2004 Cambridge Bay Annual Water Licence Report

Prepared for:
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1.0 INTRODUCTION

In 2004, 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 m^3 and winter storage volume is about 544,000 m^3 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 100 mm 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 m^3 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 m^3 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

Water 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 1,407 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	Assumed Water Consumption (Litres)
January	6,106,380
February	5,515,440
March	6,106,380
April	5,909,400
May	6,106,380
June	5,909,400
July	6,106,380
August	6,106,380
September	5,909,400
October	6,106,380
November	5,909,400
December	6,106,380
Total	71,897,700

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 m^3 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 intake pumphouse to the community for the remainder of 2004, until the supply pipeline was fixed in 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.

6.0 SURVEILLANCE NETWORK PROGRAM MONITORING

The location of three surveillance network program stations was identified by a water resources officer: the Water Supply Intake (CAM-1); the Solid Waste Disposal Facility Seepage (CAM-2, N69°07'26.2"W105°01'43.6"); and, located after the metal dump runoff and sewage lagoon effluent, the Sewage Lagoon Discharge (CAM-3, N69°07'19.5"W105°02'15.1").

In 2004, to the best of the community's knowledge, based upon feedback from the community's operating staff, the community infrastructure systems were operating within the criteria of the water licence with the exception of the estimated annual removal of approximately 71,987 m^3 of water from the Water Lake. The current water licence allows for the removal of 70,000 m^3 of water from Water Lake annually.

7.0 SYSTEM ABANDONMENT AND RESTORATION WORK

The water supply pipeline broke in early 2004. As such, potable water had to be trucked from the intake pumphouse rather than from the distribution pumphouse for the remainder of 2004. The water and sewer

systems serving the Hamlet of Cambridge Bay did not have any system abandonment work completed in 2004.

8.0 SYSTEM STUDIES AND INSPECTIONS

Indian and Northern Affairs Canada (INAC) completed an inspection of the Cambridge Bay facilities on July 20, 2004. These inspections are typically done annually to ensure that facilities are in compliance with the terms of their water licence.

The inspector reported concerns regarding the record-keeping of chlorine levels and water use. The inspector indicated that a spill kit should be available at the pumphouse for hypochlorite spills.

The new pipeline to replace the broken water pipeline should include water meters to better record water consumption.

All water samples taken from Water Lake were within the licenced guidelines and the Canadian Council of Ministries of the Environment (CCME) *Summary of Guidelines for Canadian Drinking Water Quality*.

The inspector reported concerns that the metal dump is in the path of the sewage lagoon effluent at CAM-2. Samples were taken from the effluent flowing through the metal dump. These samples met all the Licenced and CCME guidelines, with the exception of iron, with a concentration at 963 ug/L, compared to the standard of 300 ug/L.

Effluent samples were taken at CAM-3. These samples exceeded the Licenced and CCME guidelines for iron concentration at 464 ug/L.

The Hamlet of Cambridge Bay was instructed to produce an Annual Report to the Water Board.

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 2004, there were no recorded trench or sump excavations associated with the Hamlet's water, sewer and solid waste management systems.

11.0 LAGOON SLUDGE

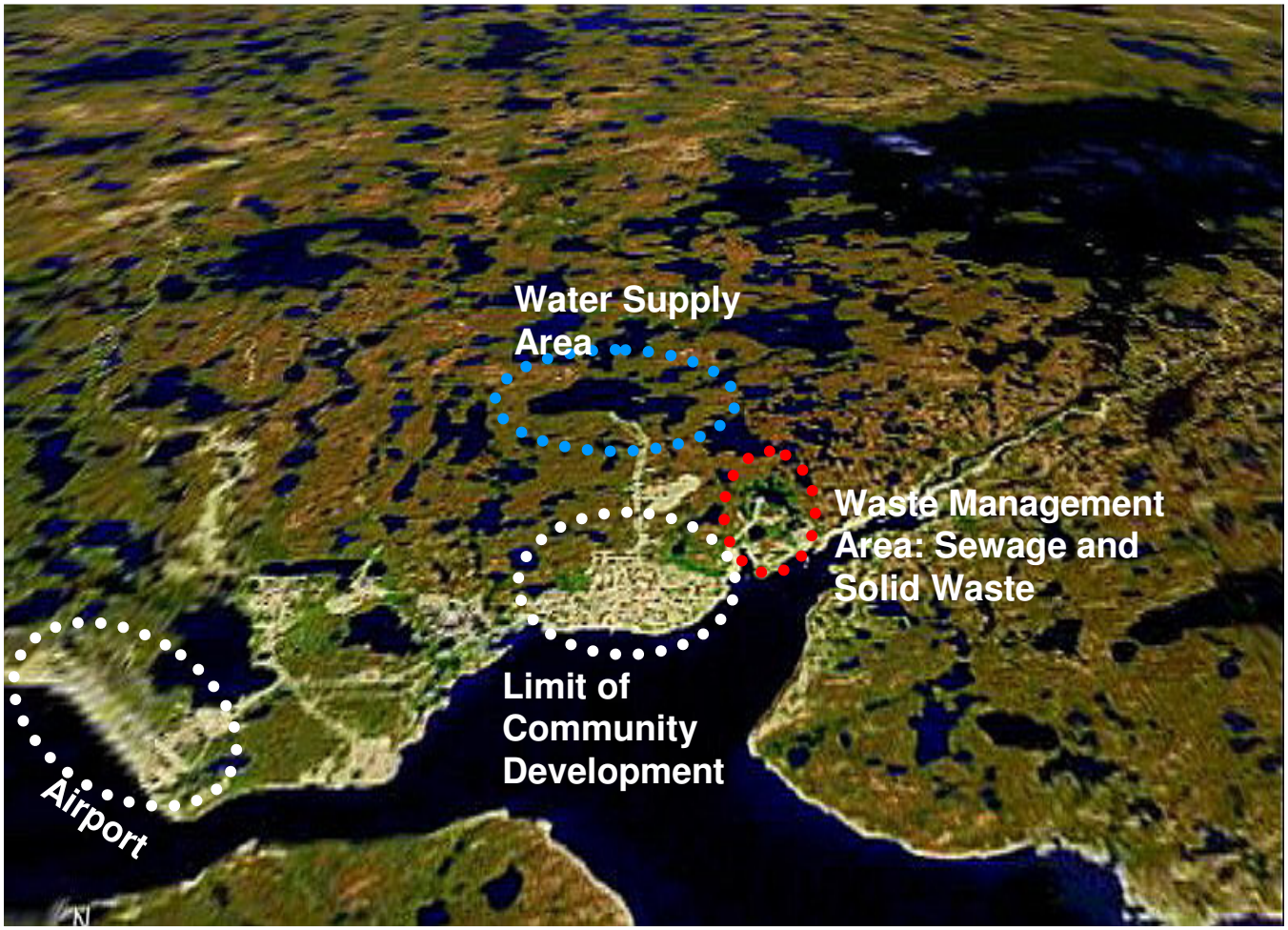
In 2004, there was no recorded removal of solid waste or sludge from the sewage lagoon.

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

Stewart, Scott, Water Resource Officer, Nunavut District Office: "Hamlet of Cambridge Bay Water Licence Inspection July 20, 2004".



Hamlet of Cambridge Bay
Annual Report
Water Supply and Waste Sites

Figure 1

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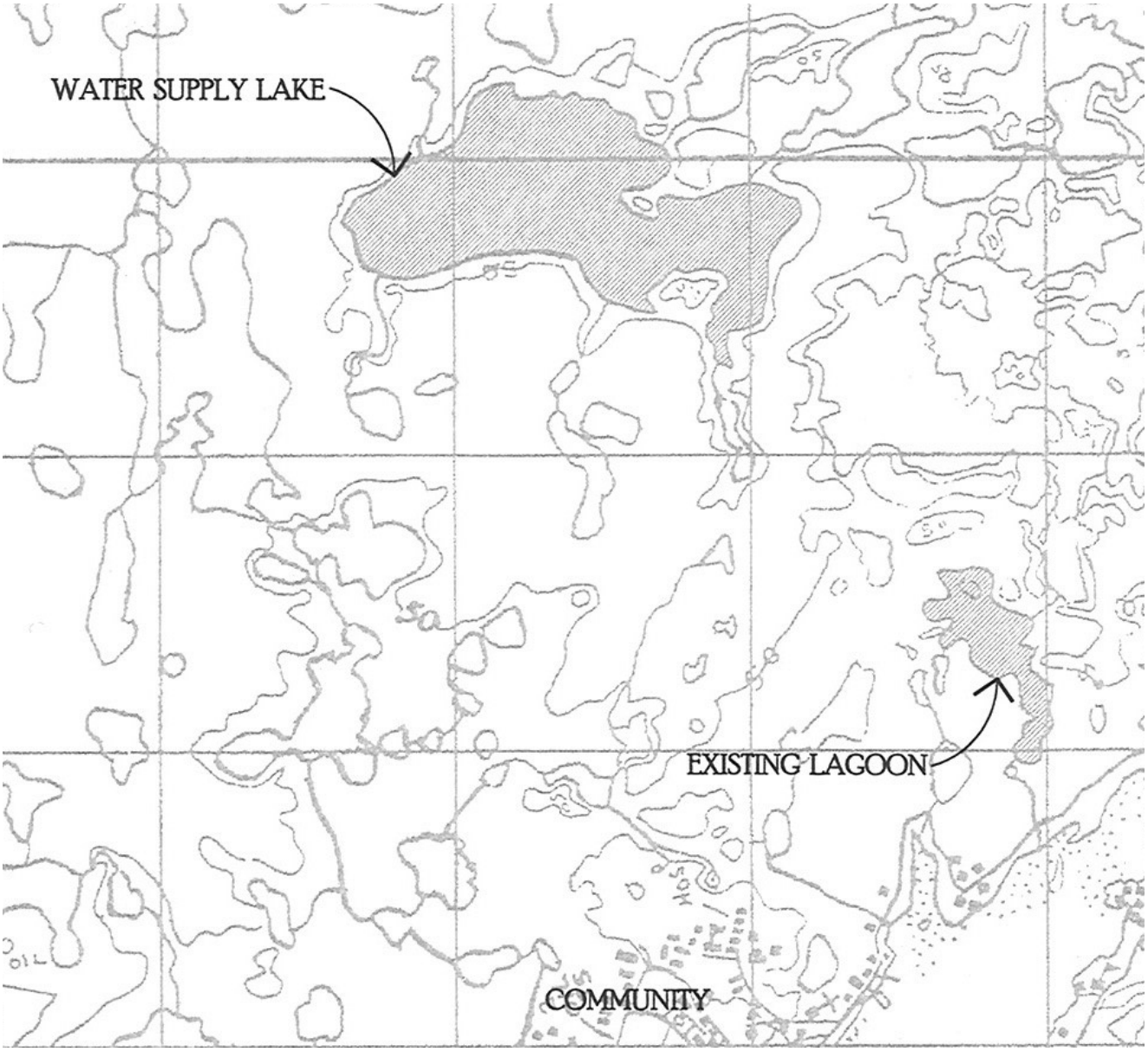

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Lagoon and Water Supply Locations

Figure 2

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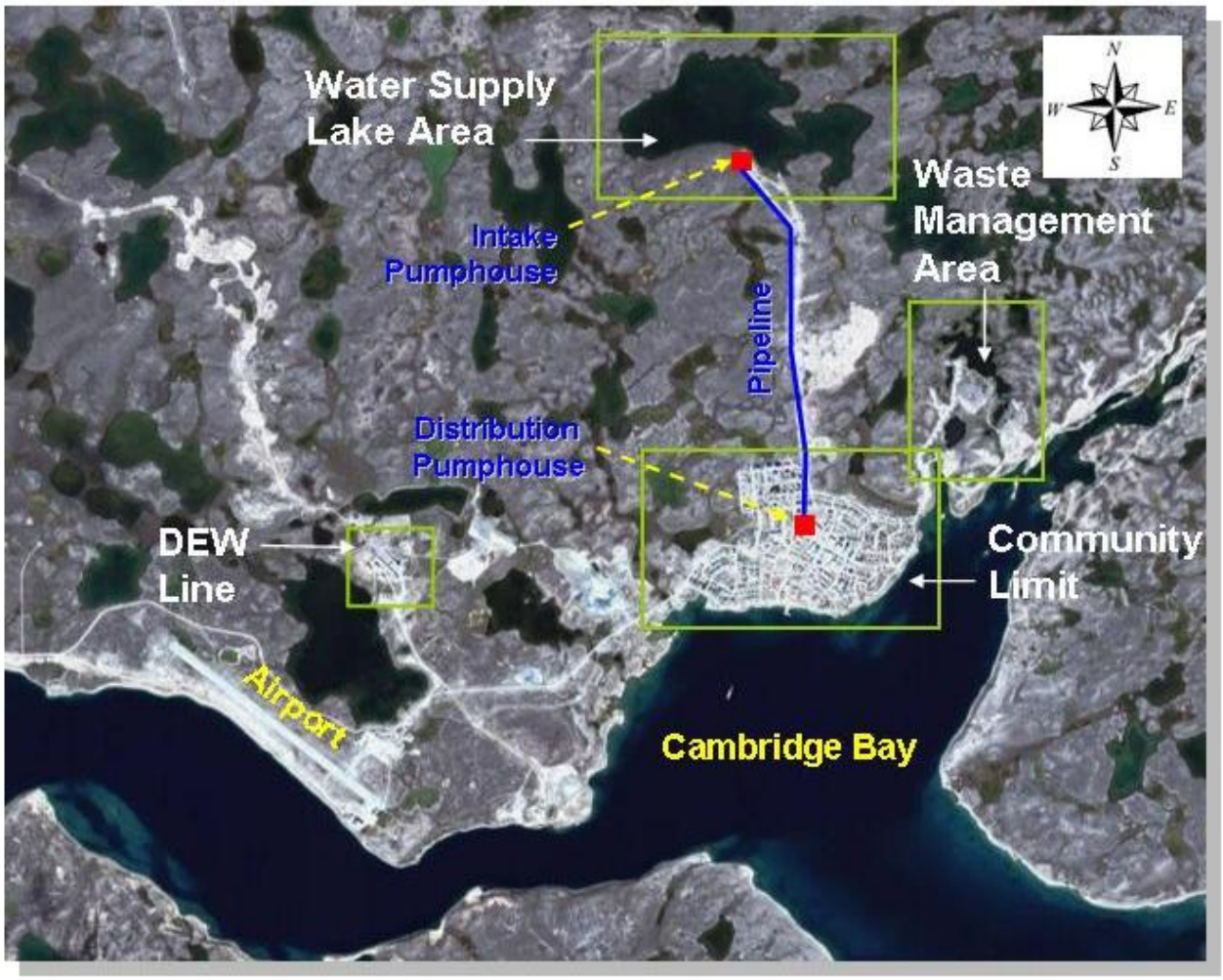

Hamlet of Cambridge Bay
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Water Pumphouse and Pipeline Locations

Figure 3

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Hamlet of Cambridge Bay
Annual Report
Sewage Lagoon Pond Locations

Figure 4

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Figure 3 Water Distribution Pumphouse

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Water Distribution Pumphouse

Figure 5

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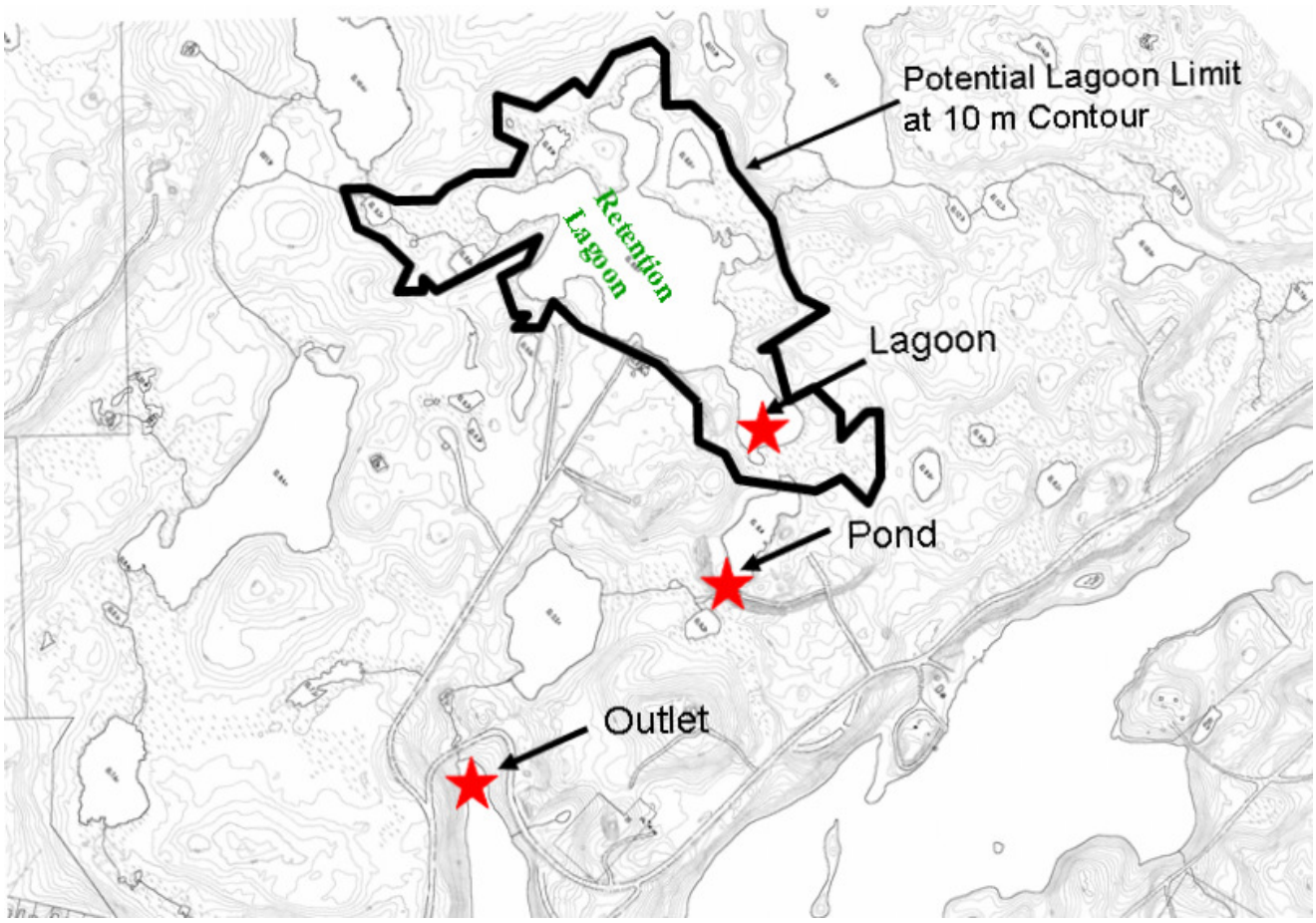

Hamlet of Cambridge Bay
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Sewage Lagoon Sampling Locations

Figure 6

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