2007 Cambridge Bay Annual Water Licence Report

Prepared for:
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TABLE OF CONTENTS

LIST OF FIGURES

1.0 INTRODUCTION

In 2007, 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.[1]

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 is estimated to be 72,000 m^3.[2]

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

In the twelve (12) months from May 2007 until April 2008 the Hamlet of Cambridge Bay used 70,445,785 litres of potable water. Data is not available for early 2007 until April 2007, therefore the twelve month period from May 2007 until April 2008 is assumed indicative of the annual water consumption for 2007.

Based on a 2006 census and an assumed annual growth rate of 2.01%, the population in 2007 is estimated as 1,642.[3] Therefore, the estimated water use is 118 litres per capita per day.

Month	Total Water Consumption (Litres)
January-07	NA
February-07	NA
March-07	NA
April-07	NA
May-07	6,468,625
June-07	6,205,875
July-07	5,771,360
August-07	5,862,296
September-07	5,747,876
October-07	5,973,467
November-07	6,214,740
December-07	5,615,600
January-08	5,566,859
February-08	5,577,827
March-08	5,852,000
April-08	5,589,260
Total	70,445,785

Note: NA – quantities not available.

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 70,445 m^3 allows a retention time in the sewage lagoon of 373 days.

5.0 SYSTEM MODIFICATIONS, MAINTENANCE AND LICENCE AMENDMENTS

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 expired on August 31, 2007. The Hamlet of Cambridge Bay applied in August 2007 for a renewal of the water licence to the Nunavut Water Board, which is currently pending.

There are no records of system modifications or maintenance in 2007 for the water and sewer systems serving the Hamlet of Cambridge Bay. .

6.0 SURVEILLANCE NETWORK PROGRAM MONITORING

In 2007, 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 annual removal of slightly more water from the Water Lake annually than allowed by the current water licence of 70,000 m^3.

7.0 SYSTEM ABANDONMENT AND RESTORATION WORK

The water and sewer systems serving the Hamlet of Cambridge Bay did not have any system abandonment or restoration work completed in 2007.

8.0 SYSTEM STUDIES AND INSPECTIONS

Indian and Northern Affairs Canada (INAC) did not perform a site inspection in 2007.

A waste management planning report was prepared by Earth Tech Canada in July 2006 to identify potential new locations to be used by the Hamlet for waste management. In August, 2006 a water sampling program was also undertaken of the existing lagoon and landfill facilities. Results were reported by Earth Tech and concluded that the discharged concentrations of parameters examined from the existing lagoon system were at an acceptable level. Additionally, it was found that the solid waste landfill runoff was a significant source of contaminants to the existing lagoon system. Based on these findings and community input the Hamlet of Cambridge Bay is currently opting to redevelop its existing waste management sites.

In February 2007, Earth Tech (Canada) Inc. prepared a waste diversion strategy for the Hamlet of Cambridge Bay. The intention of this study was to provide the Hamlet a framework to start the waste diversion from the landfill. The study was also intended to introduce an incremental diversion program to the community with the following actions:

- Promote public(community, territorial governments and local business) awareness and education to waste diversion program;
- Initiate environmental fee charge, such as beverage containers, electronic products (territorial legislation required);
- Establish a waste diversion management center to organize various activities in the community by initiating a variety of diversion programs for materials including household hazardous waste, beverage containers, paper products, and bulk wastes (tire, metal waste and e-waste, etc.).

In April 2007, Earth Tech (Canada) Inc. prepared a preliminary engineering draft report on existing Sewage Lagoon Redevelopment in the Hamlet. The report concluded that the existing lagoon system appears to be functioning to reduce sewage contaminants to an acceptable level prior to discharge into the environment. The existing facility may also be redeveloped for a twenty (20) year planning horizon. The report recommended a series of improvements to engineer the lagoon system with the following features: relocation of the outfall; construction of runoff diversion berms; construction of a retention berm; and implementation of a seasonal discharge.

In June 2007, Earth Tech (Canada) Inc. prepared a preliminary engineering draft report on Solid Waste Site Improvement in the Hamlet. The report concluded that the site may be redeveloped for a ten (10) year horizon. The report recommended a series of improvements to engineer the site with the following features: cells for municipal solid waste; a cell for controlled burning of selected waste; specific areas for honey bags, hazardous waste and tires; runoff control features; perimeter fencing; and implementation of an operation and maintenance plan.

Additionally, Earth Tech prepared a report entitled, "Hamlet of Cambridge Bay Background Report For Water Licence Renewal" in August, 2007. This was a background report to provide an overview of the community water and waste infrastructure system to accompany the Hamlet of Cambridge's water licence (NWB3CAM0207) renewal application.

9.0 TRAINING AND COMMUNICATION EXERCISES

There is no record of staff of the Hamlet of Cambridge Bay attending any conferences in 2007.

10.0 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.

11.0 SYSTEM EXCAVATIONS

In 2007, there were no trench or sump excavations associated with the Hamlet's water, sewer and solid waste management systems.

12.0 LAGOON SLUDGE

In 2007, there was no removal of solid waste or sludge from the sewage lagoon.

13.0 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.

Cambridge Bay's solid waste landfill and sewage lagoon will be redeveloped for 2009. These improvements will include changes to site configuration and O&M practices. Details of these redevelopment plans are available in Earth Tech's "Preliminary Engineering Report for Redevelopment of Existing Sewage Lagoon"[4] and "Preliminary Engineering Report for Solid Waste Site Improvements".[5]

References:

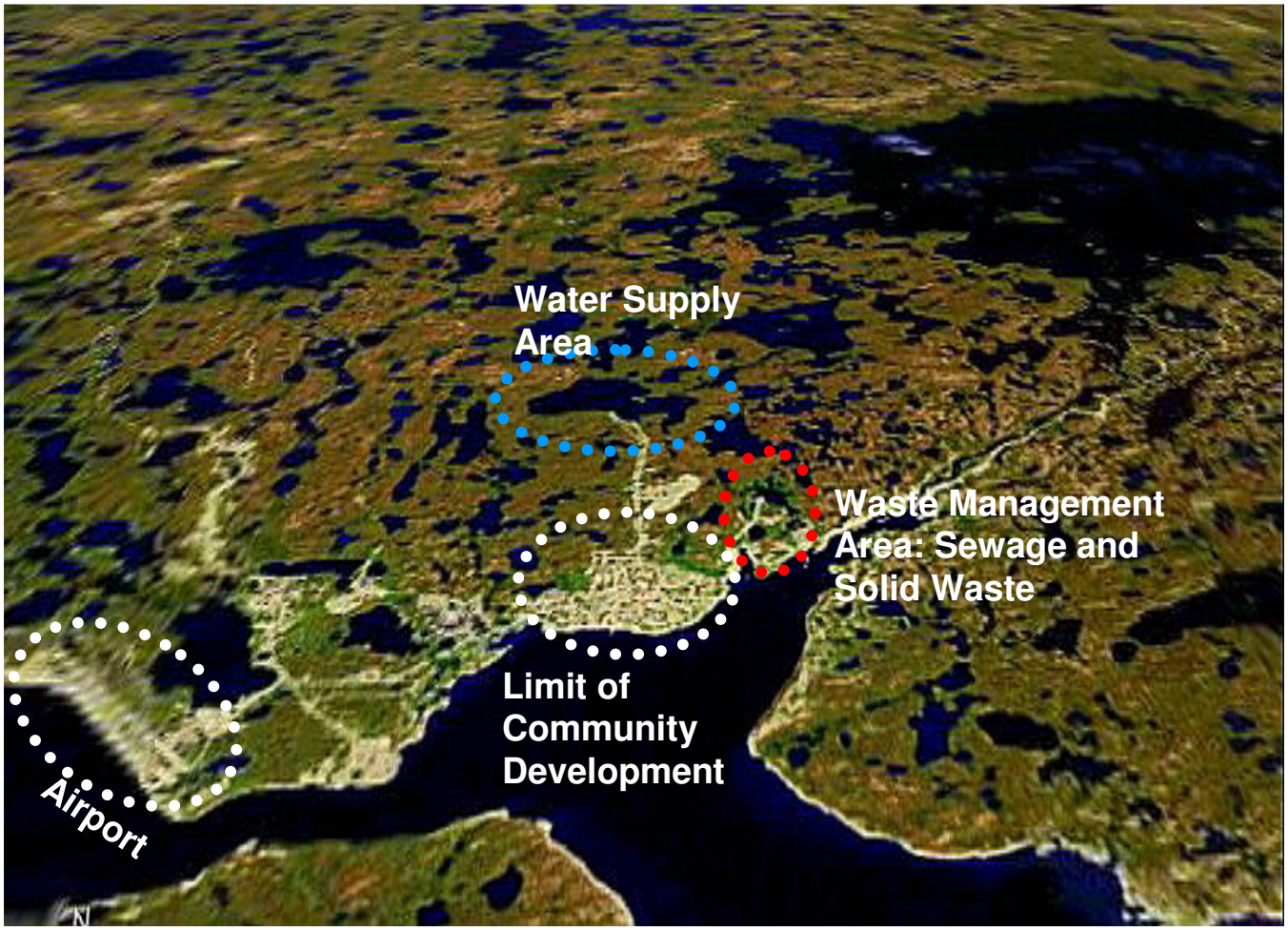
1 "Hamlet of Cambridge Bay, Background Report for Water Licence Renewal", Earth Tech Canada, August 2007.

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

3 "Hamlet of Cambridge Bay, NU, Detailed Design Report for Redevelopment of Existing Waste Facilities". Earth Tech Canada, August 2007.

4 "Preliminary Engineering Report for Redevelopment of Existing Sewage Lagoon", Earth Tech Canada, April 2007.

5 "Preliminary Engineering Report for Solid Waste Site Improvements", Earth Tech Canada, June 2007.



Hamlet of Cambridge Bay
Annual Report
Water Supply and Waste Sites

Figure 1

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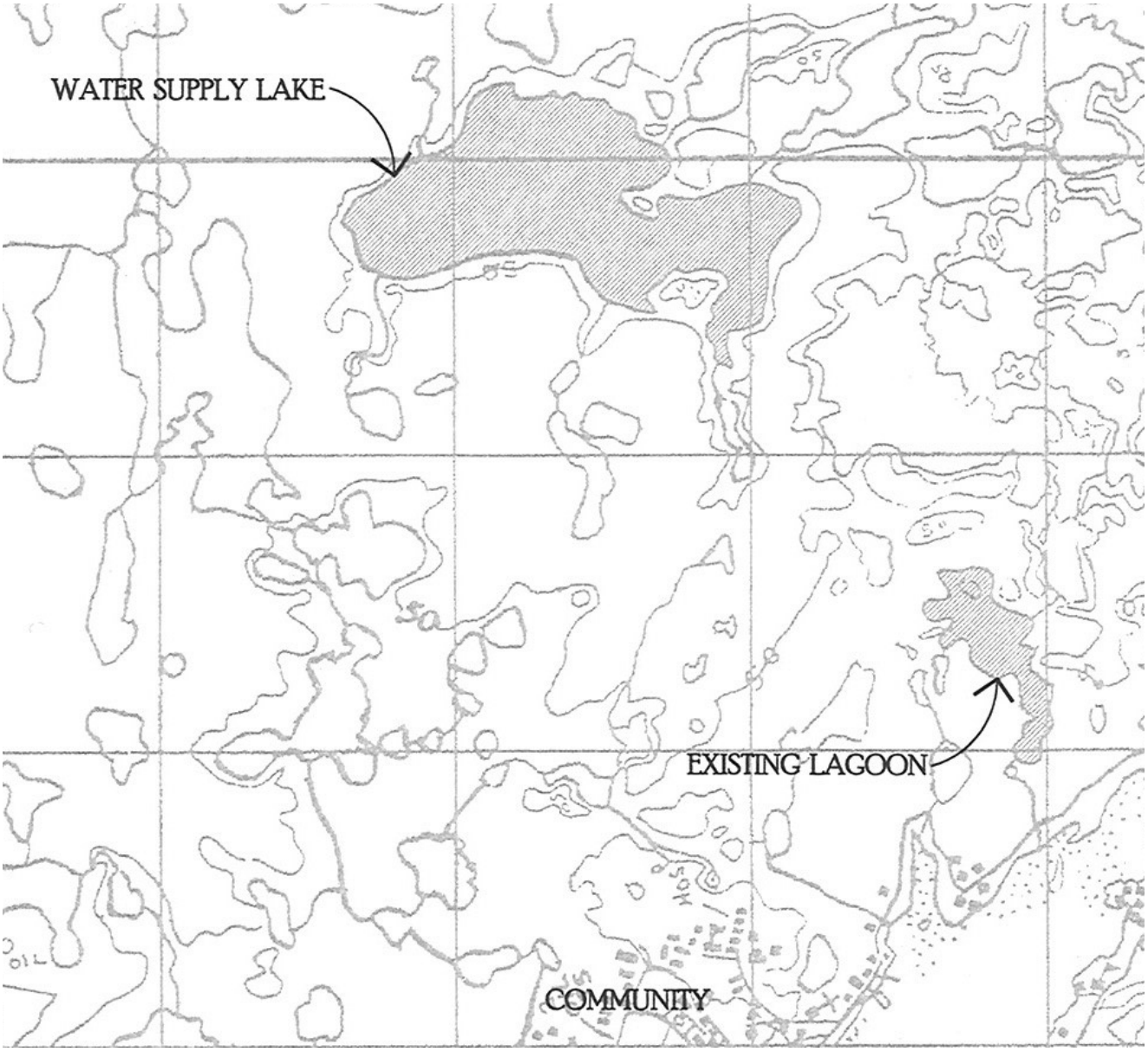

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Lagoon and Water Supply Locations

Figure 2

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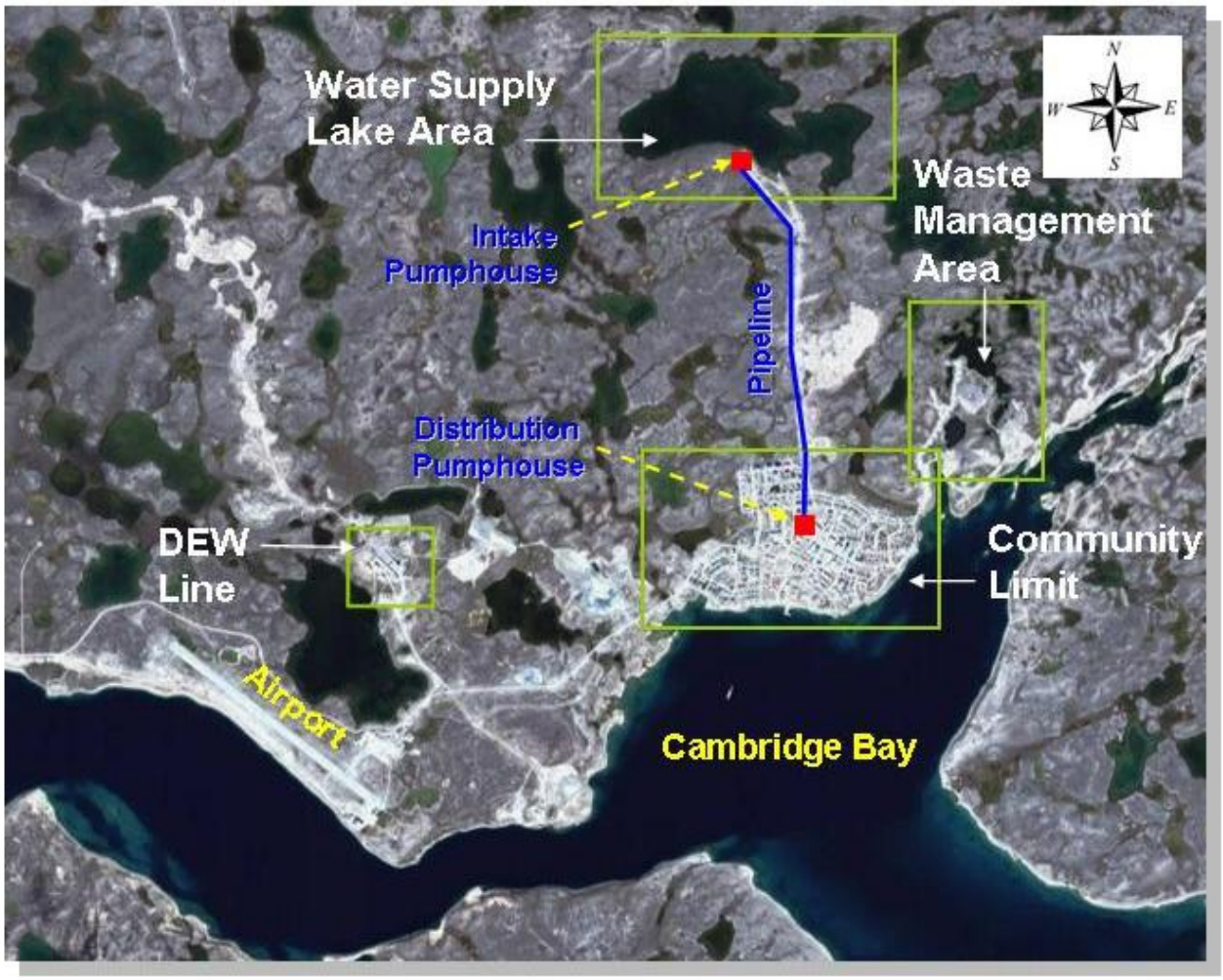

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Water Pumphouse and Pipeline Locations

Figure 3

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Hamlet of Cambridge Bay
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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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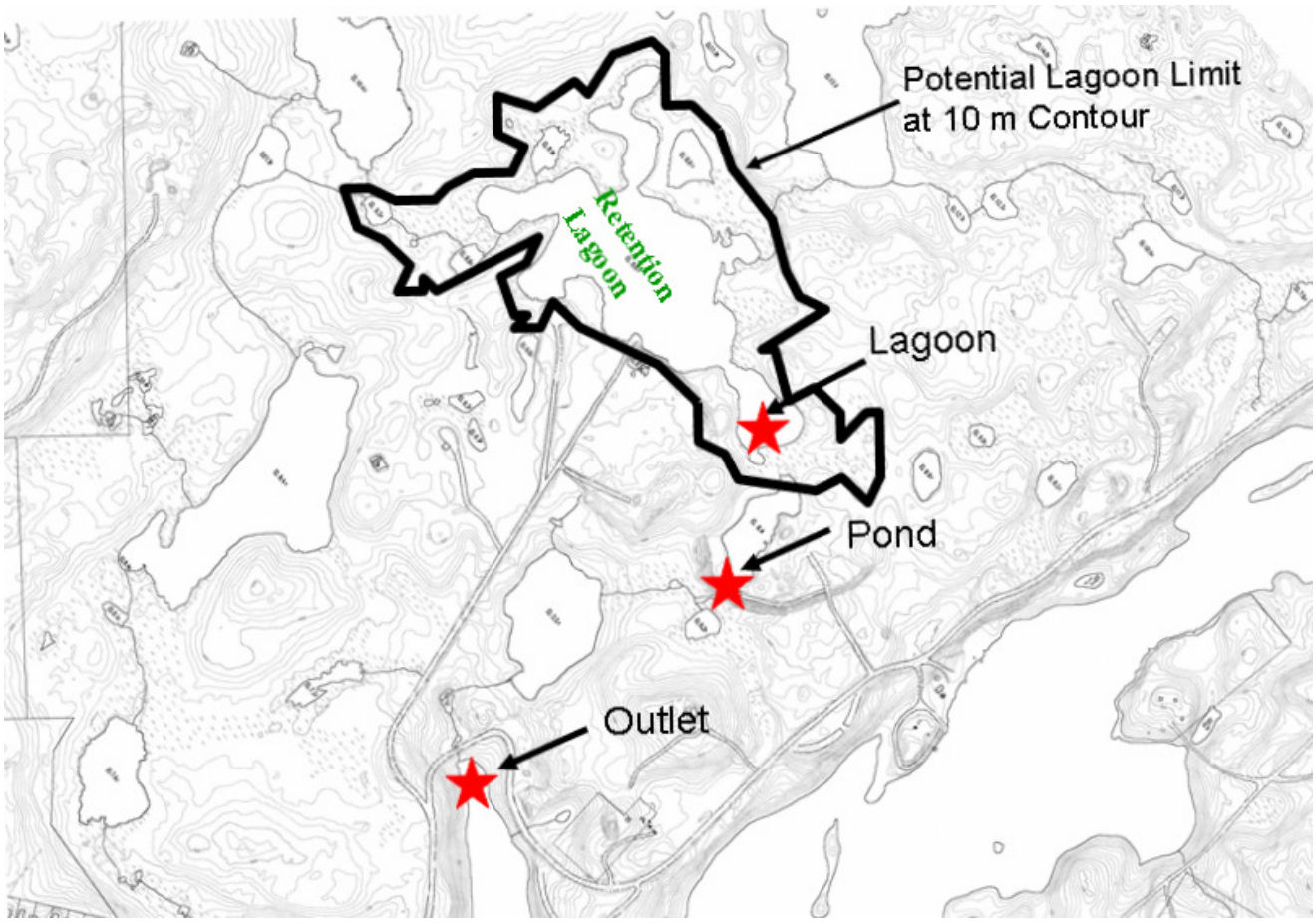

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Sewage Lagoon Sampling Locations

Figure 6

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