

2005 Cambridge Bay Annual Water Licence Report

Prepared for:

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1.0 INTRODUCTION

In 2005, the community infrastructure systems providing water, sewage and solid waste management to the residents of the Hamlet of Cambridge Bay were successfully operated and maintained by the community. **Figure 1** and **Figure 2** provide an overview of the location of the source water and wastewater lagoon with respect to the community.

2.0 WATER USE

The raw water source is Water Supply Lake, approximately 3 kilometers north of the community. The catchments area for the Lake is 231 hectares (571 acres). The summer storage of Water Supply Lake is approximately 1,738,000 m³ and winter storage volume is about 544,000 m³ with 2.5 meters of ice. The water source is not near any human activities and, as such, is relatively free from potential contamination.

The intake facilities extend 20 meters into Water Supply Lake to a depth of approximately 4 meters below the surface. The intake pump discharge line consists of a 100mm diameter HDPE pipe. This pipeline is coupled to submersible pump at the intake pumphouse and rests with a HDPE intake shaft or casing pipe. The water is chlorinated at the intake pumphouse prior to pumping to the distribution pumphouse.

A 2,900 meters water supply pipeline runs from the intake facilities to the distribution pumphouse at the centre of community. The 150 mm waterline is freeze protected with insulation and a 50 mm recirculation waterline.

Water is then distributed by water trucks from the truckfill station in the community center to the water tanks within each residence in the community. Water delivery is provided to the residents by the Hamlet using 12,000 litre water trucks. There is a 260 m³ storage tank located beside the distribution pumphouse. **Figure 3** shows the location of the intake area, pipeline, and distribution pumphouse. **Figure 4** shows the water distribution pumphouse.

3.0 WASTEWATER DISCHARGE

Sewage is collected from the community by sewage trucks to the sewage lagoon system, located approximately 1.5 km northeast of the community and adjacent to the existing Waste Metal Disposal Site. The system consists of several natural ponds connected in series (Pond 1, Pond 2, Pond 3, Pond 4, Pond 5 and Pond 6) as shown in **Figure 5**. Based on the normal water level in the lagoon ponds, the lagoon volume was estimated to be 72,000 m³ by IEG Environmental Consultants.

The sewage is discharged into Pond 1 of the lagoon by tanker trucks at truck discharge site. The treated sewage by the lagoon is channeled into Cambridge Bay. Currently, there is no discharge control structure in the lagoon. The existing lagoon is, therefore, seasonally flooded due to spring runoff flowing into the lagoon from the surrounding watershed. The sewage effluent from the lagoon is discharged to Cambridge Bay continually.

4.0 WATER AND WASTEWATER QUANTITIES

Although water consumption quantities were recorded and submitted to the government agencies, consumption values are not available for this report. As such, water consumption was estimated as 140 litres per capita per day. The population for Cambridge Bay was estimated as 1,441 based on the Statistics Canada reported population of 1,309 in 2001 and an assumed 2.44% annual growth rate.

As such, water consumptions are estimated per month below.

Month	Total Water Use (Litres)
January	6,253,940
February	5,648,720
March	6,253,940
April	6,052,200
May	6,253,940
June	6,052,200
July	6,253,940
August	6,253,940
September	6,052,200
October	6,253,940
November	6,052,200
December	6,253,940
Total	73,635,100

The monthly and annual quantities of wastewater discharged are not metered, but are estimated to equal the quantity of potable water. The estimated annual wastewater production of 73,635 m³ allows a retention time in the sewage lagoon of 357 days.

5.0 SYSTEM MODIFICATIONS, MAINTENANCE AND LICENCE AMENDMENTS

The water supply pipeline to the distribution pumphouse broke in early 2004. As such, potable water for the Hamlet of Cambridge Bay was trucked directly from the pumphouse to the community until the supply pipeline was fixed in July, 2005.

The water use and waste disposal in the Hamlet of Cambridge Bay is regulated by a Type B Water Licence. The water licence for the Hamlet of Cambridge Bay, number NWB3CAM0207, was issued on September 1, 2002 and expires on August 31, 2007.

In February 2005, the Nunavut Water Board issued Amendment 1 to Licence No. NWB3CAM0207, in order to allow the Hamlet to remediate petroleum-impacted soils at a Hydrocarbon-Impacted Soil Landfarm Treatment Facility.

6.0 SURVEILLANCE NETWORK PROGRAM MONITORING

When sampling is undertaken, there are three points from which wastewater samples are obtained from the sewage lagoon system as indicated in **Figure 6**; the sewage lagoon pond "lagoon", the outlet of the pond adjacent to the metal disposal site "pond", and the ocean discharge point "outlet". Wastewater sampling was undertaken in 1998 and 2003. The results of the 2003 wastewater quality were presented in 2005 in a report titled "Cambridge Bay Municipal Sewage Lagoon and Waste Facilities Assessment", issued by IEG Environmental Consulting Limited.

In 2005, to the best of the community's knowledge, based upon feedback from the community's operating staff and the limited water sample data, the community infrastructure systems were operating within the criteria of the water licence with the exception of the estimated annual removal of approximately 73,635 m³ of water from the Water Lake. The current water licence allows for the removal of 70,000 m³ of water from Water Lake annually.

7.0 SYSTEM ABANDONMENT AND RESTORATION WORK

The water supply pipeline, which was broken in early 2004, was fixed in July, 2005. The water and sewer systems serving the Hamlet of Cambridge Bay did not have any system abandonment work completed in 2005.

8.0 SYSTEM STUDIES AND INSPECTIONS

A wastewater effluent sampling program was undertaken in 2003. The results of the 2003 wastewater quality were presented in 2005 in a report titled "Cambridge Bay Municipal Sewage Lagoon and Waste Facilities Assessment", issued by IEG.

There were no Indian and Northern Affairs Canada (INAC) inspections reported for the Hamlet of Cambridge Bay in 2005.

9.0 SYSTEM DISCHARGES

Sewage enters into Pond 1 at the truck discharge site. Sewage travels through the six lagoon ponds identified in **Figure 4**. The wastewater will enter a series of natural lakes and wetlands before ultimately discharging into Cambridge Bay approximately 450 metres east of the community. Effluent from the sewage lagoon discharges during spring, summer and fall. Effluent does not discharge during winter due to freezing.

10.0 SYSTEM EXCAVATIONS

In 2005, there were no recorded trench or sump excavations associated with the Hamlet's water, sewer and solid waste management systems.

11.0 LAGOON SLUDGE

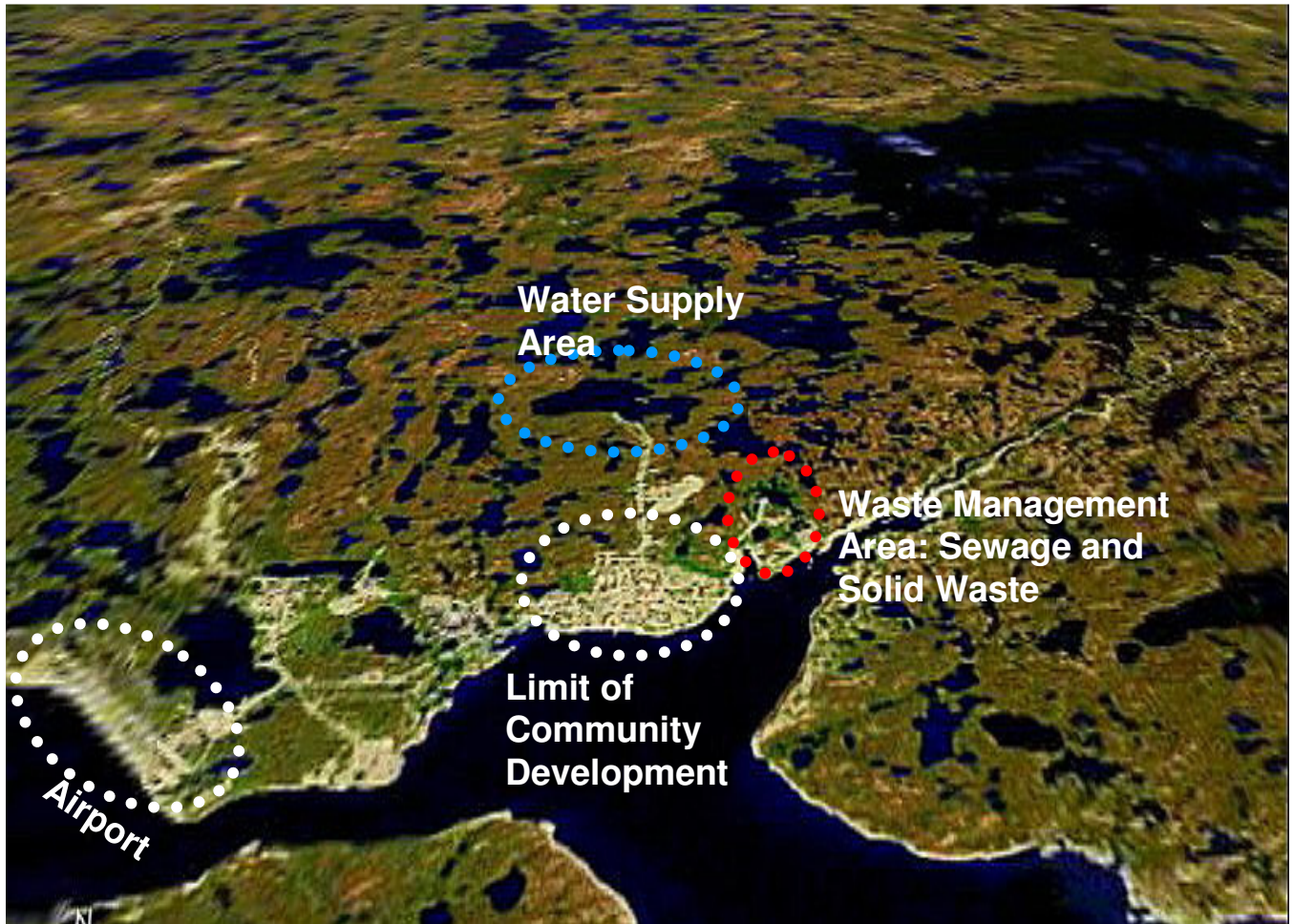
In 2005, there was no recorded removal of solid waste or sludge from the sewage lagoon.

12.0 OPERATION AND MAINTENANCE PLANS

Operation and Maintenance (O&M) Manuals for the Hamlet of Cambridge Bay's solid and sewage waste treatment systems have been identified as a requirement for the renewal of the Hamlet's water licence by the Nunavut Water Board (NWB). As such O&M Manuals will be updated and submitted to the NWB for review.

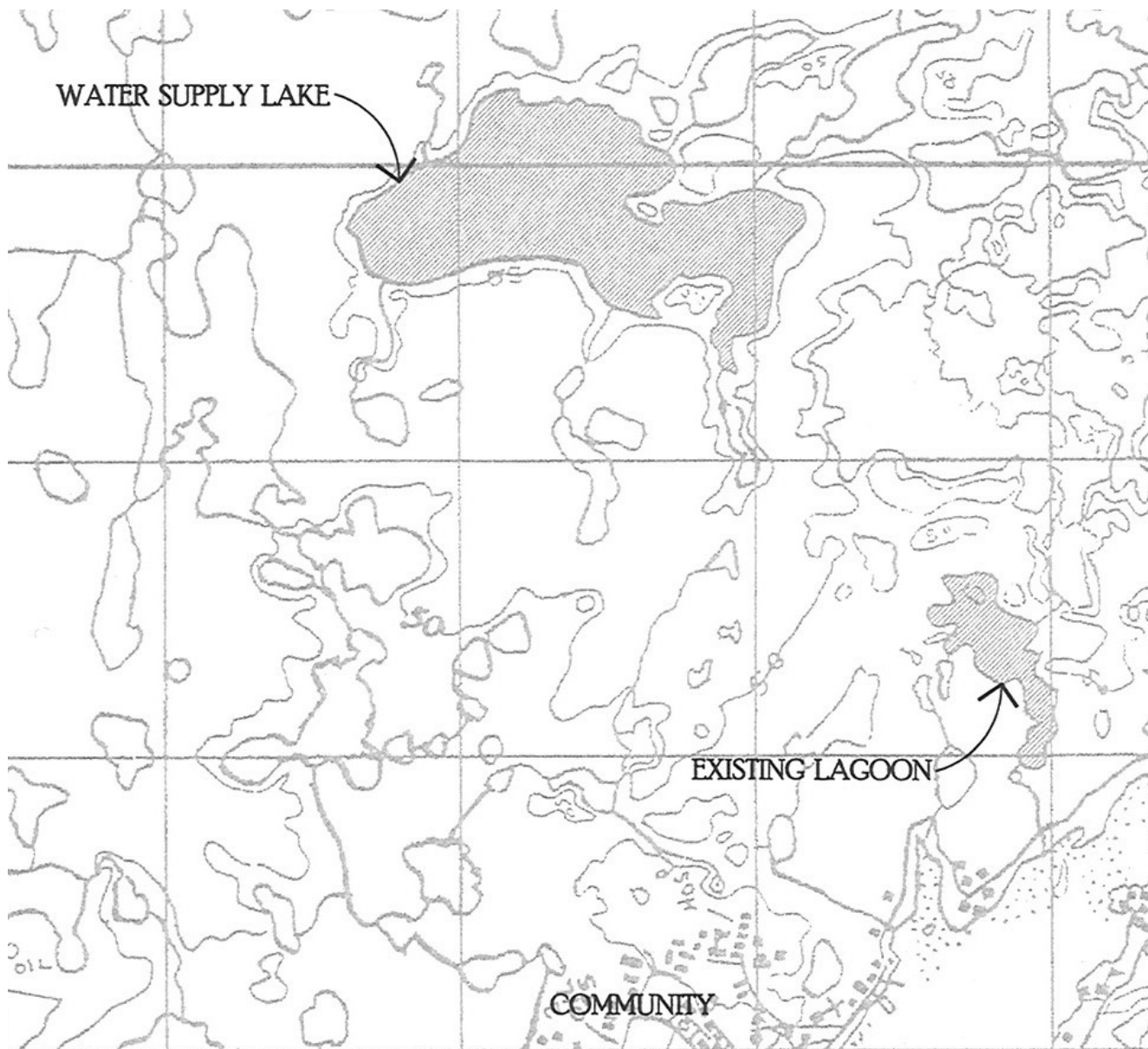
13.0 REFERENCES

"Cambridge Bay Municipal Sewage Lagoon and Waste Facilities Assessment", IEG, October 2005.



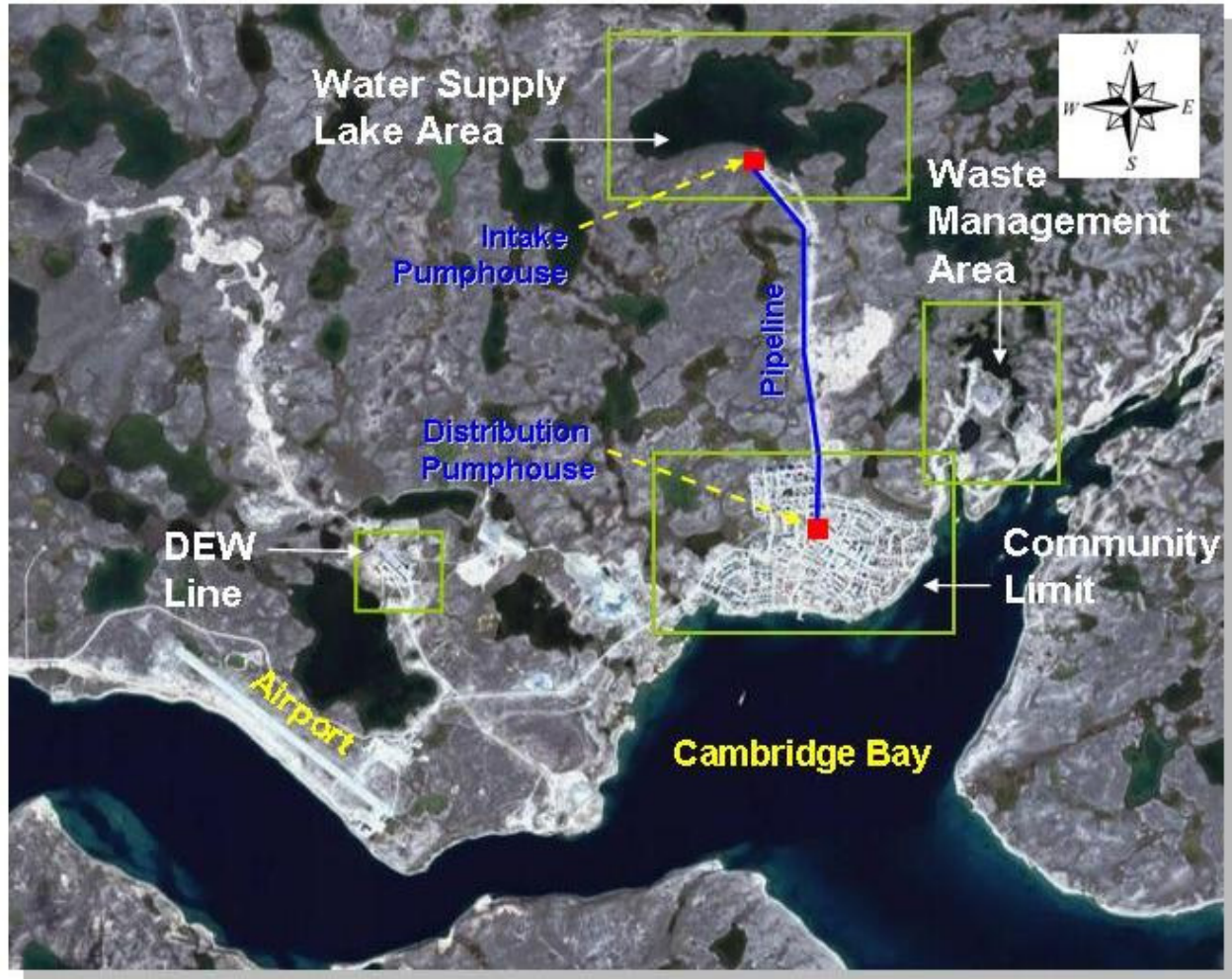
**Hamlet of Cambridge Bay
Annual Report
Water Supply and Waste Sites**

Figure 1



**Hamlet of Cambridge Bay
Annual Report
Lagoon and Water Supply Locations**

Figure 2



**Hamlet of Cambridge Bay
Annual Report
Water Pumphouse and Pipeline
Locations**

Figure 3



**Hamlet of Cambridge Bay
Annual Report
Sewage Lagoon Pond Locations**

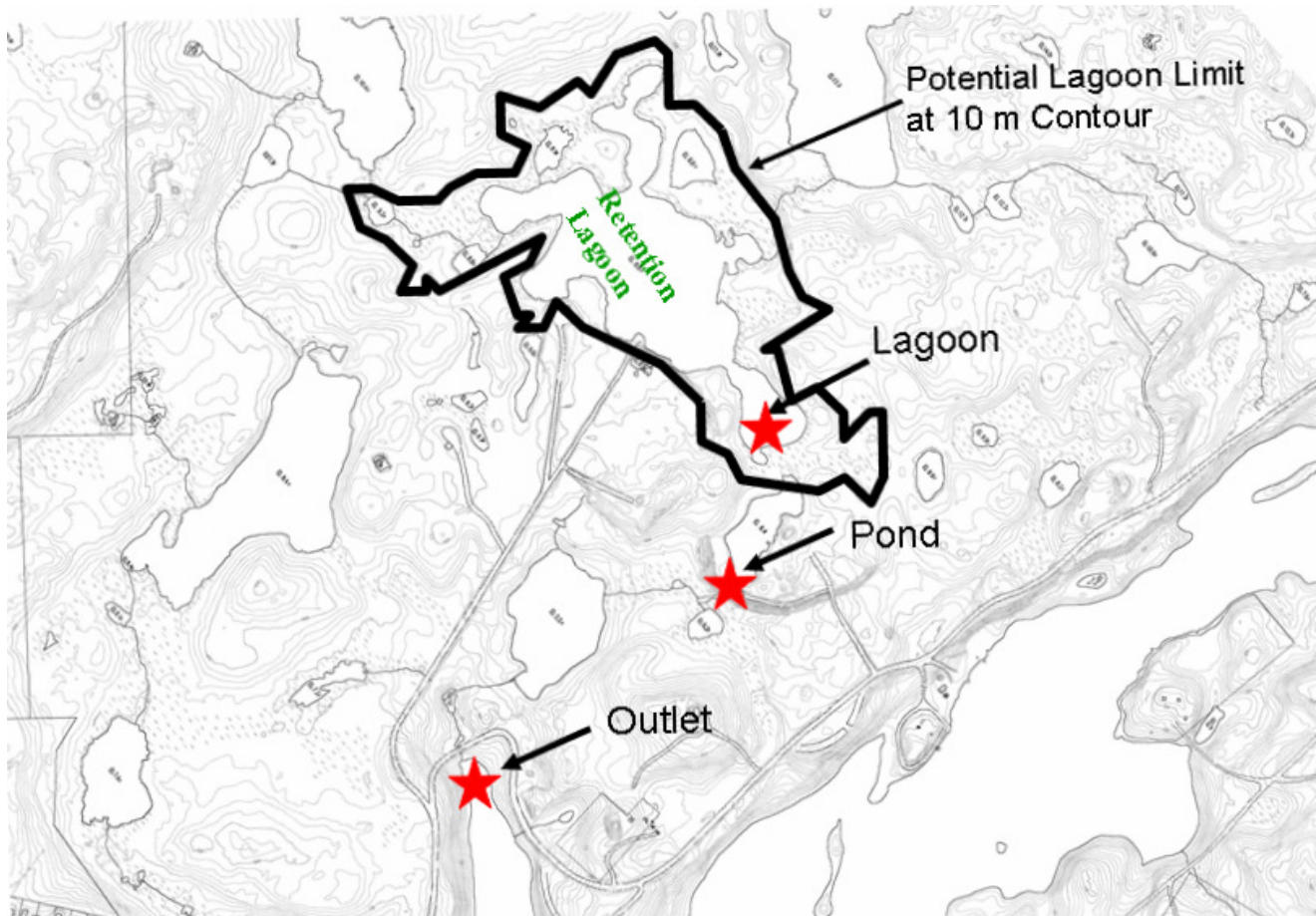
Figure 4



Figure 3 Water Distribution Pumphouse

**Hamlet of Cambridge Bay
Annual Report
Water Distribution Pumphouse**

Figure 5



**Hamlet of Cambridge Bay
Annual Report
Sewage Lagoon Sampling Locations**

Figure 6