Monitoring Program; and
e. Schedule of inspection and checklist.

2. The Licensee shall submit to the Board, for approval, an Abandonment and Restoration Plan, at least six (6) months prior to abandoning any facilities or upon submission of the final design drawings for the construction of new facilities to replace existing ones. Where applicable, the Plan shall include information on the following:

a. Water intake facilities;
b. the Water treatment and Waste disposal sites and facilities;
c. abandoned Water and Waste facilities;
d. petroleum and chemical storage areas;
e. any site affected by Waste spills;
f. leachate prevention;
g. an implementation schedule;
h. maps delineating site facilities;
i. consideration of altered drainage patterns;
j. type and source of cover materials;
k. future area use;
l. Hazardous Wastes; and
m. a proposal identifying measures by which restoration costs will be financed by the Licensee upon abandonment related to Water use, Waste deposit to Water, or appurtenant undertakings related to Water use and/or deposit of Waste to Water, subject to the act and regulations.

3. The Licensee shall complete all restoration work within the time schedule specified in the Plan, or as subsequently revised and approved by the Board.

4. The Licensee shall carry out progressive reclamation of any components of the project no longer required for the Licensee's operations.

5. In order to promote growth of vegetation and the needed microclimate for seed deposition, all disturbed surfaces shall be prepared by ripping, grading, or scarifying the surface to conform to the natural topography.

6. Areas that have been contaminated by hydrocarbons shall be reclaimed to meet objectives as outlined in the Government of Nunavut's *Environmental Guideline for Site Remediation* (Revised January 2009). The use of reclaimed soils for the purpose of back fill or general site grading may be carried out only upon consultation and approval by the Government of Nunavut, Department of Environment and an Inspector.

PART H: CONDITIONS APPLYING TO THE MONITORING PROGRAM

1. The Licensee shall maintain Monitoring Program Stations at the following locations:

Monitoring Program Station Identification	Description	Status
KUG-1	Raw Water Supply Intake at Coppermine River	Active (Volume)
KUG-2	Effluent discharge from the Water Retention Area in the Solid Waste Disposal Facilities	Active (Quality)
KUG-3	Effluent discharge end-of-pipe at Final Discharge Point from the Sewage Lagoon to the Wetland Treatment Area	Active (Quality)
KUG-4	Outfall area for the Wetland Treatment Area	Active (Quality)
KUG-5	Effluent discharge and run-off from the Landfarm Facility (controlled discharge)	Active (Quality)
KUG-6	Effluent discharge (controlled discharge)from the Old Sewage Lagoon	New/Active (Quality)
KUG-7	Thermistor readings in accordance with approved Temperature Monitoring Program for the Sewage Lagoon Dyke under Part F Item 2b	New/Active (Temperature)

2. The Licensee shall measure and record, in cubic metres, the daily, monthly, and annual quantities of Water extracted for all purposes at Monitoring Program Station KUG-1.

3. The Licensee shall sample monthly at Monitoring Program Station KUG-2, KUG-3 and KUG-4 during periods of observed flow and annual discharges.

4. All Samples obtained at KUG-2, KUG-3, KUG-4 and KUG-6 shall be analyzed for the following parameters:

Biological Oxygen Demand (BOD_5)	Fecal Coliforms
pH	Conductivity
Total Suspended Solids	Oil and Grease (visual)
Nitrate-Nitrite	Ammonia Nitrogen
Chloride	Sulphate
Sodium	Potassium
Magnesium	Calcium
Total Hardness	Total Alkalinity

Total Arsenic
Total Cadmium
Total Cobalt
Total Copper
Total Lead
Total Mercury
Total Zinc
Total Phenols
Total Aluminum
Total Chromium
Total Iron
Total Manganese
Total Nickel
Carbonaceous Biochemical Oxygen Demand (CBOD)

5. The Licensee shall sample monthly at Monitoring Program Station KUG-3, during periods of observed flow and annual discharges to verify compliance with effluent quality criteria under Part D Item 2.

6. The Licensee shall carry out inspections at Monitoring Program Stations KUG-2, KUG-3 and KUG-4, weekly from May to October inclusive, to determine Effluent or water flow in order to fulfill the monitoring requirements of Part H, Item 4 and 5. A record of inspections shall be retained and made available to an Inspector upon request.

7. The Licensee shall sample prior to discharge at Monitoring Program Station KUG-5, to verify compliance with Effluent quality criteria under Part D, Item 6.

8. All samples obtained at KUG-5 shall be analyzed for the following parameters:

pH
Total Suspended Solids
Total Hardness
Oil and Grease (visual)
Total Petroleum Hydrocarbons (TPH)
Polycyclic Aromatic Hydrocarbons (PAH)
BTEX:
Benzene
Toluene
Ethylbenzene
Xylene
Conductivity
Total Copper
Total Mercury
Total Zinc
Total Chromium
Total Lead
Nickel
Total Arsenic
Total Cadmium
PCB (Polychlorinated biphenyls

9. The Licensee shall sample prior to discharge at Monitoring Program Station KUG-6, to verify compliance with Effluent quality criteria under Part D, Item 2.

10. Additional monitoring stations, sampling and analysis may be requested by an Inspector.

11. The Licensee shall submit to the Board for review, within ninety (90) days of the date of issuance of the Licence, a Quality Assurance/Quality Control Plan based on the guidance document entitled *Quality Assurance (QA) and Quality Control (QC) Guidelines For Use by Class "B" Licences in Collecting Representative Water Samples in the Field and for Submission of a QAQC Plan* INAC (1996). The submitted Plan shall include a cover letter from an accredited laboratory confirming acceptance of the Plan for the monitoring

and analyses to be performed under the Licence.

12. The Licensee shall conduct all sampling, sample preservation and analyses in accordance with methods prescribed in the current edition of *Standard Methods for the Examination of Water and Wastewater*, or by such other methods approved by a laboratory certified by the Canadian Association for Laboratory Accreditation (CALA) or otherwise approved by the Board.

13. All analyses shall be performed in a laboratory accredited according to ISO/IEC Standard 17025. The accreditation shall be current and in good standing.

14. The Licensee shall monitor temperature at Monitoring Station(s) KUG-7 a minimum of twice annually, in early spring and mid to late fall or in accordance with the Sewage Lagoon Dyke Monitoring Program requested under Part F, Item 1b and 1c.

15. The Licensee shall provide the temperature readings at different depths at Monitoring Station(s) KUG-7 within the annual report, due no later than March 31. An annual evaluation of the geothermal data of the Sewage Disposal Facility shall be provided as an addendum to the Annual Report.

16. The Licensee shall include all of the data and information of the Monitoring Program, as required under Part B, Item 1(a), or as requested by an Inspector.

17. Modifications to the Monitoring Program including the Monitoring Program Stations and parameters may be made only upon written approval of the Board.