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NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN

WATER LICENCE APPLICATION FORM

Application for: (check one)

☐ New ☐ Amendment ☒ Renewal ☐ Assignment

LICENCE NO:

(for NWB use only)

1. NAME AND MAILING ADDRESS OF APPLICANT/LICENSEE

Hamlet of Coral Harbour
Coral Harbour, NU
X0C 0E0

Phone: (867) 925-8867

Fax: (867) 925-8233

e-mail: _____

2. ADDRESS OF CORPORATE OFFICE IN CANADA (if applicable)

N/A

Phone: _____

Fax: _____

e-mail: _____

3. LOCATION OF UNDERTAKING (describe and attach a topographical map, indicating the main components of the Undertaking)

Latitude: 64° 08' N Longitude: 83° 10' W NTS Map No. _____
Scale: _____

4. DESCRIPTION OF UNDERTAKING (attach plans and drawings)

See attached additional information

5. TYPE OF UNDERTAKING (A supplementary questionnaire must be submitted with the application for undertakings listed in "bold")

☐ Industrial

☐ Mine Development

☐ Advanced Exploration

☐ Exploratory Drilling

☐ Remote/Tourism Camps

☒ Municipal

☐ Power

☐ Other (describe): _____

6. WATER USE

- ☒ To obtain water
☐ To modify the bed or bank of a watercourse
☐ To alter the flow of, or store, water
☐ To cross a watercourse
- ☐ To divert a watercourse
☐ Flood control
☐ Other (describe): _____

7. QUANTITY OF WATER INVOLVED (litres per second, litres per day or cubic metres per year, including both quantity to be used and quality to be returned to source)

92,629 L/day at the end of the 10 year licence period.

8. WASTE (for each type of waste describe: composition, quantity, methods of treatment and disposal, etc.)

See attached additional information and the Coral Harbour Sewage treatment and Solid Waste Site Improvements Report prepared by Ferguson Simek Clark

- ☒ Sewage
☒ Solid Waste
☐ Hazardous
☒ Bulky Items/Scrap Metal
- ☐ Waste oil
☐ Greywater
☐ Sludges
☐ Other (describe): _____

9. PERSONS OR PROPERTIES AFFECTED BY THIS UNDERTAKING (give name, mailing address and location; attach if necessary)

None

Land Use Permit

- DIAND ☐ Yes ☐ No If no, date expected _____
- Regional Inuit Association ☐ Yes ☐ No If no, date expected _____
- Commissioner ☐ Yes ☐ No If no, date expected _____

10. PREDICTED ENVIRONMENTAL IMPACTS OF UNDERTAKING AND PROPOSED MITIGATION MEASURES (direct, indirect, cumulative impacts, etc.)

See attached additional information.

- NIRB Screening ☐ Yes ☐ No If no, date expected _____

NIRB has not reviewed this project.

11. INUIT WATER RIGHTS

Will the project or activity substantially affect the quality, quantity, or flow of water flowing through Inuit Owned Lands and the rights of Inuit under Article 20 of the Nunavut Land Claims Agreement?

No

11. (Continued)

If yes, has the applicant entered into an agreement with the Designated Inuit organization to pay compensation for any loss or damage that may be caused by the alteration. If no compensation agreement has been made, how will compensation be determined?

12. CONTRACTORS AND SUB-CONTRACTORS (name, address and functions)

None

13. STUDIES UNDERTAKEN TO DATE (list and attach copies of studies, reports, research, etc.)

See attached additional information.

14. THE FOLLOWING DOCUMENTS MUST BE INCLUDED WITH THE APPLICATION FOR THE REGULATORY PROCESS TO BEGIN

Supplementary Questionnaire (where applicable: see section 5) ☒ Yes ☐ No If no, date expected _____

Inuktitut/English Summary of Project ☒ Yes ☐ No If no, date expected _____

Application fee \$30.00 (c/o of Receiver General for Canada) ☐ Yes ☐ No If no, date expected _____

15. PROPOSED TIME SCHEDULE

☐ Annual (or) ☒ Multi Year

Start Date: 2002 Completion Date: 2012

Lucy Netser
Name (Print)

Senior Administrative Officer
Title (Print)

Signature

May 17, 2002
Date

For Nunavut Water Board use only

APPLICATION FEE Amount: \$ _____ Receipt No.: _____

WATER USE DEPOSIT Amount: \$ _____ Receipt No.: _____

Coral Harbour Water Licence Application

(1) Name and Mailing Address of Applicant:

Hamlet of Coral Harbour
Coral Harbour, NU
X0C 0E0

Telephone: (867) 925-8867

Fax: (867) 925-8233

(2) Address if Head Office in Canada if Incorporated: N/A

(3) Location of Undertaking:

Coral Harbour is located at South Bay, in the Boothia-Foxe Lowland Ecoregion, on the southern end of Southampton Island. Located at 64°08' N and 83°10' W, it is 720 km west of Iqaluit and 1,560 km north-east of Yellowknife.

Linear bedrock ridges run in an approximate north to south direction spaced about 400 m apart. Virtually all of the bedrock in the area consists of Paleozoic marine limestone. The seasonal effects of frost shattering and surface water runoff have resulted in a blanket of irregular, angular gravel and the flushing of fine material from ridges. The subsequent deposition of fines has occurred in low-lying areas. Where the rock is not exposed at the surface, the ground is usually covered with a thin layer of brown, fibrous peat. True soil development is limited to marshy areas.

The active layer of permafrost is up to 2 m below the surface during the late summer months. Weakly developed polygonal patterned ground is evident in virtually all the areas devoid of vegetation.

Mosses and lichens are common throughout the region. Flowering plants fare better in low-lying wetland, while lichens characterize drier areas. Graminoids, brown mosses, and willows up to 30 cm in height are found in the wetter areas.

Coral Harbour receives an average of 14.1 cm of rainfall and 131.9 cm of snowfall per year. Mean annual precipitation totals 27.3 cm. July mean high and low temperatures are 13.1° C and 4.2° C. January mean high and low temperatures are -25.5° C and -33.8° C. Winds are generally northwest and annually average 20.2 km/h.

The Coral Harbour area was first inhabited by the Sallirmiut Inuit, descendants of the Thule. These people made stone, whale, and turf homes, wore bearskin clothes and used flint-headed weapons. These characteristics are atypical of other coastal Inuit groups. On his 1612 voyage, Sir Thomas Button's expedition became the first Europeans to reach Southampton Island. The area began economically in the 1860's as a whaling base,

continuing until 1920. All but five of the Sallirmiut perished from disease brought over by the whalers; the tribe is now extinct.

The settlement was established by the Hudson Bay Company, which opened a post in 1925. An Inuk started the Anglican Mission at the same time, and a Roman Catholic Mission opened in 1927. During the Second World War, an airfield was opened by the R.C.A.F. and the U.S.A.F. 15 km from the present community. The site served as a refueling stop and hospital staging area. At this time the community was divided into north and south camps. In 1948, the MOT took over the airfield, and the DEW-Line operation saw an increase in its use. A school was built in 1950. The federal administrator arrived in 1959 and the first nursing station was built in 1963.

Today the economy is based on marine mammal and polar bear resources. Some residents are employed at the airfield or the weather station, while others work in private enterprise. Tourism opportunities consist of sport fishing, arts and crafts sales, and the carving of walrus ivory. Private business is associated mainly with the tourism industry. Coral Harbour gained hamlet status on April 1, 1972. A traditional name for the Hamlet is "Salliq", meaning 'islands in the south'.

The GNWT and the Hamlet jointly operate the 1,524 m x 31 m certified Arctic 'C' gravel runway. Other facilities and services include the air terminal building, weather/communications equipment, and navigational aids. Scheduled flight service is available. An unlicensed water aerodrome provides floatplane access. Break-up is in July and freeze-up in October.

Marine transportation is provided by barge. Facilities include a beach landing for shallow draft only and a pushout at Snafu Beach, five kilometers west of the community. There is no direct road access to Coral Harbour. Within the community there are approximately 20.9 km of roads. Calcium chloride is applied annually to 4.6 km of road to act as a dust suppressant and surface-stabilizing agent.

(4) Description of Undertaking:

Water and Sanitation:

Water supply and Treatment:

Kigulik Lake, located 2.9 km west of the community, was the former winter source for water. Weather-related access closures and the seasonal deterioration of its water quality forced the community to search for a more reliable source.

The source chosen was the Post River. This fast-flowing river contained adequate capacity for the Hamlet. The water is of good to excellent chemical quality for domestic use. Based on chemical analysis the water is very clear, soft, weakly buffered, and low in dissolved solids.

However, concerns for winter reliability remained. To resolve this concern a reservoir and truckfill system were constructed near the river. Now a permanent supply line from the river is used to fill the reservoir each summer. Water is pumped from the river at a point 2 km northwest of the community. The pumphouse is a wood frame building equipped with a skid-mounted portable diesel pump system. The water is drawn from a point 20 m from shore and pumped 1500 m to the reservoir.

For treatment, water is drawn from the reservoir and chlorinated in the pumphouse by a hypochlorinator. The pipe that carries the water from the pumphouse to the truckfill arm has chlorine injected into it when the trucks are being filled.

Comparison of the chemical analysis for raw and treated water samples to the Guidelines for Canadian Drinking Water Quality shows the parameters tested to be below the recommended limits. Microbiological analysis of treated water shows that batch chlorination eliminates or greatly reduces the number of bacterial species present in raw water samples.

Water Storage and Distribution:

Water for domestic use is stored in a rock-blast reservoir, located approximately 1 km northwest of the community. The reservoir, completed in 1980, has a usable storage capacity of 25,200,000 L. The reservoir was expanded in the late 1990's. This expansion doubled the storage capacity of the community.

Submersible pumps located inside twin 100 mm diameter HDPE intake lines pump the water from the reservoir. The intake lines are heat-traced and are carried inside 250 mm diameter HDPE pipes, which are themselves, protected by 75 mm of polyurethane insulation and a 400 mm HDPE outer casing. The casings are supported by an 80 m long inclined rock slope which has been blasted out of the side of the reservoir. The upper ends of the casings enter the truckfill pumphouse at floor level.

The truckfill pumphouse, a 3.5 m x 4.7 m pre-engineered building, houses the hypochlorinator. A steel pipe carries the water from the intake lines through the pumphouse and into the truckfill arm. A similar small pre-engineered building located beside the pumphouse houses an emergency generator.

The truckfill rate is 900 L/min. Water is delivered by the hamlet's 8172 L capacity truck. Each residence receives a delivery three days per week. Tanks sizes vary from 225 L to 2250 L for residences. The nursing station, school, hotel, and government staff quarters contain larger tanks ranging from 1362 L to 4540 L in capacity. All water deliveries are metered.

Annual Water Consumption:

Based on consumption figures for the last complete fiscal year, dating between April 1, 2000 and March 1, 2001, the annual water consumption for the Hamlet was 24,997,198 litres, and this volume is increasing annually. Water demand projections for the next ten years are shown in Table 2.

Sewage Collection and Disposal:

The Hamlet provides sewage tank pumpout service for the community. An 8172 L capacity sewage truck (1994) pumps out tanks five days per week with each house receiving service two or three times per week.

Liquid pumpout sewage is treated in a natural wetland site 3.4 km northwest of the community. The total area of the wetlands is about 10.5 ha. The wetlands consist of four shallow ponds. The remaining 3.5 ha are covered by soils from 2 - 15 mm in thickness. Cotton grasses and sedges are the major vegetation species that grow in the soils. The highly treated water is discharged to Hudson Bay.

During the winter months, sewage is stored in the upper reaches of the wetlands in the form of an ice mound.

Wetlands treatment is a web of complex physical and biological processes. Sedimentation, absorption of pollutants in the surface soils, nutrient uptake by plants, and the oxidation of compounds by microorganisms are some of the processes that effect the treatment.

A 1995 study by Artic Environmental Services Ltd. determined that Coral Harbour wetlands treatment is very effective with substantial removal of BOD₅, fecal coliform, and ammonia. The quality of the effluent entering the receiving pond was well within Water Board criteria and the Canadian Water Quality Guidelines for Freshwater Aquatic Life.

Solid Waste Collection and Disposal:

Employees of the hamlet collect garbage five days per week. A Ford truck modified with a compactor on the back is used to collect the garbage. The hamlet foreman estimates that the truck is capable of hauling 2300 kg of garbage in one trip. Each residence has a 205 L drum in front of it to contain the trash until pickup. There are approximately 177 residences in the community.

The garbage is hauled to the existing solid waste management site. It is located 2.5 km northwest of the community on the east side of a gravel ridge. The truck deposits the garbage at the edge of the covered portion of the landfill. A wheeled loader pushes the garbage over the edge of the slopes every two weeks. Combustible waste at the disposal site is burned weekly. At the end of each summer a cat compacts the garbage that has accumulated. Every two years the uncovered garbage is covered and compacted.

The existing solid waste disposal site covers an area of approximately 7,300 m³. There is no fencing at the site. This is one of the largest contributing factors to the amount of windspread litter observed around the site. The community usually performs a clean up of the litter every two or three years. There is room for expansion to the north and east. This area is wet and boggy throughout the summer months and would be difficult to work with.

The area to the west of the existing site is in use as a bulky waste disposal area. The bulky waste in this area is old vehicles and tires. The Hamlet does not want any more development in this area for fear of contamination of the Post River. Hamlet workers are in the process of relocating the bulky waste to an area southeast of the landfill site. Old appliances are stored 500 m north of the solid waste site.

Large metal waste items are discarded within the municipal waste area. These items include old tanks, culverts, barrels, etc. The presence of these items with municipal wastes reduces the compaction potential of the refuse and thus decreases the service life of the existing facility. Any future developments should include a more organized approach to the disposal of metal items that are not typical of the household garbage stream.

The hamlet foreman expressed some concerns. Waste oil, antifreeze, transmission fluid, etc. is stored in an area near the hamlet shop. The Hamlet does not have a disposal procedure for these wastes. The loader operator must be careful when pushing garbage over the side of the slopes to avoid puncturing the machine's tires. The foreman would like to have fencing installed in the future to minimize the effects of wind on the landfill.

(7) Quantity of Water Involved:

Population Estimates:

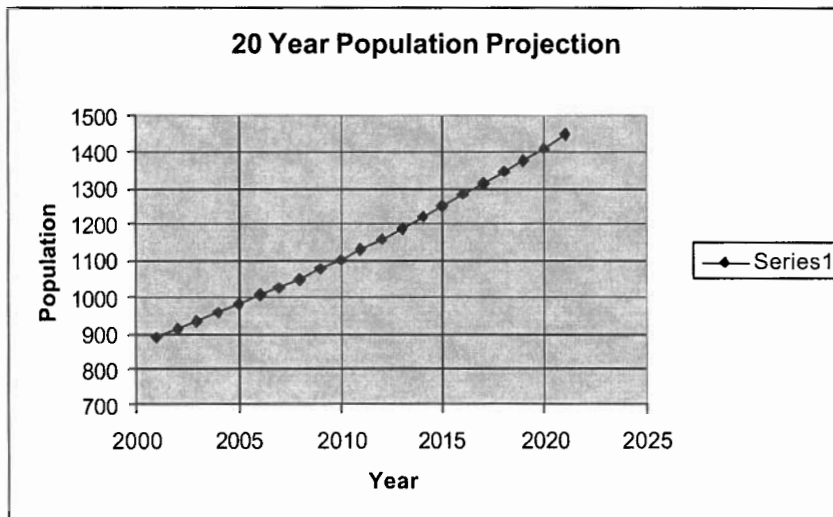
The population of Coral Harbour, 669 in 1996, is increasing at a rate of 3.01%. The per capita growth rate was extrapolated from the populations within the census years of 1981 and 1996. Based on discussions with hamlet officials the current population in 2001 is between 750 and 800. The population by ethnic distribution is 95% Inuit and 5% non-aboriginal. The population by age and sex distribution is as follows: 0-4 (19%), 5-14 (25%), 15-64 (54%), 65+ (2%); 50% male and 50% female. The Government of Nunavut has published population projections for the community. These will be used for the remainder of this report.

Table 1: Population projections for the Hamlet of Coral Harbour

Calendar Year	Population
2001	888
2006	1003
2011	1128
2016	1281
2021	1445

Source: www.stats.gov.nu.ca

Figure 1: Population projection for the Hamlet of Coral Harbour



Average water consumption for the 2001 fiscal year was 24,997,198 litres. Table 2 provides a water use projection using the population growth rate. At the end of the 10-year water licence the water use will be approximately 33,809,589 litres per year.

Therefore, the Hamlet requests an annual water use rate of 34,000,000 litres

Table 2 – Water Demand Projections

			Daily	Annual
Planning	Calendar	Total	Projected	Projected
Year	Year	Population	Volume	Volume
		#	litres	litres
	2001	888	68,485	24,997,198
0	2002	911	70,259	25,644,447
	2003	935	72,079	26,308,728
	2004	959	73,946	26,990,233
	2005	984	75,861	27,689,338
	2006	1003	77,750	28,378,727
5	2007	1027	79,686	29,085,380
	2008	1054	81,670	29,809,616
	2009	1080	83,704	30,551,807
	2010	1107	87,805	32,049,006
	2011	1128	90,185	32,917,347
10	2012	1159	92,629	33,809,589

(8) Waste Deposited:**Wastewater:**

The current volume of sewage generated by the community of Coral Harbour is 25,644,447 litres annually corresponding to the annual water use. The Hamlet is applying for a ten-year water licence. In 2012, the annual volume of sewage generated will be 33,809,589 litres.

The Hamlet provides sewage tank pump out service for the community. The Hamlet owns and operates two 6000 L sewer trucks. An older 4800 L truck is available for back up. All houses are pumped out each day. Some homes have opted to receive pump out service only 3 to 5 times per week. The sizes of the holding tanks in the community vary from 3000 to 4000 L. Of the 177 residences in the community, 150 are currently in service. Sewage service is provided 7 days per week.

The sewage is transported to a sewage drop off area 2.8 km northwest of the community. The sewage is treated by the natural wetlands method. The total area covered by the overland treatment system is 10.5 ha. The wetlands consist of four shallow ponds with an area of 7 ha. The remaining 3.5 ha are covered by soils from 2 - 15 mm in thickness.

Cotton grasses and sedges are the major vegetation species that grow in the soils. The highly treated water is discharged to Hudson Bay. The sewage wetlands run in a predominantly southeasterly direction towards the ocean. As such it runs through the toe of the expanding solid waste facility.

The discharge point is a pushout adjacent to the access road. It is setup to allow the operator to discharge in three different directions, depending on the wind direction. There are no bollards or signage to indicate the area is a sewage disposal area. Some logs were placed to act as a wheel stop for the operators.

During the winter months, sewage is stored in the upper reaches of the wetlands in the form of an ice mound.

There are no residences in town that rely on honeybags. All buildings and homes rely on sewage pumpout. The cost for providing this service is included in the cost for providing water. Residents will utilize honeybags for camping trips. These are disposed of along with the municipal waste. The hamlet foreman finds this method of disposal acceptable.

Solid Waste Collection and Disposal:

Solid Waste Volume Projections:

There is no published information on waste volumes in Coral Harbour. Relying on data from other communities in this region, the following table (Table 4) of estimated solid waste volumes was prepared.

The following assumptions were made to prepare this table:

- Yearly Per capita volume described by Heinke and Wong (1990) is 0.014 m³/person/day.
- The per capita population growth rate is 2.5% per year.
- The waste will compact by 50% in the landfill.
- The cover material required is 20% of the compacted volume.

Table 4: Solid Waste Projections for the Community of Coral Harbour

Planning Year	Calendar Year	Total Population	Projected Daily Rate (m3pcd)	Projected Daily Volume (m3/day)	Projected Daily Weight (tonnes)	Projected Annual Volume (m3/day)	Projected Annual Weight (tonnes)
	1996	669	0.014	9.4	0.9	3419	338
	1997	689	0.014	9.7	1.0	3557	352
	1998	710	0.014	10.1	1.0	3700	366
0	1999	731	0.014	10.5	1.0	3850	381
	2000	753	0.015	11.0	1.1	4005	397
	2001	776	0.015	11.4	1.1	4167	413
	2002	799	0.015	11.9	1.2	4336	429
	2003	823	0.015	12.4	1.2	4511	447
5	2004	848	0.015	12.9	1.3	4693	465
	2005	874	0.015	13.4	1.3	4883	483
	2006	900	0.015	13.9	1.4	5080	503
	2007	927	0.016	14.5	1.4	5285	523
	2008	955	0.016	15.1	1.5	5499	544
10	2009	984	0.016	15.7	1.6	5721	566
	2010	1013	0.016	16.3	1.6	5952	589
	2011	1044	0.016	17.0	1.7	6192	613
	2012	1075	0.016	17.7	1.7	6443	638
	2013	1108	0.017	18.4	1.8	6703	664
15	2014	1141	0.017	19.1	1.9	6974	690
	2015	1175	0.017	19.9	2.0	7255	718
	2016	1211	0.017	20.7	2.0	7549	747
	2017	1247	0.017	21.5	2.1	7853	777
	2018	1285	0.017	22.4	2.2	8171	809
20	2019	1323	0.018	23.3	2.3	8501	842
	2020	1363	0.018	24.2	2.4	8844	876
	2021	1404	0.018	25.2	2.5	9202	911
	2022	1446	0.018	26.2	2.6	9573	948

Recycling program

There are no recycling programs in place. No plans to commence such a program are being made. In order to combat the litter problem due to the lack of fencing around the solid waste site, the Hamlet will employ students to clean up the community.

Litter Control

Wind blown litter could be controlled in an improved manner through the use of litter fences. Many employees of the Hamlet and Council are in favor of these fences and would like to see them installed.

(9) Other Persons or Properties affected by this Undertaking:

There are no properties surrounding this area, therefore, no persons will be affected by this undertaking.

(10) Predicted Environmental Impacts of Undertaking and Proposed Mitigation:

The disposal of solid waste and sewage may have local site effects due to the clearing of vegetation, contamination at the site. In addition, there may be some contamination of groundwater.

Procedures such as the segregation of wastes, the promotion of recycling or salvaging, and controlled burning will be used to minimize the volume of disposed solid waste. Fencing will be installed to limit the spread of debris by wind and will be used to reduce litter.

(11) Contractors and Sub-Contractors:

Sudliq Development is the only major contractor in Coral Harbour.

(12) Studies Undertaken to Date:

W.L Wardrop & Assoc., Addendum No.1 to Cost Effective Analysis Water Supply, Sewage & Solid Waste Disposal, Coral Harbour, NWT, February 1983.

GNWT-DPW, Design & Operations Concept Report, October 1992.

UMA Engineering Ltd., Design and Operations Concept Report, March 1994.

Arctic Environmental Services Ltd., Review of the Natural Wetlands Sewage Disposal System at Coral Harbour, March 1995.

(13) Proposed Time Schedule:

Multi-year

Start Date: 2002

Completion Date: 2012

(14) Other Relevant Information to the Water Licence Application:

Violations:

Without a water licence violations have not been reported. However, during a review of the 1996 Annual Report and the 1996 Compliance Report there were a number of non-compliance issues that had to be addressed. The issues related not to the work that was actually being carried out, but rather to the lack of communication/notification to ensure that the DIAND Nunavut District Office was advised as per licence requirements.